From: Mitch Hubert <mitch.hubert@perimeter-solutions.com>
Sent: Thursday, August 27, 2020 2:08 PM
To: Schultz, Josie M - DNR
Cc: Pamela Havelka-Rivard; Beth Erdman
Subject: RE: [External] PFAS/PFOA/PFOS usage - The Solberg Co, BRRTS # 03-05584180
Attachments: DuPont Capstone 1157 D Technical Bulletin.pdf; DuPont Capstone 1157 Technical Bulletin.pdf; DuPont Capstone 1183 Technical Bulletin.pdf; DuPont Capstone 1430 Technical Bulletin.pdf; DuPont Capstone 1440 Technical Bulletin.pdf; DuPont Capstone 1460 Technical Bulletin.pdf; DuPont Fluorotelomer AFFF Update.pdf; DuPont Fluorotelomer Presentation - SK.pdf; DuPont Forafac 1157 N Technical Bulletin.pdf; DuPont_Capstone_Product_Stewardship_Detail_Document_091510_(09nov2010).pdf; SDS Capstone 1157D.pdf; SDS Capstone 1183.pdf; SDS Capstone(tm) 1157 10-10-19.pdf; SDS Chemours Capstone 1157D.pdf; SDS Standard Capstone(tm) 1470 SDS 5-22-19.pdf; DX1025 SDS EU Compliant.pdf; DX1025 SDS GHS-US.pdf; DX1025 Technical Bulletin.pdf; DX1026 SDS EU Compliant.pdf; DX1026 SDS-GHS-US Compliant.pdf; DX1026 Technical Bulletin.pdf; DX1030 SDS EU Compliant.pdf; DX1030 SDS-GHS-US Compliant.pdf; DX1030 Technical Bulletin.pdf; DX1080 SDS EU Compliant.pdf; DX1080 SDS-GHS-US Compliant.pdf; DX1080 Technical Bulletin.pdf; DX1090 SDS EU Compliant.pdf; DX1090 SDS-GHS-US Compliant.pdf; DX1090 Technical Bulletin.pdf; DX5011 SDS EU Compliant.pdf; DX5011 SDS-GHS-US Compliant.pdf; DX5011 Technical Bulletin.pdf; DX5044 Technical Bulletin.pdf; SDS CHEMGUARD_FP-5100_MTR_AGHS_EN.pdf

Hi Josie,
Thanks for sending that information over to us. It is good to have an idea of what analytes are important to WI DNR. We have been in contact with Pace Analytical here in the Green Bay area and they tell us they are working to get set up and certified to do the testing in their lab here rather than sending it out to their facility in NC.

Anyway, We use fluorochemicals from Dynax Corporation, Chemours (formerly DuPont), and Chemguard (part of Tyco/JCI). I have attached SDS's of the products we use as well as some technical information on the products.

Not all of the products that we produce contain all of the fluorochemicals in the attachments from above. The amount of total fluorine that is in our concentrates varies from about 0.30% to about 1.2% total fluorine depending on the type of foam concentrate and the intended mix ration of that concentrate with water.

I'd be happy to sit down with you and whomever from your office to explain more about how firefighting foams are formulated and produced and how an end user selects one type of foam over another. I'm also happy to explain anything you might like about firefighting foams in general.

All of the fluorinated foam concentrates that we use in our formulations are C6 based chemistry and all of these fluorochemicals are produced using the telomer process in contrast to the Electrofluorination

process that 3M utilized in their Lightwater brand AFFF products. As such, we do not expect any PFOS or other Sulfonic Acids. We would expect to find PFHxA and, perhaps PFOA. PFHxA would be the primary analyte found and PFOA, if found at all, would be in very low levels (PPT).

I hope this helps.

I've included Beth Erdman from General Engineering in this email because, as you are aware, we have contracted with her to handle most of the leg work and report writing for the spill response and remediation.

Thanks and best regards,
Mitch Hubert
Technology Fellow
Perimeter Solutions

From: Schultz, Josie M - DNR <josie.schultz@wisconsin.gov>
Sent: Tuesday, August 25, 2020 1:07 PM
To: Mitch Hubert <mitch.hubert@perimeter-solutions.com>
Subject: [External] PFAS/PFOA/PFOS usage - The Solberg Co, BRRTS # 03-05584180

Hi Mitch,

I'm following up to the phone conversation we had a couple weeks ago regarding the Solberg Co. site located at 1520 Brookfield Ave, Howard, WI, and the chemicals used for fire suppression. As mentioned during our conversation, please forward me the SDSs for any chemicals that may have been contained in the underground storage tank (UST) that overflowed and caused a release of petroleum product.

I also wanted to provide you with the PFAS compound list recommended by Wisconsin DNR, which includes 36 compounds and is included on page 15 and 16 of the document at this link: https://dnr.wi.gov/topic/LabCert/documents/EA-19-0001-C.pdf

Please let me know if you have any questions or concerns moving forward.

Thank you,
Josie

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Josie M. Schultz
Hydrogeologist – Northeast Region Remediation and Redevelopment Team
Wisconsin Department of Natural Resources
2984 Shawano Avenue, Green Bay, WI 54313-6727
~~Phone: 920-662-5424~~ Office phone line will be disconnected in October
Cell: 920-366-5685
Josie.Schultz@Wisconsin.gov


dnr.wi.gov

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DuPont™ Capstone® Fluorinated Surfactant 1157D

TECHNICAL INFORMATION

Description

1157D is an amphoteric partially fluorinated surfactant that significantly reduces the surface tension of aqueous solutions. It is based on six fluorinated carbon molecules that cannot break down to PFOA in the environment. 1157D surfactant was designed to eliminate the requirement to be stored as a flammable substance.

Features

1157D surfactant enables the formation of an aqueous film that is distributed over the entire surface of the hydrocarbon. 1157D surfactant:

- Meets the goals of the U.S. EPA 2010/15 PFOA Stewardship Program
- Is targeted below LOD* for PFOA
- Has the same active ingredient as 1157 surfactant, however, 1157D surfactant has been formulated to significantly reduce the flammability of the concentrated surfactant

Applications

1157D is a film-forming fluorinated surfactant used in aqueous film-forming foam (AFFF), film-forming fluoroprotein foam (FFFP), and alcohol-resistant foams (AFFF-AR/FFFP-AR) against hydrocarbons and polar liquid fires.

*Below the limit of detection (LOD) based on the published analytical method found in *The Journal of Chromatography A*, 1110 (2006) 117–124.

Typical Properties

Please refer to product specifications data sheet for commercial specifications.

Appearance	Clear, amber-colored liquid
Chemical structure	Betaine partially fluorinated surfactant
Active matter, wt%	27
Solvent	Propylene glycol/ethanol/water
Density at 20 °C (68 °F)	1.13
pH	5.5
Flash point (closed cup)	>61 °C/>142 °F

General Properties

Solubility at ambient temperature:

Water	Soluble
Ethanol	Soluble
Ethylene glycol	Soluble
Viscosity at 20 °C (68 °F)	900 cP

Surface Tension at 25 °C (77 °F) in Aqueous Solution (mN/m)

1157D	0.01 wt%	0.05 wt%	0.1 wt%
Surface tension	29.0–34.0	17.0–19.0	15.8–16.8

Interfacial Tension at 25 °C (77 °F) (mN/m)

	Cyclohexane	n-Heptane	n-Hexane
Water	40.5	47.5	48
Water + 1 $g.L^{-1}$ of 1157	5.7	5.0	4.2

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DuPont™ Capstone® Fluorinated Surfactant 1157D

Personal Safety, First Aid, Storage and Handling

See the Safety Data Sheet (SDS) for specific product information. Avoid skin and eye contact. Follow all applicable directions.

Ordering Information

To place an order for 1157D surfactant, for help in selecting or evaluating the product for your application, for additional literature or for a product sample, please contact the local DuPont representative office in your region.

DuPont™ Capstone® Repellents and Surfactants:

- Deliver more sustainable solutions with maximum performance
- Are short-chain molecules that cannot break down to PFOA in the environment
- Are supported by an in-depth foundation of data
- Are in compliance with REACH requirements
- Are listed on TSCA inventory
- Meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program

For questions regarding technical data, commercialization, and sampling:

DuPont Fluoropolymer Solutions

Technical Inquiries

Asia Pacific	+8621.2892.1097
Europe	+33.1.30.92.82.12
Latin America	+52.55.5722.1150
North America	+1.866.828.7009

Regional Technical Centers

Customer Service Center, Americas
DuPont Experimental Station
200 Powder Mill Road
Wilmington, DE 19803
U.S.A.
+1.866.828.7009

Customer Service Center, Europe/Middle East/Africa
Mantes Technical & Expertise Center
DuPont de Nemours (France) SAS
1 Allée de Chantereine
78711 Mantes la Ville — France
+33.1.30.92.82.12

Customer Service Center, Asia Pacific
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DUPONT®
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DuPont™ Capstone® Fluorinated Surfactant 1157

TECHNICAL INFORMATION

Description

1157 is an amphoteric partially fluorinated surfactant that significantly reduces the surface tension of aqueous solutions. It is based on six fluorinated carbon molecules that cannot break down to PFOA in the environment.

Features

1157 enables the formation of an aqueous film that is distributed over the entire surface of the hydrocarbon. It:

- Meets the goals of the U.S. EPA 2010/15 PFOA Stewardship Program
- Is targeted below LOD* for PFOA

Applications

1157 is a film-forming fluorinated surfactant used in aqueous film-forming foam (AFFF), film-forming fluoroprotein foam (FFFP), and alcohol-resistant foams (AFFF-AR/FFFP-AR) against hydrocarbons and polar liquid fires.

Typical Properties

Please refer to product specifications data sheet for commercial specifications.

Appearance	Clear amber-colored liquid
Chemical structure	Betaine partially fluorinated surfactant
Active matter, wt%	27
Solvent	Ethanol/water
Density at 20 °C (68 °F)	1.03
pH	5.5
Flash point (closed cup)	25 °C (77 °F)

*Below the limit of detection (LOD) based on the published analytical method found in *The Journal of Chromatography A*, 1110 (2006) 117–124.

General Properties

Solubility at ambient temperature:

Water	Soluble
Ethanol	Soluble
Ethylene glycol	Soluble
Viscosity at 20 °C (68 °F)	6 cP

Surface Tension at 25 °C (77 °F) in Aqueous Solution (mN/m)

1157	0.01%	0.05%	0.1%
Surface tension	20.5	16.0	15.5

Ross-Miles Foaming Data

Concentration of 1157 at 0.5 g/L	mL of Foam After		
	30 sec	3 min	5 min
Deionized water	540	510	485
Tap water	330	310	310
Artificial sea water	185	180	180

Interfacial Tension at 25 °C (77 °F) (mN/m)

	Cyclohexane	Essence F-5	n-Heptane	n-Hexane
Water	40.5	44.5	47.5	48
Water + 1 g/L of 1157	4.2	4.1	3.7	3.3

Precautions — Toxicity

Like any other chemical product, fluorinated surfactants must be handled and used with care (any contact with the skin and eyes is to be avoided).

A material Safety Data Sheet (SDS) is available on request.

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DuPont™ Capstone® Fluorinated Surfactant 1157

Personal Safety, First Aid, Storage and Handling

See the Safety Data Sheet for specific product information. Avoid skin and eye contact. Follow all applicable directions.

Ordering Information

To place an order for 1157, for help in selecting or evaluating the product for your application, for additional literature or for a product sample, please contact the local DuPont representative office in your region.

DuPont™ Capstone® Repellents and Surfactants:

- Deliver more sustainable solutions with maximum performance
- Are short-chain molecules that cannot break down to PFOA in the environment
- Are supported by an in-depth foundation of data
- Are in compliance with REACH requirements
- Are listed on TSCA inventory
- Meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program

For questions regarding technical data, commercialization, and sampling:

DuPont Fluoropolymer Solutions

Technical Inquiries

Asia Pacific	+8621.2892.1097
Europe	+33.1.30.92.82.12
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North America	+1.866.828.7009

Regional Technical Centers

Customer Service Center, Americas
DuPont Experimental Station
200 Powder Mill Road
Wilmington, DE 19803
U.S.A.
+1.866.828.7009

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DuPont de Nemours (France) SAS
1 Allée de Chantereine
78711 Mantes la Ville — France
+33.1.30.92.82.12

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DuPont™ Capstone® Fluorinated Surfactant 1183

TECHNICAL INFORMATION

Description

1183 is an amphoteric partially fluorinated surfactant that significantly reduces the surface tension of aqueous solutions. It is based on six fluorinated carbon molecules that cannot break down to PFOA in the environment.

Features

1183 enables the formation of an aqueous film that is distributed over the entire surface of the hydrocarbon. It:

- Meets the goals of the U.S. EPA 2010/15 PFOA Stewardship Program
- Is targeted below LOD* for PFOA

Applications

1183 is a film-forming fluorinated surfactant used in aqueous film-forming foam (AFFF) and alcohol-resistant formulations (AFFF-AR) against hydrocarbons and polar liquid fires. 1183 can be blended with 1157.

Typical Properties

Please refer to product specifications data sheet for commercial specifications.

Appearance	Clear amber-colored liquid
Chemical structure	Amine oxide partially fluorinated surfactant
Active matter, wt%	40
Solvent	Ethanol/water
Density at 20 °C (68 °F)	1.07
pH	7
Flash point (closed cup)	25 °C (77 °F)

*Below the limit of detection (LOD) based on the published analytical method found in *The Journal of Chromatography A*, 1110 (2006) 117–124.

General Properties

Solubility at ambient temperature:

Water	Soluble
Ethanol	Soluble

Surface Tension at 25 °C (77 °F) in Aqueous Solution (mN/m)

1183	0.01%	0.05%	0.1%
Surface tension	19	15.5	15.4

Ross-Miles Foaming Data

Concentration of 1183 at 0.5 g/L	mL of Foam After		
	30 sec	3 min	5 min
Deionized water	350	340	340
Artificial sea water	120	120	120

Precautions — Toxicity

Like any other chemical product, fluorinated surfactants must be handled and used with care (any contact with the skin and eyes is to be avoided).

A material Safety Data Sheet (SDS) is available on request.

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DuPont™ Capstone® Fluorinated Surfactant 1183

Personal Safety, First Aid, Storage, and Handling

See the Safety Data Sheet (SDS) for specific product information. Avoid skin and eye contact. Follow all applicable directions.

Ordering Information

To place an order for 1183, for help in selecting or evaluating the product for your application, for additional literature or for a product sample, please contact the local DuPont representative office in your region.

DuPont™ Capstone® Repellents and Surfactants:

- Deliver more sustainable solutions with maximum performance
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- Are supported by an in-depth foundation of data
- Are in compliance with REACH requirements
- Are listed on TSCA inventory
- Meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program

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DuPont Fluoropolymer Solutions

Technical Inquiries

Asia Pacific	+8621.2892.1097
Europe	+33.1.30.92.82.12
Latin America	+52.55.5722.1150
North America	+1.866.828.7009

Regional Technical Centers

Customer Service Center, Americas
DuPont Experimental Station
200 Powder Mill Road
Wilmington, DE 19803
U.S.A.
+1.866.828.7009

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78711 Mantes la Ville, France
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DuPont™ Capstone® Surfactants 1430

TECHNICAL INFORMATION

Description

1430 is a blend of partially fluorinated and hydrocarbon surfactants designed to be a film-forming and foaming additive used in water-based portable extinguishers and AFFF foam concentrates. 1430 is a specialized foam concentrate that enables the formation of an aqueous film capable of spreading across the surface of burning fuels, which leads to fast extinguishing time by suppressing the flammable vapor emission.

1430 specialized foam concentrate[1] is based on six fluorinated carbon molecules that cannot break down to PFOA[2] in the environment.

Applications

1430 is effective as an additive in water-based portable extinguishers against both Class B and Class F fire types, as well as Class A fire type if combined with the appropriate additives. 1430 may also be used as a main component for aqueous film-forming foam (AFFF) and alcohol-resistant formulations (AFFF-AR) against hydrocarbons and polar liquid fires.

1430 is designed for use in portable or spray can firefighting foam applications.

Features

Fire-fighting foams made with DuPont™ Capstone® fluorinated surfactants help extinguish fires quickly, which helps to protect critical assets and personnel. 1430 is suitable for almost all international standards of portable extinguishers, allowing formulators to engineer products to reach high-ranking certifications for their respective applications. As an example, 1430 has been designed for bringing the required extinguishing time of EN 3-7 233B trial with a 1 to 1.5% dilution factor.

[1] Meets the goals of the U.S. EPA 2010/15 PFOA Stewardship Program.

[2] Below the limit of detection (LOD) for PFOA based on the published analytical method found in the *Journal of Chromatography A*, 1110 (2006) 117–124.

Typical Properties

Please refer to product specifications data sheet for guaranteed commercial specifications.

Appearance	Clear, yellow liquid
Active matter, wt%	24–26
Solvent	Water/butyl diglycol
Density at 20 °C (68 °F)	1.05–1.09
pH	7.0–8.5
Flash point	None
Freezing point, °C	< –18
Refractive index at 20 °C (68 °F)	1.390–1.410
Brookfield viscosity (spindle 61, speed 100), cP	17

General Properties

Solubility at ambient temperature	Soluble in water at any concentration
Surface tension and interfacial tension at 25 °C in aqueous solution at 1% in tap water	Surface tension 15.3 mN/m Interfacial tension, n-heptane 2.7 mN/m
Spreading coefficient SC	SC = 2.2

* SC = ST(H)–(ST(s)+ST(i))

ST(H) = surface tension of the hydrocarbon solvent (n-heptane 20.2 mN/m)

ST(s) = surface tension of aqueous solution

ST(i) = interfacial tension hydrocarbon/solution

The spreading coefficient should be higher than zero. In that case, the aqueous film, which is generated between the foam and the burning liquid, can float and cover the surface of the hydrocarbon, leading to the suppression of flammable vapor emissions.

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DuPont™ Capstone® Surfactants 1430

Foaming Power at 20 °C (68 °F) (Ross-Miles Method)

Concentration of 1430 additive at 0.5 g/L	mL of Foam (after elapsed time)		
	After 30 sec	After 3 min	After 5 min
Tap Water	235	230	230

Personal Safety, First Aid, Storage and Handling

See the Safety Data Sheet (SDS) for specific product information. Avoid skin and eye contact. Follow all applicable directions.

Ordering Information

To place an order for 1430 fluorinated surfactants, for help in selecting or evaluating the product for your application, for additional literature or for a product sample, please contact the DuPont representative office in your region.

DuPont™ Capstone® Repellents and Surfactants:

- Deliver more sustainable solutions with maximum performance
- Are short-chain molecules that cannot break down to PFOA in the environment
- Are supported by an in-depth foundation of data
- Are in compliance with REACH requirements
- Listed on TSCA inventory
- Meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program

For questions regarding technical data, commercialization, and sampling:

DuPont Fluoropolymer Solutions

Technical Inquiries

Europe	+33.1.30.92.82.12
Latin America	+52.55.5722.1150
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Regional Technical Centers

Customer Service Center, Americas
DuPont Experimental Station
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DuPont™ Capstone® Fluorosurfactants 1440

TECHNICAL INFORMATION

Description

Capstone® fluorosurfactant grade 1440 is a blend of fluorinated and hydrocarbon surfactants consisting of film-forming and foaming additives used in water-based portable extinguishers and/or in aqueous film-forming foam (AFFF) concentrates. The fluorosurfactants enable the formation of an aqueous film capable of spreading on the surface of burning fuels. It is made through a telomerization process versus an electrochemical fluorination process.

Applications

Capstone® fluorosurfactant grade 1440 is particularly effective as an additive in water-based portable extinguishers against fires of class A, class B and class F/K. These fluorosurfactants can also be used as a main component for AFFF and alcohol-resistant formulations (AR-AFFF) for hydrocarbons and polar liquid fires.

Benefits

Fire fighting foams made with DuPont™ Capstone® fluorinated surfactants extinguish fires quickly, protecting assets and personnel. They effectively extinguish fires with only a small quantity of foam, which results in less wastewater. Capstone® fluorosurfactant grade 1440 is suitable for almost all international standards of portable extinguishers, potentially reaching the highest ranking.

Typical Properties

Please refer to product specifications data sheet for guaranteed commercial specifications.

Appearance	Clear, yellow liquid
Active matter, wt%	24–26
Solvent	Water/butyl diglycol
Density at 20 °C (68 °F)	1.05–1.09
pH	7.0–8.5
Flash point	None
Freezing point, °C	< –18
Refractive index at 20 °C (68 °F)	1.390–1.410
Brookfield viscosity (spindle 61, speed 100), cP	10–30

General Properties

Solubility at ambient temperature	Soluble in water at any concentration
Surface tension and interfacial tension at 25 °C in aqueous solution at 1% in tap water	Surface tension 15.0–16.0 mN/m Interfacial tension, n-heptane 2.5–3.0 mN/m
Spreading coefficient SC:	SC = ST(H)-(ST(s) + ST(i)) SC = 1.2–2.7

ST(H) = surface tension of hydrocarbon solvent (n-heptane 20.2 mN/m)
ST(s) = surface tension of aqueous solution
ST(i) = interfacial tension hydrocarbon/solution

The spreading coefficient should be >0 in order to have the formation of a film at the surface of the hydrocarbon that stops the emission of hydrocarbon vapor.

Fire Testing, Laboratory Scale, n-heptane, Tap Water

	Extinguishing Time	Burn Back Time
AFFF 6% containing: Forafac® surfactant, grade 1203G (4.8% wt)	69s	12 min 40s
AFFF 6% containing: Capstone® fluorosurfactant, grade 1440 (4.8% wt)	66s	14 min 10s

AFFF formulation used (in %wt active ingredient)	
1203G	1.34%
1440	1.19%
Hydrocarbon co-surfactants:	
Anionic surfactant	4.1%
Amphoteric surfactant	1.1%
Butyl diglycol	8.5%
Diethanol Amine until pH 7.5 (water balance to 100%)	

Available in Asia Pacific Region only

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DuPont™ Capstone® Fluorosurfactants 1440

Precautions

Like any other chemical product, fluorinated surfactants must be handled and used with care. A safety data sheet (SDS) is available on request.

First Aid, Storage and Handling

See the material Safety Data Sheet (SDS) for specific product information. Normal care should be taken to avoid skin and eye contact. Before using this product, please read the current SDS and the precautionary statement on the product package. Follow all applicable directions.

DuPont™ Capstone® Repellents and Surfactants:

- Deliver more sustainable solutions with maximum performance
- Are short-chain molecules that cannot break down to PFOA in the environment
- Are supported by an in-depth foundation of data
- Are in compliance with REACH requirements
- Are listed on TSCA inventory
- Meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program

For questions regarding technical data, commercialization, and sampling:

DuPont Fluoropolymer Solutions

Regional Technical Center

Customer Service Center Asia Pacific

DuPont (China) R&D Center, Shanghai	+86 21.2892.1097
DuPont (Taiwan) Office, Taipei	+886.2.2514.4412

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DUPONT®

The miracles of science™

DuPont™ Capstone® Surfactants

1460

WATER-SOLUBLE ADDITIVE FOR FIRE FIGHTING FOAM

TECHNICAL INFORMATION

Description

1460 is a water-soluble, non-flammable and VOC-free partially fluorinated copolymer with low molecular weight. It is compatible with all types of anionic, cationic, nonionic, and amphoteric surfactants. 1460 is based on six fluorinated carbon molecules that cannot break down to PFOA in the environment. 1460 is a critical ingredient of high-performing aqueous firefighting foams used to extinguish Class B polar-solvent fires.

Features

In combination with fluorinated surfactants (such as 1157, 1157D, and 1183), 1460 enables the formulation of alcohol-resistant foam concentrates. 1460 surfactant:

- Meets the goals of the U.S. EPA 2010/15 PFOA Stewardship Program
- Is targeted below LOD[1] for perfluorooctanoic acid (PFOA)
- Displays good compatibility with anionic, cationic, amphoteric and nonionic materials
- Enhances the alcohol-resistant properties of foam concentrate without leading to a high increase in viscosity

Applications

1460 can be used as an effective alcohol-resistant agent in polyvalent or multi-purpose foams (AFFF-AR/FFFP-AR) for extinguishing hydrocarbon and polar-solvent fires.

[1] Below the limit of detection (LOD) based on the published analytical method found in the Journal of Chromatography A, 1110 (2006) 117–124.

Typical Properties

Appearance	Clear, amber-colored liquid
Chemical Structure	Partially fluorinated acrylic copolymer
Solid Content, wt%	34–36
Solvent	Water
Density at 20 °C (68 °F)	1.1
pH	4–6
Flash point (closed cup)	>93 °C (>199 °F)
Solubility at 20 °C (68 °F)	Soluble in water
Viscosity at 20 °C (68 °F)	80–120 cP
Freeze/thaw stable	Yes

General Properties

Please refer to product specifications data sheet for commercial specifications.

Surface Tension at 25 °C (77 °F) in Aqueous Solution, mN/m			
1460	0.1%	0.5%	1.0%
Surface tension	30–32	25–27	23–25

Fire Testing, Laboratory Scale, Average of 6 Trials, Isopropanol, Tap Water		
	Extinguishing Time	**Burn Back Time**
AR-AFFF 3% containing: 1157N 1268	70s	460s
AR-AFFF 3% containing: 1157 1460	72s	466s

Personal Safety, First Aid, Storage and Handling

See the Safety Data Sheet (SDS) for specific product information. Avoid skin and eye contact. Follow all applicable directions.

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DuPont™ Capstone® Surfactants 1460

Example of an AFFF-AR Formulation For Use at 3%

Capstone® fluorosurfactants, %	2–6
Hydrocarbon cosurfactants (30% ingredient), %	8–15
Butyl diglycol (or any other glycol ether, foam stabilizer), %	10–20
Polysaccharide, %	0.5–1.5
1460, %	2.5–5
Water balance to 100%	—

Ordering Information

To place an order for 1460, for help in selecting or evaluating the product for your application, for additional literature or for a product sample, please contact the local DuPont representative office in your region.

Solvent Contaminant Test at Room Temperature, Average of 3 Trials

AR-AFFF 3% Foam Concentrate in tap water containing: 1157 1460 Foam of 3% AR-AFFF in 3% tap water	Solvent	Destruction of the Foam		
		50% of the surface	75% of the surface	100% of the surface
	Acetone	50 minutes	52 minutes	55 minutes
	2-Propanol	53 minutes	56 minutes	62 minutes
	n-heptane	More than 300 minutes		

DuPont™ Capstone® Repellents and Surfactants:

- Deliver more sustainable solutions with maximum performance
- Are short-chain molecules that cannot break down to PFOA in the environment
- Are supported by an in-depth foundation of data
- Are in compliance with REACH requirements
- Meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program

For questions regarding technical data, commercialization, and sampling:

DuPont Fluoropolymer Solutions

Technical Inquiries

Europe	+33.1.30.92.82.12
Latin America	+52.55.5722.1150
North America	+1.866.828.7009

Regional Technical Centers

Customer Service Center, Americas
DuPont Experimental Station
200 Powder Mill Road
Wilmington, DE 19803
U.S.A.
+1.866.828.7009

Customer Service Center, Europe/Middle East/Africa
DuPont de Nemours (France) SAS
1 Allée de Chantereine
78711 Mantes la Ville — France
+33.1.30.92.82.12

Customer Service Center, Asia Pacific
DuPont (China) R&D Center, Shanghai
+8621.2892.1097

www.capstone.dupont.com

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DuPont Fluorotelomer AFFF Update

Presented at

IFE Foam Conference:

Foam Under Fire!

20 December 2004

Manchester, UK

Dr. Stephen Korzeniowski

Presentation Agenda

- Function of Fluorosurfactants in AFFF
- Telomer Chemistry
- AFFF Beliefs - Fact or Fiction
- AFFF Surfactant Toxicology
- Degradation Studies
- Discussion

Why are we using Fluorotelomer Surfactants *in FFF ?*

- Fluorotelomer Surfactants (FT) in AFFF have a proven track-record of superior performance on Class B fires
  - Lower Critical Application Rate
  - Faster Knockdown
  - Superior Burnback Resistance

- Provide significantly higher level of fire suppression capability than any other foam agent currently available

- Responsible for saving numerous lives and billions of dollars worth of plant and equipment over the past 35 years

Why are we using Fluorotelomer Surfactants *in FFF ?*

- FT enable water to float onto the hydrocarbon's surface
  - Vapors emission is stopped
- FT help make the foam oil (hydrocarbon) repellent
  - Foam can be used on direct application and remain efficient
  - FT limits the foam contamination
- The foam blanket gives the best resistance to burn back and re-ignition
- Technologies other than FT have important limitations:
  - Lower efficiency on direct application
  - Lower burn back resistance
  - Require a higher application rate

Different Process and Chemistry

Telomerization vs. ECF Products

Telomerization (Fluorotelomers)

$CF_2=CF_2$ **(TFE)**

↓

$F(CF_2CF_2)_nI$ **(Telomer A)**

n = 2-8

n = 4

[O]

$C_7F_{15}CO_2H$ **(PFOA)**

$F(CF_2CF_2)_n\mathbf{CH_2CH_2}I$ **(Telomer B)**

↓

$F(CF_2CF_2)_n\mathbf{CH_2CH_2}OH$ **(Telomer BA)**

Straight Chain Alkyl

↓

Sales Products

Linear

ECF (ElectroChemical Fluorination, **3M**)

$C_8H_{17}SH$

↓

$C_8H_{17}SO_2Cl$

↓↓

$C_8F_{17}\mathbf{SO_2}F$ **(POSF)**

↓

$C_8F_{17}\mathbf{SO_2}N(C_2H_5)CH_2CH_2OH$

30% Branched Alkyl **(N-EtFOSE)**

↓

Sales Products

(proposed degradation path)

$C_7H_{15}CO_2H$

↓

$C_7F_{15}COF$

↓ [HF, e^-]

$C_7F_{15}CO_2H$ **(PFOA*)**

$C_8F_{17}\mathbf{SO_3}X$ **(PFOS*)**

Branched

"PFBS-Based

$\mathbf{C_4F_9SO_2}N(C_2H_5)CH_2CH_2OH$

Fingerprint: Linear vs. Branched

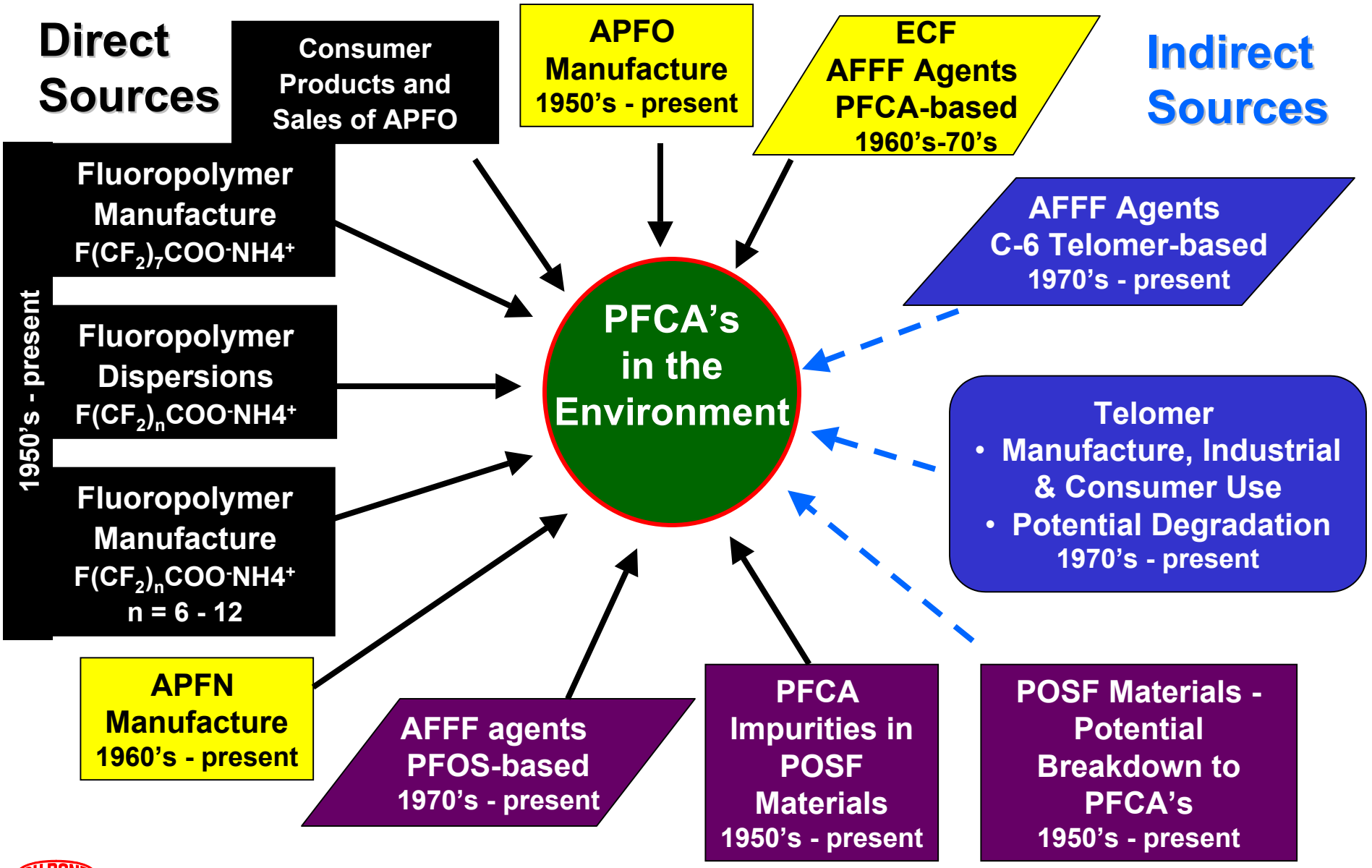
***Note** : ECF produced materials are approximately 30% branched at the fluorinated chain end and contain, 5,6,7,8 and 9 carbon chain length material

AFFF Beliefs: Sources

Belief: Fluototelomer-based AFFF fluorosurfactants are a primary source of PFCAs, perfluorocarboxylic acids, in the environment

- True or False
  - False
- *There are many potential major and direct sources of PFCAs in the environment. In any discussion the larger picture needs to be considered*

Potential PFCA Sources : $F(CF_2)_n COO^-$



AFFF Beliefs: Manufacture

Belief: AFFF fluorosurfactants are primarily made from the Telomer alcohols such as

$F(CF_2CF_2)_nCH_2CH_2OH$

- True or False
  - False
- *Most AFFF fluorosurfactant agents are actually made from Telomer B Iodide* $F(CF_2CF_2)_nCH_2CH_2I$ *not the alcohols*

AFFF Beliefs: Manufacture

Belief: AFFF fluorosurfactants are made largely from eight (8) fluorinated carbons such as

$F(CF_2)_8CH_2CH_2I$

- True or False
  - False
- *Most AFFF fluorosurfactant agents are actually made mostly from six (6) fluorinated carbons such as* $F(CF_2)_6CH_2CH_2I$
  - This was clearly shown by the work of Dr. Jennifer Field, Oregon State University

Telomer-based AFFF Surfactants

- *Telomer-based AFFF agents contain predominantly C_6 fluorinated surfactants as the key active ingredient that contributes to film formation*
  - *– verified with direct manufacturers*
- *Telomer-based AFFF agents are not made with and do not contain or degrade into PFOS*
- *Telomer-based AFFF agents are not made with PFOA and no PFOA-based products are added*

AFFF Beliefs: Manufacture

Belief: AFFF fluorosurfactant manufacturers changed their manufacturing practices as a result of the EPA ECA actions and changed their products from 8 carbons to six over the past 5 years

$$F(CF_2)_8CH_2CH_2X \longrightarrow F(CF_2)_6CH_2CH_2X$$

- True or False
  - False

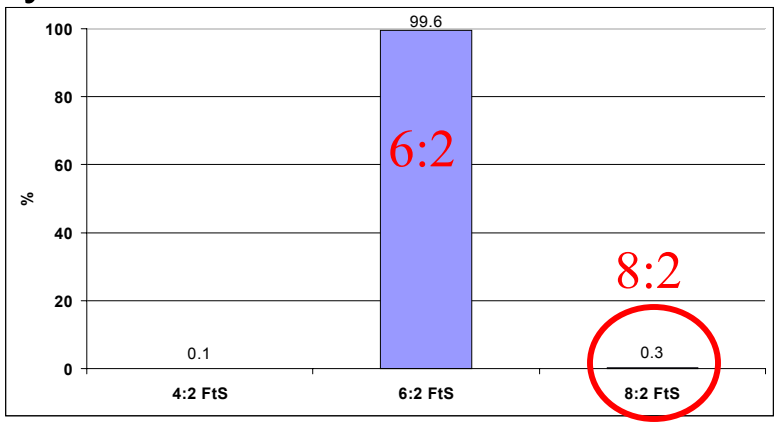
$$F(CF_2)_8CH_2CH_2X \not\longrightarrow F(CF_2)_6CH_2CH_2X$$

- *Most AFFF fluorosurfactant agents are actually made from largely six (6) fluorinated carbon backbones and have been for decades*

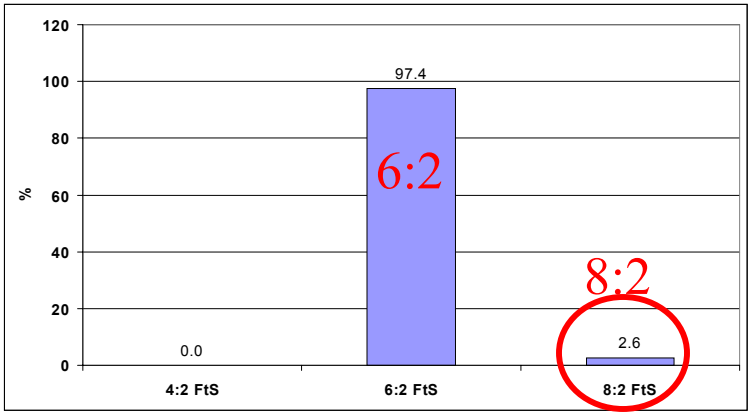
J. Field Report Findings

Composition of Telomer Sulfonates

Tyndall



Wurtsmith (500m)



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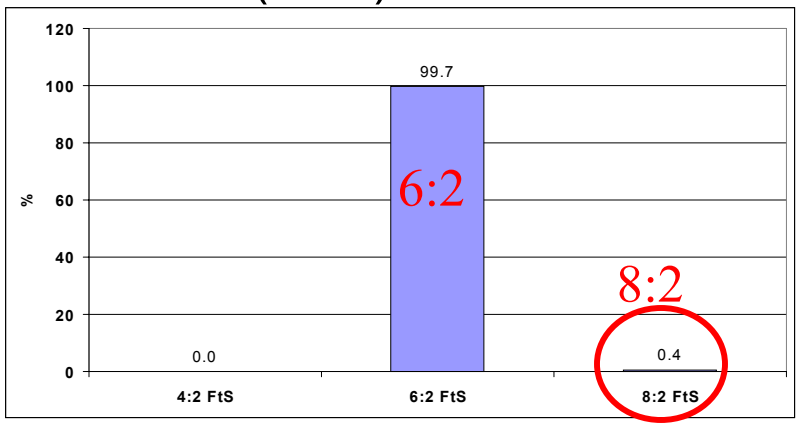


The report confirms that telomer-based AFFF agents are predominantly C_6-based

These sulfonates were not found at Fallon!!

Examples: 6:2 FtS = $C_6F_{13}CH_2CH_2SO_3^-$

AFFF Beliefs: Surfactant Breakdown

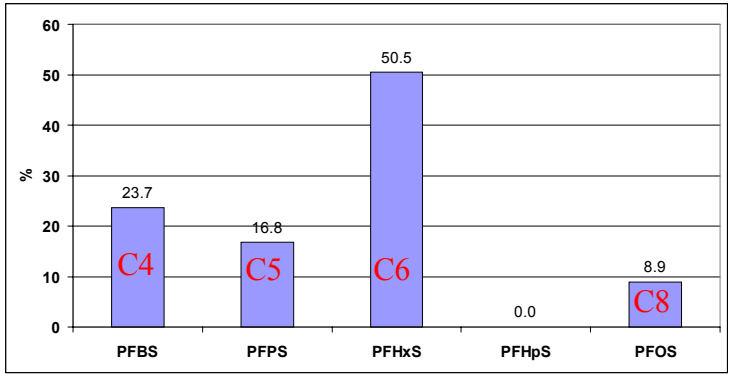
Belief: AFFF fluorosurfactants are known to breakdown into perfluorocarboxylic acids like PFOA since these acids are sometimes found where AFFF agents were previously used

- True or False
  - False
- There is no known evidence that the Fluorotelomer based sulfonate-type surfactants, such as those found by Dr. Field in the Air Force base studies, degrade in the environment to PFOA or related acids
- *No correlation appears to exist between the occurrence and concentration of telomer sulfonates and perfluoroalkyl carboxylates in the groundwater sample set*

J. Field Report Findings

Composition of Perfluoroalkyl Sulfonates

Fallon



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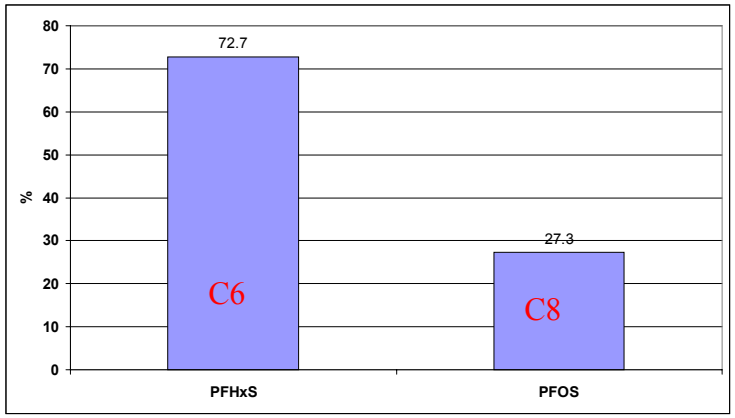
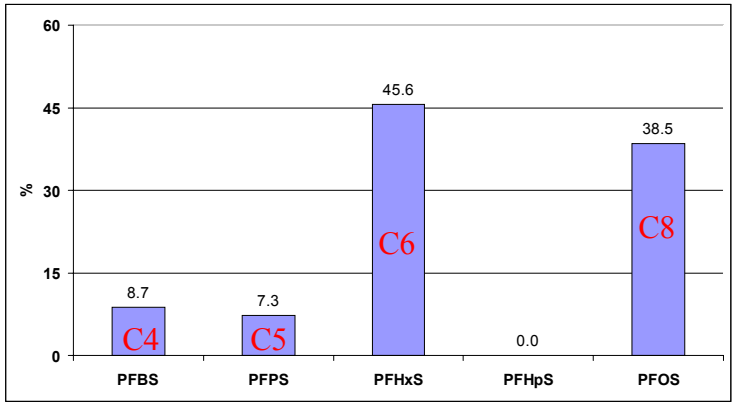


Tyndall



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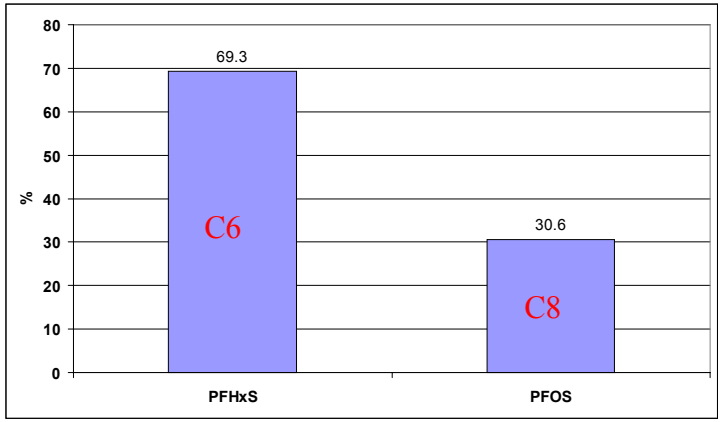


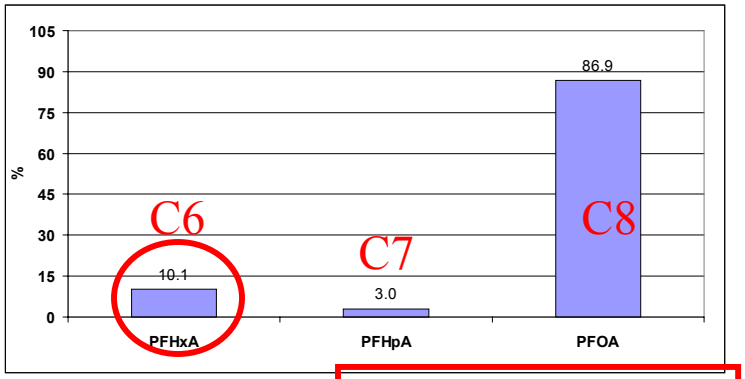
Example: PFOS = $C_8F_{17}SO_3^-$

ECF-based Agents contained a range of chain lengths

J. Field Report Findings

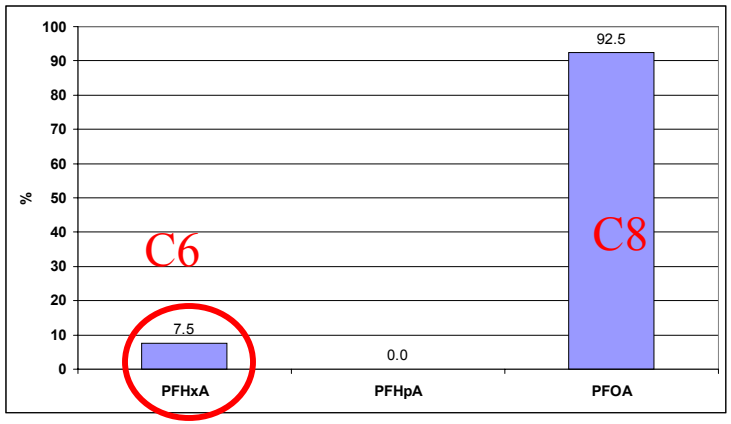
Composition of Perfluoroalkyl Carboxylates (PFCAs)

Fallon

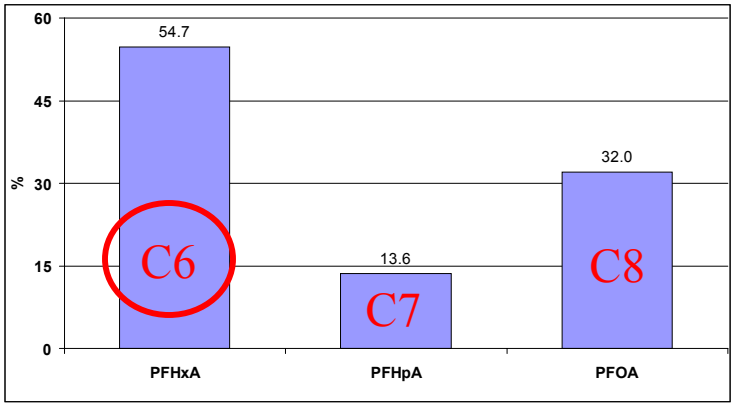


No Telomer sulfonates found here

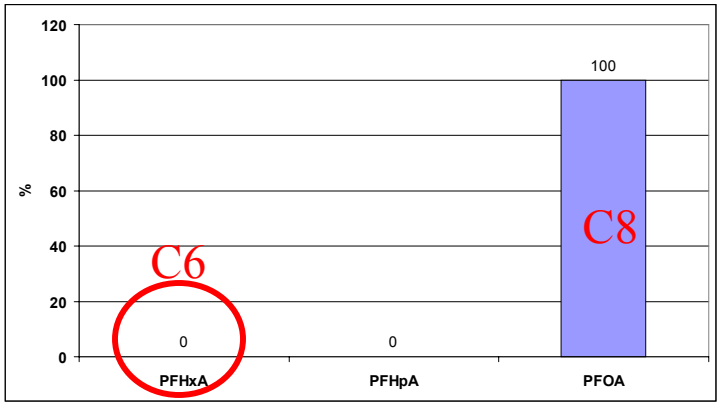
Wurtsmith (20m)



Tyndall



Wurtsmith (500m)



Example: PFOA $= C_7F_{15}COO^-$

Note: likely source of PFCAs - as an additive to or as a contaminant in the POSF-based foam surfactants

General Conclusions

- **Telomer fluorosurfactants in AFFF sold to the military:**
  - Precursor - $C_6F_{13}CH_2CH_2SX$ from $C_6F_{13}CH_2CH_2I$
  - Type of telomer surfactants - contain group $C_6F_{13}CH_2CH_2SCH_2CH\sim$
  - Degradation product found in groundwater - $C_6F_{13}CH_2CH_2SO_3^-$ 6:2 telomer sulfonate

$C_6F_{13}CH_2CH_2SX$ --> $C_6F_{13}CH_2CH_2SCH_2CH\sim$ --> $C_6F_{13}CH_2CH_2SO_3^-$

- ***6:2 Telomer sulfonate is the likely biodegradation product of the C_6 telomer fluorosurfactants contained in milspec AFFF***
  - Additional laboratory studies underway

AFFF Beliefs: Surfactants as Pollutants

Belief: AFFF "fluorosurfactants are an extreme pollutant"; IFJ, Sept 2004

- True or False
  - False
- It is known these surfactants and likely degradation products are persistent in the environment
- *Persistence alone does not make them extreme pollutants; it does make them persistent compounds and reinforces need to use these products judiciously*
- *Hazard or toxicology needs to be considered in any comprehensive risk assessment*

AFFF Beliefs: Surfactants as Hazardous Chemicals

Belief: AFFF and other related fluorotelomers are generally hazardous chemicals and suspect genotoxins

- True or False
  - False
- *In general, AFFF and related fluorotelomer products are <u>not</u> genotoxins i.e. not mutagenetic materials*
- *In general, AFFF and related fluorotelomer products are <u>not</u> viewed as significant environmental toxins*

Fluorotelomer Genotoxicity

Telomer Product Examples	Genetic Test	Result
Acrylic Polymers for textiles – 2 products	***In vitro* mammalian chromosome aberration test** ***Salmonella typhimurium* reverse mutation assay**	Negative
Urethane Polymer for carpets	***In vitro* mammalian chromosome aberration test** ***Salmonella typhimurium* reverse mutation assay**	Negative
Acrylic Polymer for Stone & Tile	**Reverse mutation assay with *S. typhimurium* and *E. coli***	Negative
Forafac® 1157 AFFF Fluorosurfactant	**Reverse mutation assay with *S. typhimurium* and *E. coli* and Chromosomal abberation test with Chinese Hamster cells**	Negative
Ethoxylate Fluorosurfactant	**Reverse mutation assay with *S. typhimurium* and *E. coli***	Negative
Phosphate Fluorosurfactant	***In vitro* mammalian chromosome aberration test** ***Salmonella typhimurium* reverse mutation assay**	Negative

Conclusion: As a class of compounds the fluorotelomers are neither genotoxic nor mutagenetic

Forafac® 1157 Surfactant Toxicity

Test Description	Results	Comment
28-day Subchronic Oral Toxicity in Rats	NOEL for M/F rats is 200 mg/kg/day; NOAEL for F rats was 1000 mg/kg/day	Doses were 0, 10, 40, 200, and 1000 mg/kg/day. No mortality seen; no effects on hematology and in urinary tests
Developmental Toxicity	PILOT: Reduced maternal weight, no fetal effects	Main study in progress: 0, 25, 150, 1000 mg/kg/day
Bioconcentration in Carp, *Cyprinus carpio*, via OECD 305	For main active ingredient >97.5% of substance: At 5 ug/L, BCF = < 5.1 At 50 ug/L, BCF = < 51	Whole fish test

Forafac® 1157 backbone is $F(CF_2CF_2)_nCH_2CH_2SO_2Y$, where n = 3 predominantly , and Y are various organic functional groups or appendages

Forafac® 1157 Surfactant Ecotoxicity

Test Description	Results	Comment
Acute fish toxicity with killifish, *Oryzias latipes*	96-hour LC_{50} > 35mg/L	No greater than low-moderate toxicity
Invertebrates toxicity with *Daphnia magna*	24-hour EC_{50} = 1.5-2 g/L	Low toxicity
Bacterial toxicity with *Pseudomonas putida*	16-hour EC_{50} = 16-41 mg/L	Low-moderate toxicity

Forafac® 1157 backbone is $F(CF_2CF_2)_nCH_2CH_2SO_2Y$, where n = 3 predominantly , and Y are various organic functional groups or appendages

Zonyl® Sulfonates Toxicity Examples

Test Description For Zonyl® FS-62	Results	Comment
Developmental Toxicity in Rats via Inhalation	NOEL for rats is 25 ppm	Inhalation concentrations were 0, 25, 125, and 600 ppm. No fetal resorptions or external malformations at any dose
28-day Subchronic Oral Toxicity in Rats	NOEL for M/F rats is 15 mg/kg/day	Doses up to 150 mg/kg/day. No mortality seen; target: kidney
Acute Toxicity in Rats	ALD = 2300 mg/kg in male rats	Considered slightly toxic; doses up to 3400 mg/kg

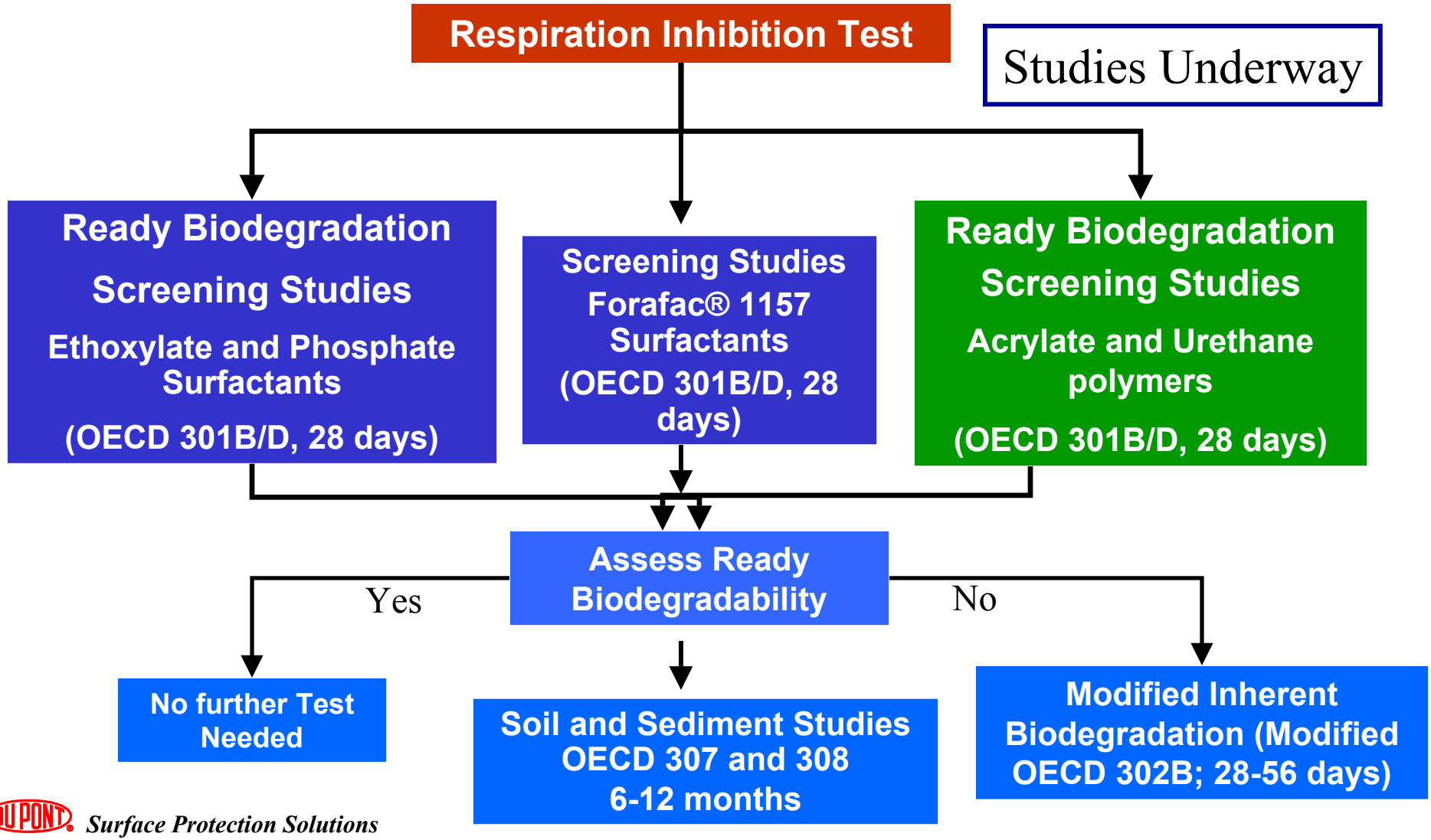
Zonyl® FS-62 is largely $F(CF_2CF_2)_nCH_2CH_2SO_3X$, where n = 3, and X is a counterion

Zonyl® Sulfonates Ecotoxicity Examples

Test Description for Zonyl® FS-62	Results	Comment
Acute fish toxicity with fathead minnow, *Pimephales promelas*	96-hour LC_{50} = 316mg/L	Slight toxicity
Acute fish toxicity with rainbow trout, *Oncorhychus mykiss*	96-hour LC_{50} > 94.1 mg/L	Slight toxicity
Invertebrates toxicity with *Daphnia magna*	48-hour EC_{50} > 85.9 mg/L	Slight toxicity
Green Algae toxicity with *Seleanstrum capricornutum*	72-hour E_bC_{50} and E_rC_{50} > 199 mg/L	Slight toxicity

Zonyl® FS-62 is largely $F(CF_2CF_2)_nCH_2CH_2SO_3X$, where n = 3, and X is a counterion

DuPont Telomer-based Surfactants & Polymers Biodegradation Studies



Presentation Conclusions

- The importance of understanding the facts around Telomer chemistry origins and fate cannot be overemphasized
  - what to believe or not to believe
- The AFFF surfactants as described here are not judged as substantial toxicological hazards, albeit they are persistent
- The J. Field study provides no evidence that telomer sulfonates break down in the environment into PFOA or other perfluoroalkyl carboxylates
  - additional definitive degradation studies are underway
- The report confirms that telomer-based AFFF agents are largely C_6-based
  - predominant manufacture is via the Telomer iodides

Discussion and Questions

Fluorotelomer Products in the Environment – An Update

NFPA WSC&E

2-5 June 2008

Las Vegas, Nevada

Dr. Stephen Korzeniowski
E. I. duPont de Nemours & Co., Inc.

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"Safety & Protection – Be Sure"

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Reference Forums

- Fluorinated surfactants in AFFF products discussed and debated in numerous journal articles and highlighted in each of the three Reebok Meetings:
  - Meeting 1, August 2002
    - Focused on general information about FFFC, TRP, Testing Approaches and Plans in Toxicology and EF&E
    - Presented initial physical property and Environmental Effects data
  - Meeting 2, December 2004, *"Foam Under Fire!"*
    - AFFF Surfactant Beliefs - Fact or Fiction
    - Toxicology and Ecotoxicology Updates and Plans
  - Meeting 3, September 2007
    - Key Questions, Comparative Chemistry, Sources of PFCAs
    - Trends, Toxicology, Biopersistence and Bioaccumulation
    - EF&E and Industry Efforts

"Safety & Protection – Be Sure"

Central Questions

- Where are PFOA and higher homologues (PFCAs) and related polyfluorinated materials found in the environment?
- Where did/do the PFCAs come from?
- Are consumers exposed? Are there any hazards?
- What is being done? Emission Reduction Efforts?
- How will we know exposure is getting lower?
- Are my products safe?

Highlighted Results

- PFHxA, C6 acid, toxicology in rats
  - NOAEL for **subchronic toxicity** is 20 mg/kg/day; No effects on **reproductive** parameters, NOAEL = 500 mg/kg/day; NOAEL in **development toxicity** test is 100 mg/kg/day. **Neither a selective developmental nor reproductive toxicant**
  - **NOAEL for Neurotoxicological behavior was 500 mg/kg/day**
  - **Not Genotoxic**
- Biopersistence screening in rats
  - PFHxA, 6-2 FTS, and Fluorotelomer-based AFFF surfactants showed very low uptake and rapid clearance overall and versus PFOS
- Environmental Fate and Effects Studies on 6-2 FTS
  - Rainbow Trout Early Life Stage (ELS) 90-day Study gave NOEC values of low concern for chronic toxicity
  - Rainbow Trout Bioconcentration and Bioaccumulation Study showed rapid depuration and gave BCF/BAF values of low concern (BCF <50)

6-2 FTS = 6-2 Fluorotelomer sulfonate; PFHxA = Perfluorohexanoic Acid

Fluorotelomer and ECF Products : *Different Chemistry*

Fluorotelomers (Fluorotelomers)

$CF_2=CF_2$ (TFE)

↓

$F(CF_2)_nI$ **Perfluoroalkyl Iodide**

↓ n = 6,8,10,12, even

$F(CF_2)_nCH_2CH_2I$ **Fluorotelomer Iodide**

→ $F(CF_2)_nCH_2CH_2SO_3X$: **FT Sulfonate**

→ **AFFF Surfactants**

↓

$F(CF_2)_nCH_2CH_2OH$

Fluorotelomer Alcohol

↓

Sales Products

Even number, straight chains, No Branching
Polymers n≥ 8 ; Surfactants n=6 primarily

ECF (ElectroChemical Fluorination)

$H(CH_2)_nSH$

↓

$F(CF_2)_nSO_2F$ → $F(CF_2)_nSO_3X$

PFOS n = 8;
PFH_xS n = 6
PFBS n = 4

↓

$F(CF_2)_nSO_2N(R)CH_2CH_2OH$

↓

Perfluoroalkyl sulfonamido ethanol

↓

Sales Products

ECF produced materials have up to 30% branched isomers at the fluorinated chain end and contain odd and even carbon chain lengths

Sources, Fate and Transport of Perfluorocarboxylates (PFCAs)

-Trends in the Environment

PFOA = Perfluorooctanoic Acid = $C_7F_{15}CO_2H$ = $CF_3(CF_2)_nCO_2H$, where n =6

PFCAs = Perfluorocarboxylic Acids, where n = 3-12

Precursors – can transform to PFCAs by abiotic and/or biotic means

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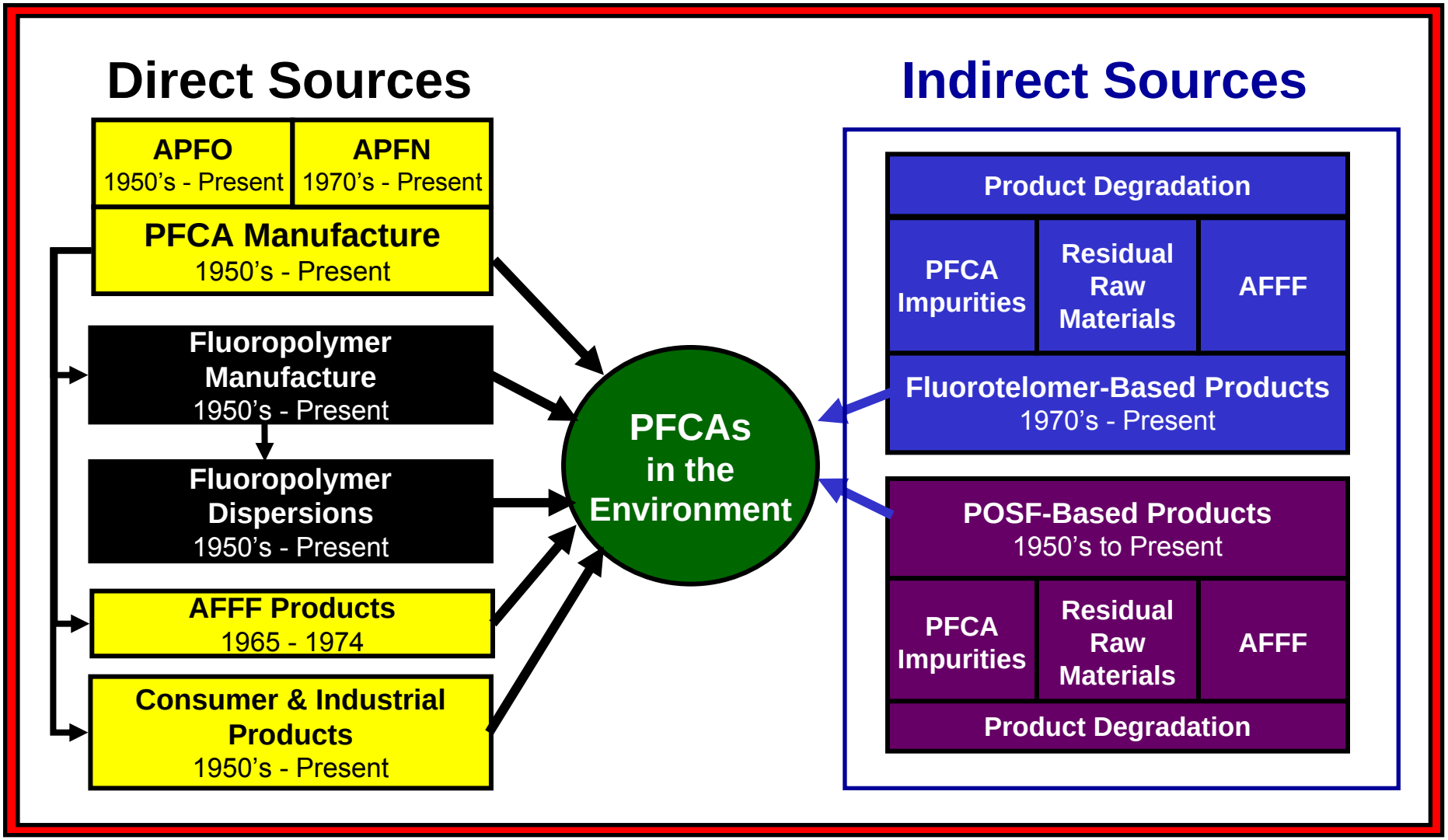
What is Perfluorooctanoic Acid (PFOA)?

- PFOA is a surfactant used as a processing aid to produce fluoropolymer high-performance materials
- PFOA and other PFCAs are unintended byproducts of other fluorochemical manufacturing and the previous manufacture of POSF-based products
- PFOA and other PFCAs are <u>not</u> used to make a different family of compounds, called fluorotelomers.
  - However, they are found at very low trace levels in some fluorotelomer products as a byproduct of their synthesis and as a result of residuals/precursors breaking down to PFCAs
- PFOS and its derivatives are not used to make fluorotelomer-based products and are not formed during manufacture and processing

Other PFCAs = Other Perfluorocarboxylic Acid chain lengths such as $C_8F_{17}CO_2H$, also called C9 and PFNA

Sources of Perfluorocarboxylic Acids (PFCAs) in the Environment : A COMPLETE Picture



Prevedouros, et al. *Environ. Sci. Technol.* **2006** *40(1)*, 32.

Sources, Fate & Transport Summary

- The sources of PFCAs:

  Largest historical sources = **direct emissions**

  Small historical sources = **indirect emissions** (fluorotelomers, fluorotelomer-based AFFF, POSF derivatives, residuals, degradation, etc.)

- How PFCAs move in the environment:

  Multiple mechanisms in air and water result in long-range transport of PFCAs

  Surface waters are the environmental sink compartment for PFCAs

- We believe we understand how to minimize future exposure:

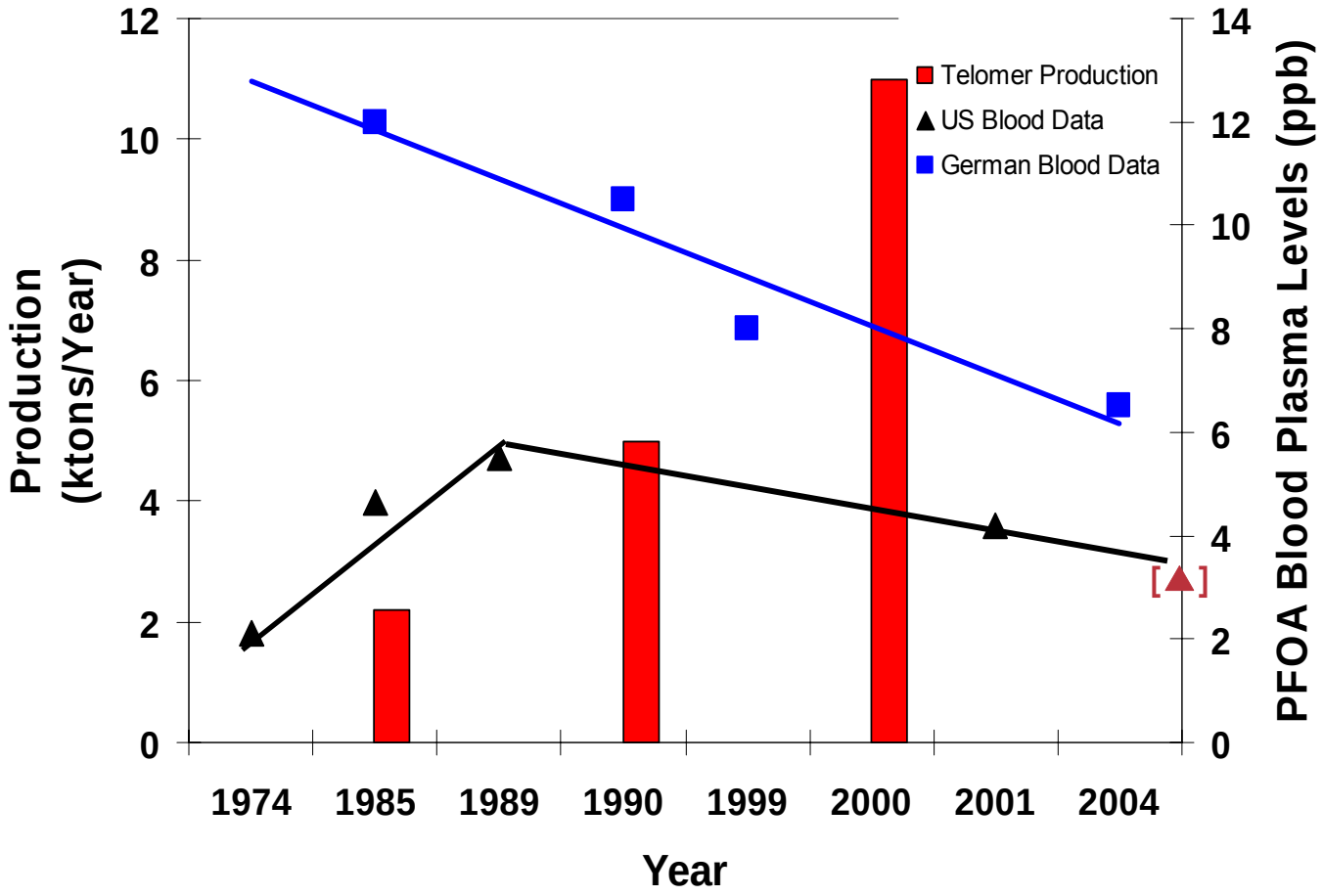
  Global action is needed by all manufacturers and users

  Significant PFCA emission **reductions have already occurred**

  US EPA 2010/15 **Stewardship Program** – commitment to dramatically reduce future manufacturing emissions and product content

Prevedouros, *et al*. *Environ. Sci. Technol.* **2006**, *40*, 32.
Armitage, *et al*. *Environ. Sci. Technol.* **2006**, *40*, 6969
Wania, F., *Environ. Sci. Technol.* **2007**, *41*, 4529

Global Fluorotelomer Industry Manufacturing Volumes and PFOA Blood Levels over Time



CDC Data published in 2007 for NHANES study confirms trend in US

- US data from Olsen et al, Environmental Health Perspectives, Feb 2005; 2005 3M 8(e) filing AR 226-3575/3576 - this mean data point for PFOA is 3.0 ppb for 2004 sampling: ([▲])
- German data from German Federal Environmental Agency UBA report 2004.

Trend Data

- Human Data
  - Statistical correlations observed between PFOA and PFOS in human blood
  - Results do not correlate with fluoropolymer or fluorotelomer historic production and are inconsistent with biodegradation of fluorotelomer products
- Arctic Wildlife
  - Limited data suggest decreasing concentrations in Arctic biota of PFOS and PFCAs over the past few years (Butt et al.; Kannan et al.; Tomy et al.)
  - PFOA and PFCAs < 8 have negligible bioaccumulation potential in wildlife
  - Water is proposed to be an important exposure medium
  - No statistical correlation between PFCAs and any fluorotelomer-based substance
- Research Needs
  - Additional longitudinal studies of human blood
  - More spatially and temporally integrated monitoring data

-Mammalian Toxicology

-Biopersistence: Relevant Comparisons

-Environmental Fate and Effects

- **Fluorotelomers**
- **Perfluorohexanoic Acid, Sodium Salt**
- **AFFF Surfactants**

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Fluorotelomer-based Raw Materials & Products

- **More than 125 DuPont fluorotelomer-based raw materials and products have been studied:**
- Test substances are commercial products as they are made and sold
- Extensive repeated-dose studies have been completed
  - Oral, dermal, inhalation; reproduction, developmental
- Toxicity testing has been conducted over the past 30+ years

- **Fluorotelomer-based products are not generally regarded as hazardous chemicals:**
  - As a class of compounds, Fluorotelomer products are not genotoxins i.e. not mutagenic materials
  - Fluorotelomer products are not viewed as significant environmental toxins
  - Fluorotelomer products that have been tested are neither selective developmental nor selective reproductive toxins
  - Fluorotelomer products must be used as directed on their respective MSDS

NaPFHxA* Toxicity Data

- Subchronic toxicity study in rats
  - Crl:CD(SD) Rats (male and female) dosed with either 0, 20, 100, or 500 mg/kg/day via gavage for 90-days
  - **NOAEL for Subchronic Toxicity was 20 mg/kg/day**
- Reproductive toxicity study in rats
  - No effects observed on reproductive parameters. Not a selective reproductive toxicant
  - **NOAEL for Reproductive Toxicity was 500 mg/kg/day**
- Neurobehavioral toxicity study in rats
  - No effects seen on neurobehavioral parameters
  - **NOAEL for Neurobehavioral Toxicity was 500 mg/kg/day**

*Perfluorohexanoic Acid, C6 acid sodium salt

NaPFHxA Toxicity Data (Cont.)

- Developmental Toxicity Study in Rats
  - Crl:CD(SD) Rats (time-mated female) Dose groups: 0, 20, 100, or 500 mg/kg/day via gavage during pregnancy
  - **NOAEL = 100 mg/kg/day. Not a selective developmental toxicant**
- Genotoxicity Studies (*in vitro*)
  - No evidence of mutations in the Bacterial Reverse Mutation Assay (OECD 471)
  - No evidence of chromosome aberrations in human lymphocytes (OECD 473)

  Conclusion: Not genotoxic

Forafac® 1157 AFFF Surfactant Toxicity

Test Description	Results	Comment
28-day Subchronic Oral Toxicity in Rats	NOEL for M/F rats is 200 mg/kg/day	Doses were 0, 10, 40, 200, and 1000 mg/kg/day. No mortality seen
Developmental Toxicity	NOAEL 1000 mg/kg/day	**Not a selective developmental toxicant**
Bioconcentration in Carp, *Cyprinus carpio*, via OECD 305	5 ug/L, BCF = < 5.1 50 ug/L, BCF = < 51	Whole fish test Very low bioaccumulation potential **By all criteria, not bioaccumulative**

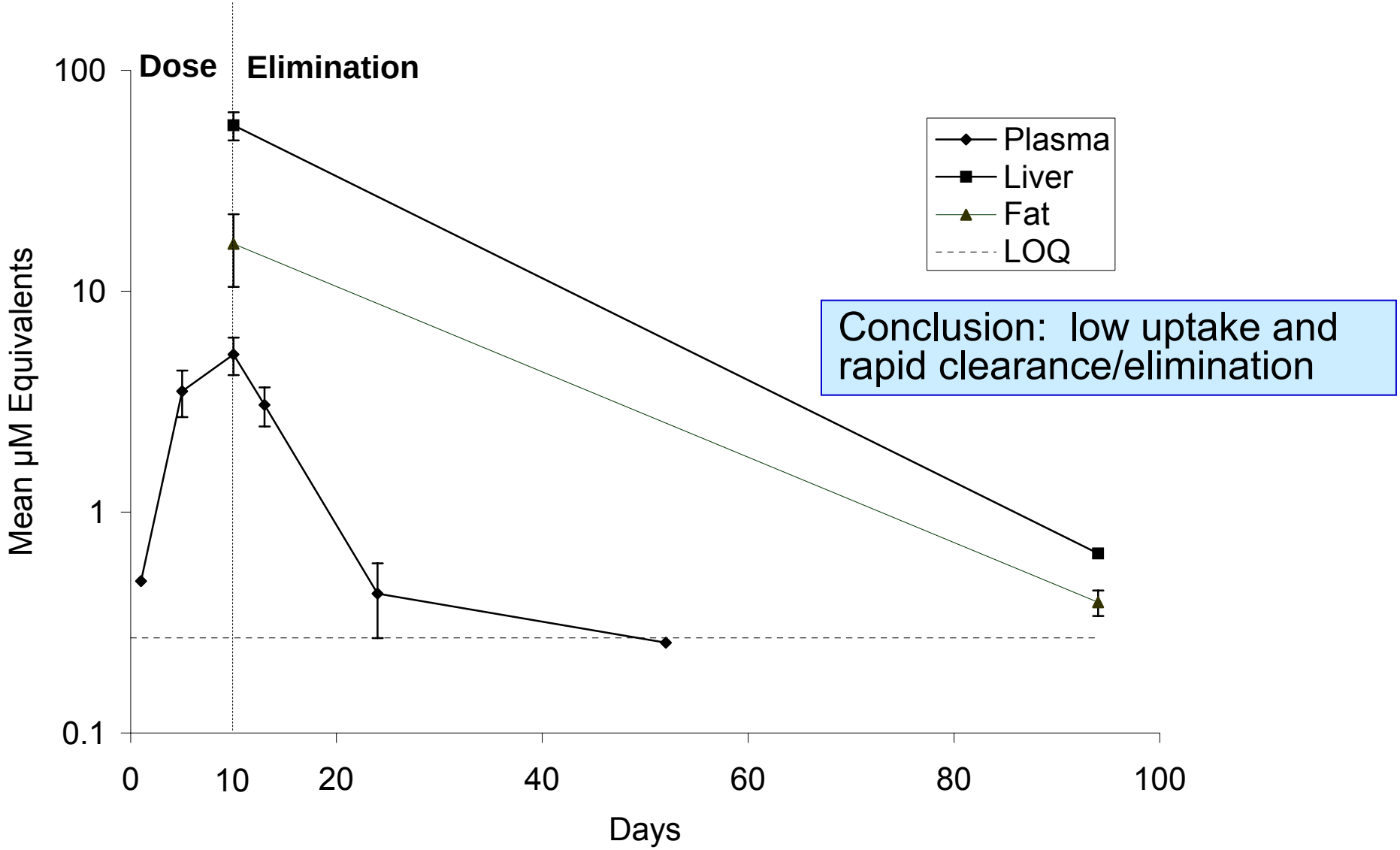
Ecotoxicity: **low-moderate toxicity** in acute fish, invertebrates, and bacterial toxicity tests. Conclusion: of low concern

Forafac® 1157 backbone is $F(CF_2CF_2)_nCH_2CH_2SO_2Y$, where n = 3 predominantly , and Y are various organic functional groups or appendages

Forafac® 1157 Developmental Toxicity Study (in Rats)

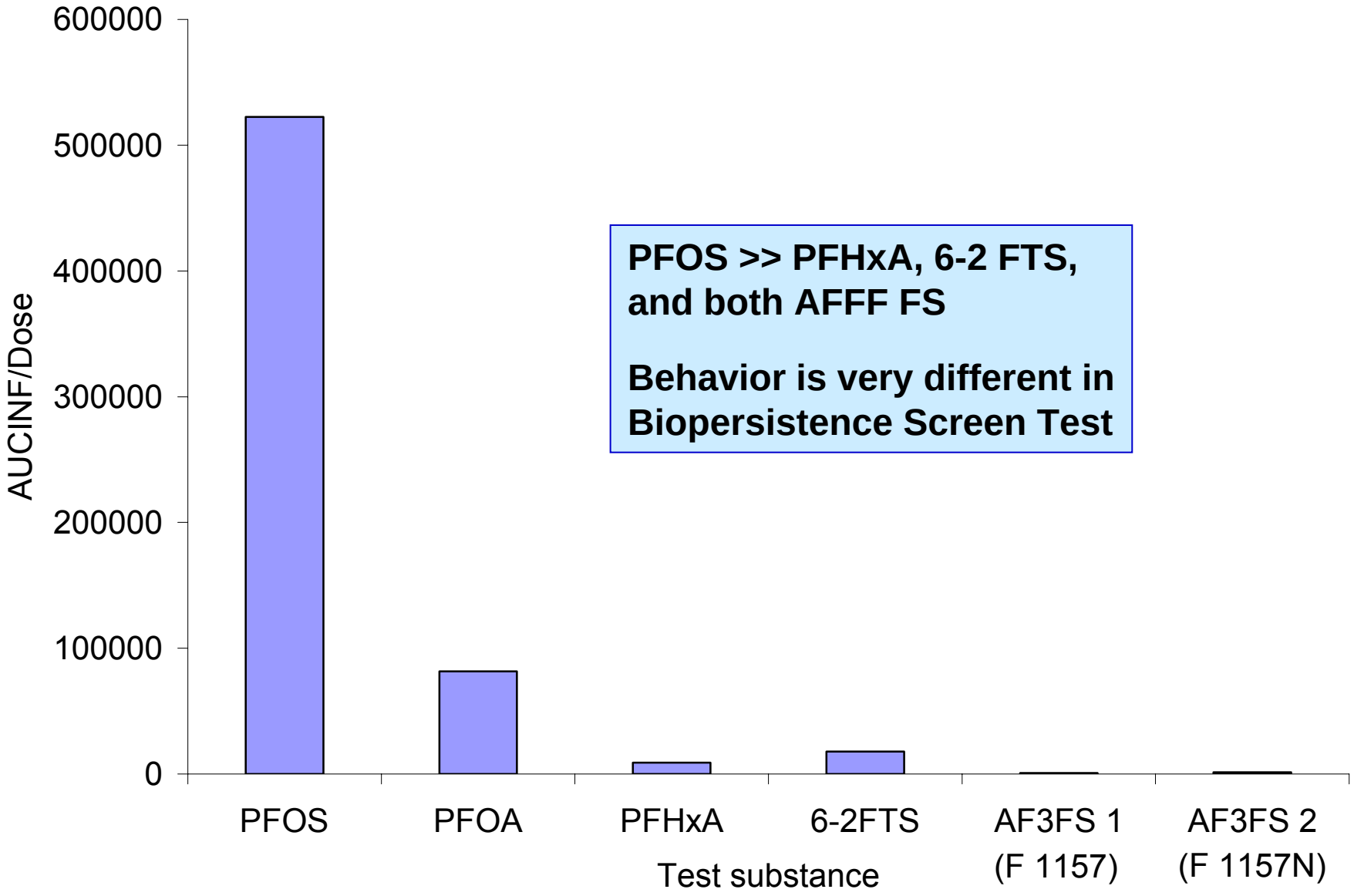
- Results
  - Maternal toxicity No Observed Effect Level (NOEL) is 150 mg/kg/day based on “body weight gain reduction” at 1000 mg/kg/day
  - Fetal developmental toxicity NOEL is 1000 mg/kg/day, the highest dose level tested
- Conclusion
  - Forafac® 1157 is not a developmental toxin

Forafac® 1157 AFFF Surfactant Biouptake and Clearance in Rats: Biopersistence Screen



Conclusion: low uptake and rapid clearance/elimination

Internal Dose Comparison using Blood AUCINF/Dose (normalized)



Biopersistence Screen Summary

- Fluorine residues can be used to screen test substances for differences in bio-uptake and clearance
- Absorption and distribution is evident
  - AUCINF provides relative integrated measure of absorbed dose
- Relative ranking for blood AUCINF/Dose is

  PFOS >> PFOA > 6-2FTS ≈ PFHxA > F 1157N ≈ F 1157
- Elimination is evident based on declining concentrations in blood and tissues

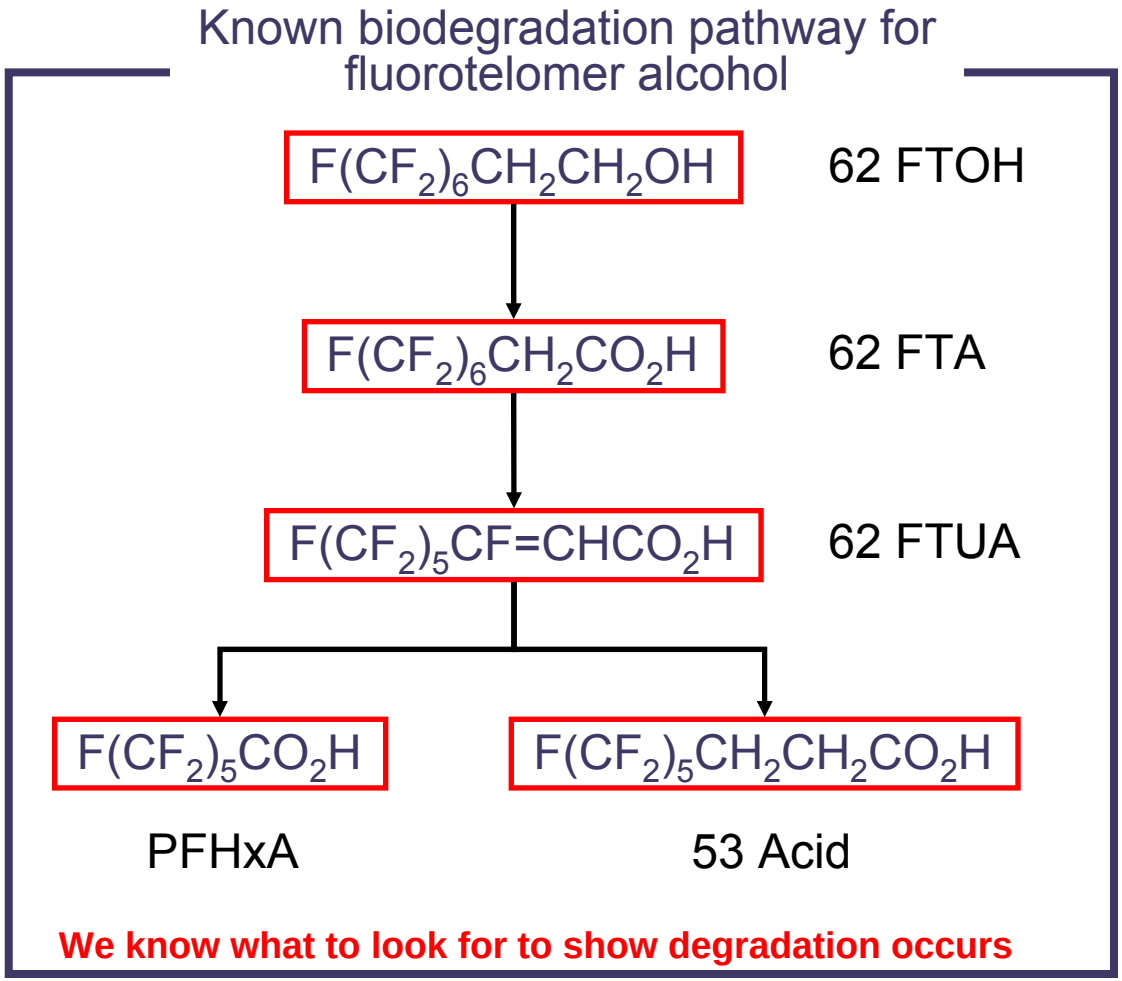
Inherent Biodegradation in Sludge of Forafac® 1157 AFFF Fluorosurfactant

- OECD 302B – Modified Zahn-Wellens/EMPA test
- Main Study Conclusions
  - No biodegradation products were observed
  - No fluorinated species were observed in the gaseous effluent
  - No additional fluoride was produced (No C-F degradation)
    - Levels measured were at background and did not change
  - Test substance was not toxic to the microorganisms and the system remained aerobic

Aerobic Biodegradation of 6-2 Fluorotelomer Sulfonate Study Rational and Objectives

- Reported that 6-2 FT Sulfonate [$F(CF_2)_6CH_2CH_2SO_3X$] may be converted to 6-2 FTOH [$F(CF_2)_6CH_2CH_2OH$] and 6-2 FTA [$F(CF_2)_6$CH2COOH] (> 15%) and small percentage of PFHxA [$F(CF_2)_5COOH$] (< 4%) in activated sludge when sulfate was depleted (an artificial condition that rarely exists in the environment).
  - Erin Marchington et al., 2007 SETAC NA meeting poster
- The experimental systems using bacterial culture and activated sludge can readily degrade 6-2 FTOH and 8-2 FTOH and thus serve as positive controls
  - Wang et al., ES&T, 2005 and unpublished data.
- The present study investigates whether or not 6-2 FT Sulfonate is biodegradable and can be converted to PFHxA under aerobic conditions.

Study Background :
What do we know? What do we want to know?



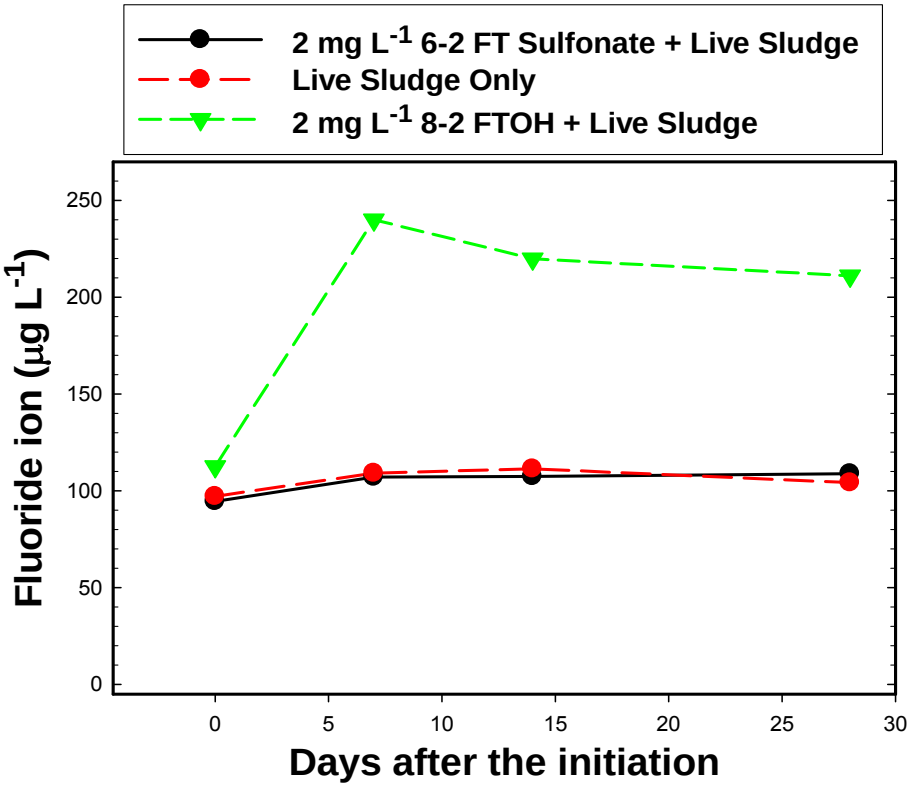
$F(CF_2)_6CH_2CH_2SO_3K$

6-2 FTS

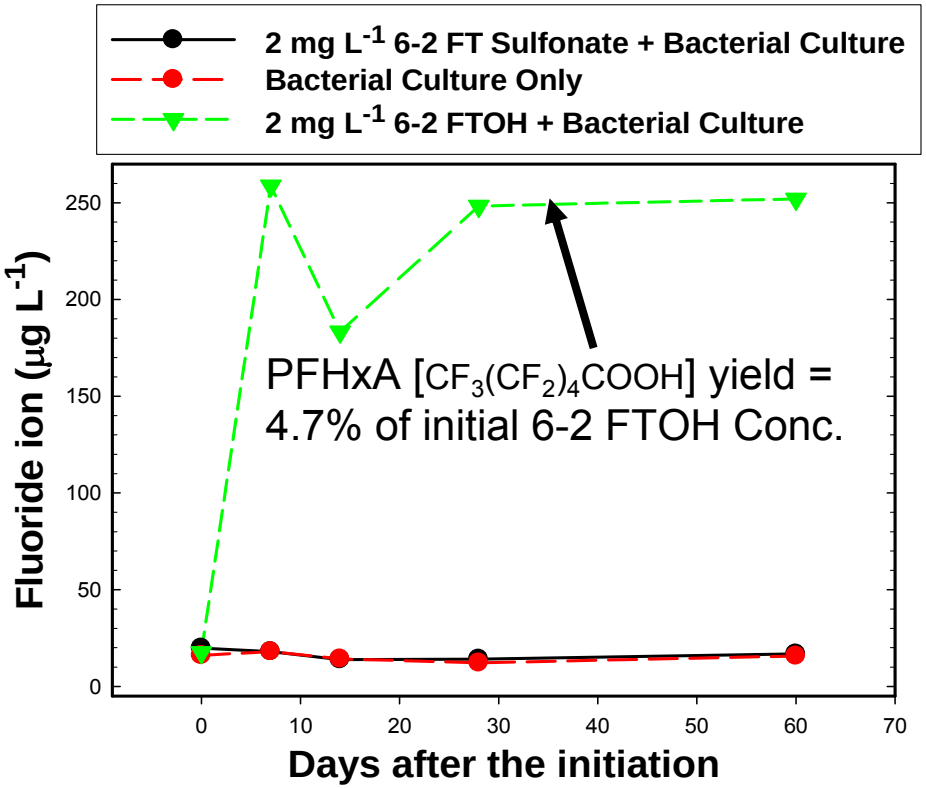
We want to know:

Does 6-2 FTS degrade to form any of the substances in the fluorotelomer alcohol degradation pathway?

No discernible increase of Fluoride (F^-), indicative of degradation, in activated sludge and mixed bacterial culture 28 – 60 days after incubation of 6-2 FTS



82 FTOH Control



62 FTOH Control

Results and Conclusions

- **No PFHxA or other metabolites indicative of biodegradation were observed above background level in any samples from activated sludge or bacterial culture.**
- **62 FTS was not biodegraded in activated sludge under the aerobic study conditions.**

Potential transformation products of 2 mg L^{-1} 6-2 FTS

	6-2 FTOH	6-2 FTA	6-2 FTUA	5-3 Acid	PFHxA
LOD (µg L^{-1})	10	1.6	0.16	0.54	0.32
Activated sludge (Day 0 – 28)	Not detected by LC/MS/MS				
Mixed bacterial culture With sulfate (Day 0 – 60)					
Mixed bacterial culture Without sulfate (Day 0 – 60)					

Environmental Fate & Effects: Key Results

- Rainbow Trout 90-day Early Life-stage Study (ELS) on F1176*
  - Regulatory guideline study (USEPA 850.1400, OECD 210) conducted under GLP
  - Exposure concentrations (mean measured):
    - Control (well water), 0.857, 1.66, 2.62, 4.85, 8.70 mg/L
  - **No Observed Effect Concentrations**
    - NOEC (first day of hatching, first day of swimup) = 2.62 mg/L
    - NOEC (egg hatching) = 4.85 mg/L
    - NOEC (larval survival and abnormalities at thinning, test end; last day of hatching; length and dry weight (i.e., growth) at test end) = 8.7 mg/L (highest test concentration)
  - **These NOEC values are much higher (less concern) than typical values used to screen for chronic toxicity, e.g., NOEC < 0.1 mg/L (Canadian DSL)**

*Forafac® 1176 = 6-2 FTS, Potassium Salt

Environmental Fate & Effects: Key Results

- Rainbow Trout Bioconcentration and Bioaccumulation Study on Forafac® 1176 (Preliminary unaudited analysis)
  - **Elimination of compound appears relatively rapid (95% within 28 days) once exposure is terminated**
  - **BCF/BAF values suggest low concern for bioaccumulation either from water or diet (e.g., CA DSL, EU criteria BCF > 2000, USEPA criterion > 1000)**
    - **Steady state BCF <50; Steady state BAF <2**
- **Not bioaccumulative according to published regulatory criteria**

Industry Action

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EPA 2010/2015 PFOA Stewardship Program

Participation in the stewardship program requires voluntary corporate commitment to two goals:

1) To commit to achieve, no later than 2010, a 95% reduction, measured from a year 2000 baseline, in both:
   - *facility emissions* to all media of PFOA, precursor chemicals that can break down to PFOA, and related higher homologue chemicals, and
   - *product content* levels of PFOA, precursor chemicals that can break down to PFOA, and related higher homologue chemicals.

2) To commit to working toward the elimination of PFOA, PFOA precursors, and related higher homologue chemicals from emissions and products by five years thereafter, or no later than 2015.

Results from 1st year reported results under VSP indicate significant reductions in both product content and plant emissions

---

- Asahi Glass, Arkema, Ciba Specialty Chemicals, Clariant, Daikin, DuPont, Solvay-Solexis, 3M

Overall Summary Points

- Risk perception regarding PFCs requires a more sophisticated knowledge base and a more refined set of risk communications tools
  - Not all fluorochemicals are the same
- Rely on suppliers that are willing to work toward defining risk-based safe use and exposure levels. Safe is safe. Period.
- The industry needs to consider ways to take action to address the confusion and misleading claims in the marketplace regarding safety and product stewardship
- Fluorotelomer-based products are safe for their intended uses and offer significant and unique benefits to society

Thank You.

Contact Information

Steve Korzeniowski

Tel : 302.695.8672

Email : stephen.h.korzeniowski@usa.dupont.com

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"Safety & Protection – Be Sure"

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DuPont™ Forafac® 1157 N

Fluorinated Surfactant

Forafac® 1157 N is an amphoteric perfluorinated surfactant, whose main property is to significantly reduce the surface tension of aqueous solutions.

This fluorinated surfactant enables the formation of an aqueous film that is distributed over the whole surface of the hydrocarbon.

Forafac® 1157 N is widely used as a film forming agent in fire fighting foam concentrates against hydrocarbon and polar liquid fires (in the case of an alcohol-resistant fire fighting foam).

Physical Characteristics

Please refer to product specifications data sheet for guaranteed commercial specifications.

Appearance	Clear amber-colored liquid
Chemical structure	Perfluoroalkyl betaine
Active matter, wt%	27
Solvent	Ethanol/water
Density at 20°C (68°F)	1.08
pH	5.5
Flash point (closed cup)	37°C (99°F)

General Properties

Solubility at ambient temperature:

Water	Soluble
Ethanol	Partly Soluble
Ethylene glycol	Soluble

Viscosity at 20°C (68°F) <250 mPa·s

Surface tension at 25°C (77°F) in aqueous solution (mN/m):
Aqueous solution at 0.01% of Forafac® 1157 N 15.8

Foaming Power (Ross-Miles Method)

Concentration of Forafac® at 0.5 g/L	mL of Foam After		
	30 sec	3 min	5 min
Deionized water	265	260	260
Tap water	225	220	220
Artificial seawater	100	95	95

Applications

Forafac® 1157 N is a film forming fluorinated surfactant used in aqueous film forming foam (AFFF), film forming fluoroprotein (FFFP), and alcohol-resistant formulations AFFF-AR/FFFP-AR (against hydrocarbons and polar liquid fires). Forafac® 1157 N confers higher heat and burn back resistance to foam concentrates.

Precautions—Toxicity

Like any other chemical product, fluorinated surfactants must be handled and used with care (any contact with the skin and eyes is to be avoided).

A safety data sheet is available on request.

Interfacial Tension at 25°C (77°F) (mN/m)

	Cyclohexane	Essence F-5	n-Heptane	n-Hexane
Water	40.5	44.5	47.5	48
Water + 1 g/L of F1157 N	6.6	5.7	4.7	4.6

U.S. Sales and Services

For placing orders or requesting additional product information, please use our convenient 24-hour, toll-free telephone number. If you prefer, you can write to us.

DuPont Chemical Solutions Enterprise
Customer Service Center, Barley Mill Plaza, Bldg. 23
Wilmington, DE 19898
(866) 828-7009
E-mail: zonyl@usa.dupont.com
www.dupont.com/zonyl

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DuPont Surface Protection Solutions

DUPONT™ CAPSTONE® REPELLENTS AND SURFACTANTS

PRODUCT STEWARDSHIP DETAIL

DUPONT®

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www.capstone.dupont.com

Table of Contents

1. DuPont — A Global Leader in Sustainability

At DuPont, sustainability is not just about reducing our impact on the environment. It is also about protecting people and the environment. The need for truly sustainable options for 21st century life remains one of the most critical challenges facing the global community. DuPont has a history of taking actions that address important societal challenges and market needs.

The DuPont vision is to be the world's most dynamic science company creating sustainable solutions essential to a better, safer, healthier life for people everywhere. For over 20 years, DuPont has been reducing the environmental footprint of its own operations. Today, footprint reduction is expected of all companies. The challenge—and the opportunity—is to create products and services that provide the performance required, are cost effective and reduce the environmental impact along the entire value chain.

As an ingredient supplier, DuPont has an impact on virtually every major industry in the world — from agriculture to construction, transportation and communications. That impact is why DuPont is building sustainability into products, how they perform for our customers and final consumers, as well as how the Company makes them. The DuPont 2015 Sustainability Goals span footprint reduction, R&D investment and revenue growth commitments. These goals are aligned with customers and the markets that these customers serve.

DuPont strives to put science to work to help customers, and their customers, grow businesses while contributing to social and environmental progress worldwide.

For DuPont, sustainable growth is the creation of shareholder and societal value while we reduce the environmental *footprint* along the value chains in which we operate. DuPont defines *"footprint"* as all injuries, illnesses, incidents, waste, emissions, use of water and depletable forms of raw materials and energy.

Today, a comprehensive sustainable growth approach is integrated into the DuPont business model. DuPont is listed on the Dow Jones Sustainability North America Index, is on the 2010 list of 100 Best Corporate Citizens, is on the Leadership Index of the Carbon Disclosure Project and was a founding member of the World Business Council for Sustainable Development (WBCSD) and the U.S. Climate Action Partnership (USCAP).

www.sustainability.dupont.com

2. DuPont Product Stewardship

DuPont has corporate product stewardship operating standards to guide new product research, as well as evaluation of products before their commercial use.

For new products or for a product to be used in a new application, the product life-cycle is evaluated, including industrial and consumer use, and disposal.

Worker and consumer exposure and environmental emissions undergo evaluations and comparisons to hazard data from toxicology studies.

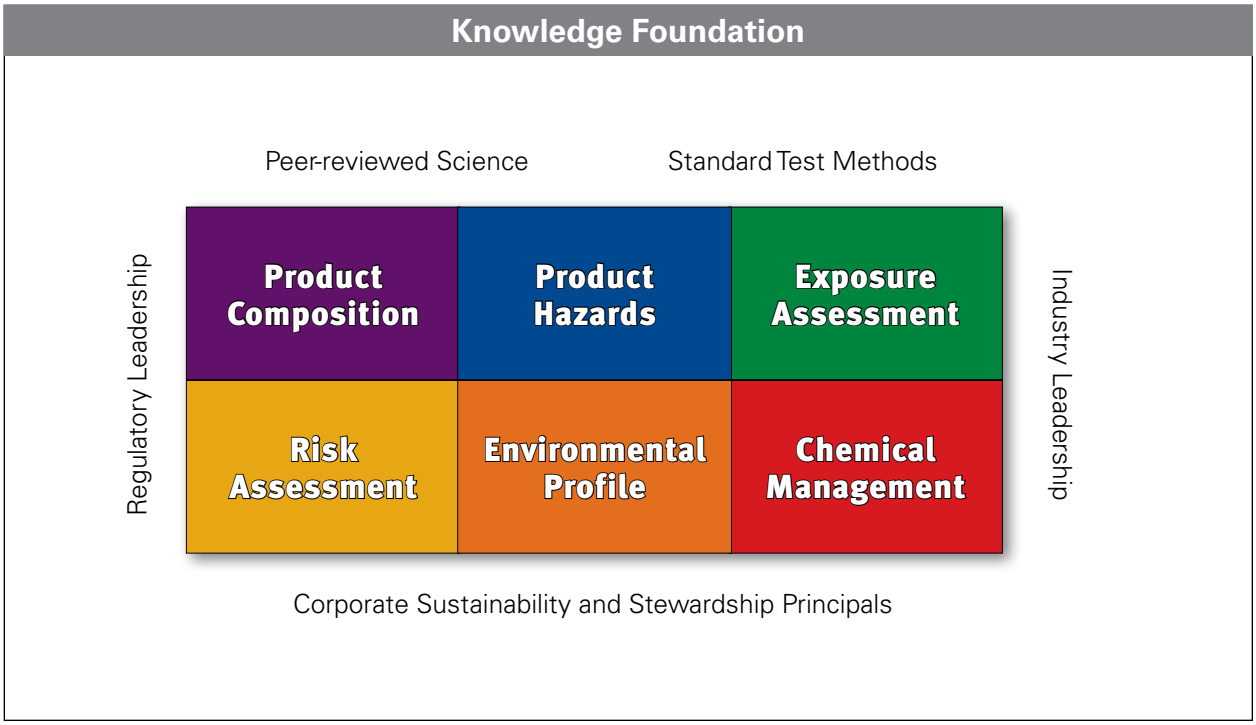
Product stewardship reviews foster a comprehensive analysis of the use, exposure and hazards of a product. The hazards, appropriate use and disposal information for a product are documented in the product M/SDS.

3. DuPont™ Capstone® Repellents and Surfactants – Knowledge Foundation

DuPont has developed a new line of surface protection products based on sustainable short-chain technology (six or less fluorinated carbons) that deliver superior performance, supported by extensive environmental, health and safety testing. DuPont™ Capstone® repellent and surfactant products are based on short-chains that cannot break down into PFOA or PFOS in the environment and they are manufactured using patented technology to minimize the presence of residual unreacted raw materials and by-products.

DuPont has developed and continues to develop comprehensive knowledge about DuPont™ Capstone® repellent and surfactant products. Extensive studies show that DuPont™ Capstone® repellent and surfactant products, raw materials such as short-chain alcohol, and potential degradation products including perfluorohexanoic acid (PFHxA) have a favorable environmental, health and safety profile, rapid bioelimination, and are not bioaccumulative. This knowledge foundation is comprised of six knowledge areas framed by principles, leadership and science (Buck, 2009). The knowledge foundation is a comprehensive body of environmental, health and safety data that show DuPont™ Capstone® repellent and surfactant products are safe for workers, consumers and the environment when used as intended.

Figure 3.1 DuPont™ Capstone® Repellents and Surfactants Knowledge Foundation



DuPont™ Capstone® Repellents and Surfactants Knowledge Foundation Summary

Product Composition

DuPont™ Capstone® repellent and surfactant products are based on sustainable short-chain technology*, made with raw materials comprised of six fluorinated carbon functionality or shorter.

Residual raw materials and by-products have been minimized using patented technology.

DuPont manufacturing facilities are ISO 9001-2008 and ISO14001 certified.

Product Hazards

A comprehensive toxicology database on products, raw material(s) and degradation product(s) provides a *knowledge foundation* to show that DuPont™ Capstone® repellent and surfactant products are safe for workers, consumers and the environment.

DuPont™ Capstone® repellent and surfactant products, raw material alcohol and perfluorohexanoate degradation product have rapid bioelimination/clearance.

For specific product hazard information, see the product M/SDS.

Exposure Assessment / Risk Assessment

DuPont™ Capstone® repellent and surfactant products are safe for workers, consumers and the environment when used as intended.

A comprehensive evaluation of the toxicology and potential exposure for products, raw materials, and degradation products provides a *knowledge foundation* for exposure assessment and risk characterization.

Environmental Profile

Studies to date show that DuPont™ Capstone® surfactant and repellent products have favorable* environmental characteristics and are safe for the environment when used as intended.

Degradation products are not expected to be harmful to human health or the environment at relevant environmental concentrations, are rapidly eliminated/cleared and are not bioaccumlative.

Chemical Management

DuPont™ Capstone® repellent and surfactant products are listed on global regulatory inventories.

We will work with customers regarding study data to qualify for specific labeling criteria and to assure proper handling, use and disposal.

Safe storage, handling, use and disposal of DuPont™ Capstone® repellent and surfactant products guidance is given in technical bulletins and product safety data sheets.

** Short-chain molecules that can not break down to PFOA in the environment. DuPont™ Capstone® repellent and surfactant products meet the goals of the U.S. EPA 2010/15 PFOA Stewardship Program.*

4. DuPont™ Capstone® Repellent and Surfactant Products

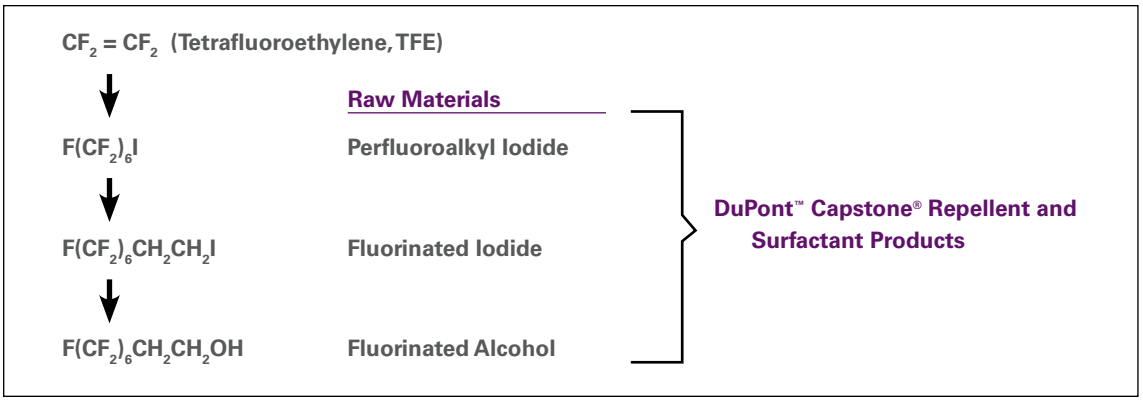
- Designed with chemical architecture that provides maximum fluorine efficiency.
- Excellent performance and favorable* environmental, safety and health properties.
- Stand upon a comprehensive environmental, health and safety *knowledge foundation*.

4.1 Product Composition

Product Composition

- DuPont™ Capstone® repellent and surfactant products are based on sustainable short-chain technology.*
- All are made with short-chain raw materials comprised of six fluorinated carbon functionality, $F(CF_2)_nCH_2CH_2^-$, where n = 6 or shorter.
- Residual raw materials and by-products have been minimized using patented technology.
- DuPont™ Capstone® manufacturing facilities are ISO 9001-2008 and ISO14001-2004 certified.

Figure 4.1.1 Products are based on short-chain chemistry



Product composition is an important consideration. The identity and quantity of residual raw materials and by-product impurities need to be understood.

DuPont uses proprietary LX Platform products technology to minimize the levels of residual raw materials and impurities present to ensure that the environmental footprint of DuPont™ Capstone® repellent and surfactant products is favorable.* The LX Platform products technology removes trace levels (parts-per-million, ppm) of the by-product impurity perfluorohexanoic acid (PFHxA) that may be formed during manufacturing.

The level of PFHxA in products is expected to be below the limit of detection (LOD) or less than 0.5 parts-per-million (ppm) as determined by a published, peer-reviewed and validated method (Larsen, 2006).

** Short-chain molecules that can not break down to PFOA in the environment.*
DuPont™ Capstone® repellent and surfactant products meet the goals of the U.S. EPA 2010/15 PFOA Stewardship Program.

5. Product Safety — We have data about our products

Product Hazards

- A comprehensive toxicology database on products, raw material(s) and degradation product(s) provides a *knowledge foundation* to show that DuPont™ Capstone® repellent and surfactant products are safe for workers, consumers and the environment.
- The database includes acute and repeated-dose studies.
- DuPont™ Capstone® repellent and surfactant products, raw material alcohol and perfluorohexanoate degradation product have rapid bioelimination/clearance.
- For specific product hazard information, see the product M/SDS.

5.1 Toxicology Studies and Hazard Assessment — An Introduction

Toxicology studies are used to identify the potential hazards of a substance by a specific exposure route (e.g., oral, dermal or inhalation). The studies are designed to find a dose (e.g., milligrams per kilogram of body weight per day, mg/kg/day) or concentration (e.g., mg/liter/day inhaled) at which toxic effects are observed and a dose at which no adverse effects are observed. Hazard assessment is the evaluation and ranking of potential hazards by their estimated frequency and intensity, and determination of an acceptable margin of safety. This is a margin that provides adequate distance between the dose at which toxic effects are observed and the expected potential exposure range.

The dose at which effects are observed in a toxicology study may be significantly greater than the amount to which any person or creature may ever be exposed. All substances are toxic at some dose level. It is essential that the hazards (or toxicity) of a substance *always* be compared to exposure in order to assess potential risk (Paustenbach, 2002). Simply put, it is not sufficient to say that a substance is "toxic". One must also determine at what dose effects are observed and by what exposure route the "toxic" effects are observed. Further, a comparison to expected potential exposure must made be in order to adequately characterize the safety of a product for its intended use.

5.2 Comprehensive Toxicology Knowledge

A comprehensive toxicology database on products, raw material(s) and degradation product(s) provides a *knowledge foundation* to show that DuPont™ Capstone® repellent and surfactant products are safe for workers, consumers and the environment. The database includes acute and repeated-dose studies **(Figure 5.2.1)**. The results of these studies are used to define safe use and disposal practices for foreseeable worker, consumer and environmental exposures.

For each DuPont™ Capstone® repellent or surfactant product, the chemical structure, properties and intended use(s) are evaluated to determine what hazard data are needed. In general, acute and genetic toxicity studies are conducted on most products or a representative equivalent. Repeated dose mammalian studies are conducted on at least one representative member of a group of common polymeric or surfactant substances. Likewise, repeated dose aquatic studies are conducted on a surfactant representative of a group. Regulatory bodies such as the U.S. Environmental Protection Agency, (EPA) provide guidance on selecting representative compounds for testing.

Figure 5.2.1 Toxicology studies overview

Mammalian

Acute

- Oral, Inhalation
- Eye, Skin Irritation
- Skin Sensitization

Genetic

- In-vitro, In-vivo

Repeated Dose

- Oral, Dermal, Inhalation
- Developmental Toxicity
- Reproductive Toxicity
- Pharmacokinetics

Aquatic Toxicity

Acute

- Fish
- Daphnia (invertebrate)
- Algae

Repeated Dose

- Fish 90-Day Early-life Stage
- Bioconcentration/Bioaccumulation

5.3 DuPont™ Capstone® Repellent Product Profile

Product

The hazards section of the M/SDS for each DuPont™ Capstone® repellent or surfactant product contains a summary of the toxicology testing results for the product or a representative equivalent. An example of the toxicology study data for a DuPont™ Capstone® repellent product is shown below.

Mammalian

Acute

- Oral LD50 (rat): >11,000 mg/kg
- Eye Irritation (rabbit): mild irritant, reversible within 48 hours
- Skin Irritation (rabbit): non-irritating
- Local Lymph Node Assay (LLNA) (mouse): negative for skin sensitization

Genetic Toxicity

- Bacterial Reverse Mutation (Ames): negative
- Chromosome Aberrations in Mammalian Cells: negative
- Not genotoxic

Aquatic Toxicity

Acute

- Fish: 96 hr LC50: >100 mg/L
- Daphnia: 48 hr EC50: >4.3 mg/L
- Algae 72 hr EC50: >100 mg/L

Repeated-Dose Mammalian

- Oral 90-day sub-chronic: NOAEL† 1000 mg/kg/day
- Reproduction, One-Generation: NOAEL 1000 mg/kg/day; no effects on reproductive parameters
- Development: NOAEL 1000 mg/kg/day; no effects on developmental parameters

†NOAEL = no observed adverse effect level

Product Toxicology Summary

- Very low acute oral and dermal toxicity. Low acute aquatic toxicity.
- Very low repeated-dose toxicity.
- Not a selective developmental or reproductive toxicant.
- Not damaging to DNA, not genotoxic.
- Rapid bioelimination and not bioaccumulative.
- Not expected to be harmful to human health or the environment at environmentally relevant concentrations.

5.4 Raw Material Profile: Short-Chain Alcohol

Raw Material

Numerous toxicology studies have been completed on short-chain alcohol raw material, $F(CF_2)_6CH_2CH_2OH$, used to manufacture DuPont™ Capstone® repellent and surfactant products (Serex, 2009). A data summary is shown below. DuPont uses proprietary LX Platform products technology to minimize the levels of residual raw materials and impurities present in products.

Mammalian

Acute

- Oral LD50 (rat): 1,750 mg/kg
- Eye Irritation (rabbit): mild irritant, reversible within 48 hours
- Skin Irritation (rabbit): non-irritating
- Dermal LD50: 5,000 mg/kg
- Local Lymph Node Assay (LLNA) (mouse): negative for skin sensitization

Genetic Toxicity

- Bacterial Reverse Mutation (Ames): negative
- Chromosome Aberrations in Mammalian Cells: negative
- Not genotoxic

Aquatic Toxicity

Acute

- Fish: 96 hr LC50: 4.84 mg/L
- Daphnia: 48 hr EC50: 7.84 mg/L
- Algae: 72 hr EC50: 4.52 mg/L

Repeated-Dose Mammalian

- Oral 90-day sub-chronic: NOAEL† 5 mg/kg/day
- Reproduction, One-generation: NOAEL 25 mg/kg/day
- Development: NOAEL 25 mg/kg/day
- Pharmacokinetics: Rapid bioelimination. Single and repeated dose studies completed.

†NOAEL = no observed adverse effect level

Raw Material Toxicology Summary

- Low acute oral and dermal toxicity. Moderate aquatic toxicity.
- Repeated-dose toxicology similar to published results for other fluorotelomer alcohols. (Serex, 2009).
- Not a selective developmental or reproductive toxicant.
- Not damaging to DNA, not genotoxic.
- Rapid bioelimination and not bioaccumulative.
- Not expected to be harmful to human health or the environment at environmentally relevant concentrations. The results of these studies support no C, M or R classification under the Globally Harmonized System (GHS) for classification and labeling or under the EC Classification, Labeling and Packaging Legislation (CLP).

5.5 Degradation Product Profile: Perfluorohexanoic Acid

Degradation Product

Toxicology study data is available for a degradation product, perfluorohexanoic acid (PFHxA) and its sodium salt (Loveless, 2009; Chengelis, 2009a). A data summary is shown below.

Mammalian

Acute

- Oral LD50 1,750 mg/kg

Genetic Toxicity

- Bacterial Reverse Mutation (Ames): negative
- Chromosome Aberrations in Mammalian Cells: negative
- Not genotoxic

Aquatic Toxicity

Acute

- Fish: 96 hr LC50: >100 mg/L
- Daphnia: 48 hr EC50: >100 mg/L
- Algae: 72 hr NOEC: 50 mg/L

Repeated-Dose Mammalian

- Oral 90-day sub-chronic: NOAEL† 20 mg/kg/day
- Reproduction, One-Generation: NOAEL 100 mg/kg/day; no effects on reproductive parameters
- Development: NOAEL 100 mg/kg/day; no effects on developmental parameters
- Pharmacokinetics: Rapid bioelimination. Single and repeated dose studies completed.

†NOAEL = no observed adverse effect level

Degradation Product Toxicology Summary

- Low acute oral toxicity. Low aquatic toxicity.
- Low repeated dose toxicity.
- Not a selective developmental or reproductive toxicant.
- Not damaging to DNA, not genotoxic.
- Rapid bioelimination and not bioaccumulative.
- Not expected to be harmful to human health or the environment at environmentally relevant concentrations.

6. Persistence, Biopersistence and Bioaccumulation

6.1 Persistence

"Persistence" generally refers to environmental persistence: the length of time a chemical stays in the environment, once introduced. Persistent substances do not break down easily in the environment. (Environment Canada, 2008).

- In general, DuPont™ Capstone® repellent and surfactant products are designed to be stable and not break down or degrade. This property makes their performance last. It is therefore important to consider the environmental profile of the product.
- As an example, the potential degradation product PFHxA is a persistent substance. It does not readily degrade via biotic or abiotic mechanisms in the environment. It is stable. However, PFHxA has rapid bioelimination/clearance, low toxicity, does not bioconcentrate and is not bioaccumulative according to global regulatory criteria.

6.2 Biopersistence, Bioelimination and Clearance

"Biopersistence" is a measure of the tendency of a chemical substance to stay in a living system for an extended period of time, as typically measured by half-life ($t_{½}$) or clearance/elimination time. Rapid bioelimination/clearance is desirable and indicates that the chemical does not persist in living systems.

Studies show that DuPont™ Capstone® repellent and surfactant products, raw material alcohol and perfluorohexanoate degradation product have rapid bioelimination/clearance.

Screening Studies

Biopersistence, a measure of how long a chemical substance remains in a living organism, was determined in male rats, a mammalian model **(Figure 6.2.1)**. PFHxA and short-chain fluorotelomer alcohol are rapidly bioeliminated. The concentration in rat blood, as area under the curve to infinity (AUCINF), of perfluorohexanoate (PFHxA) and short-chain fluorotelomer alcohol are dramatically less than longer carbon-chain homologues (Serex 2008; **Figure 6.2.2**).

Figure 6.2.1 Biopersistence Screening Study

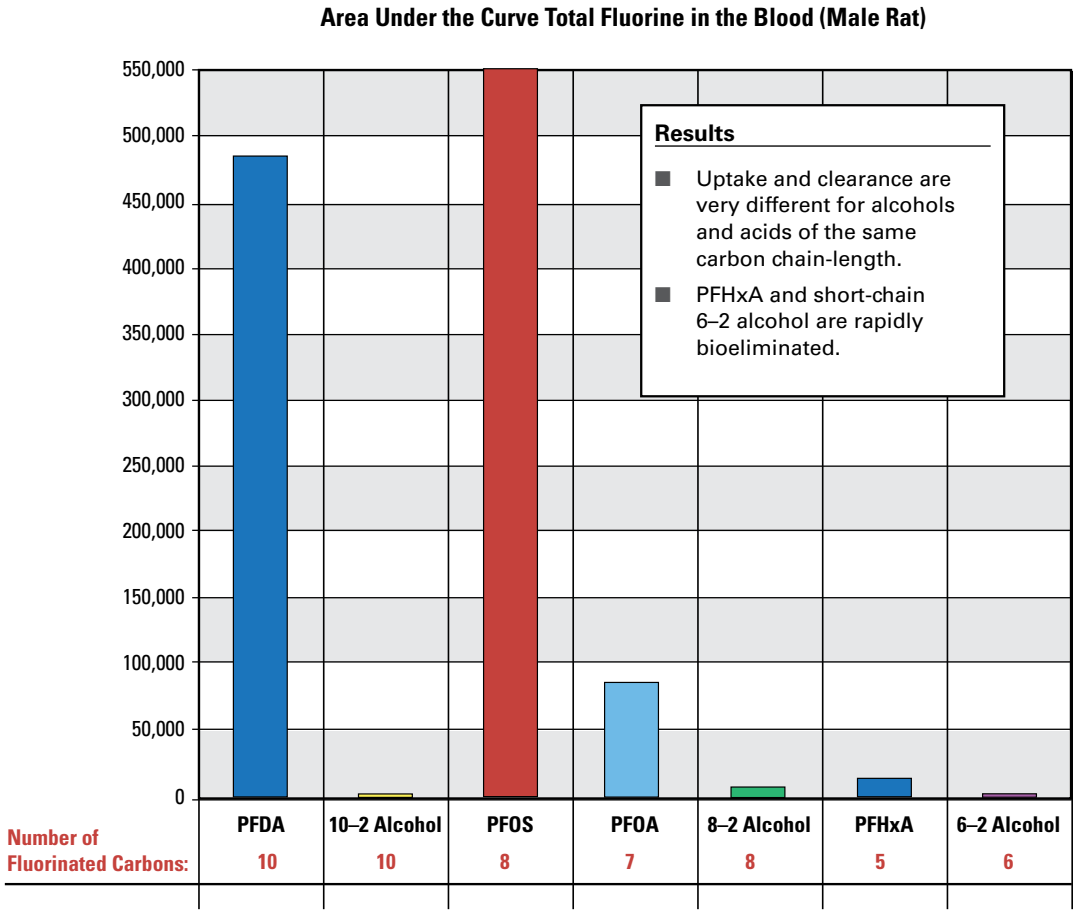
Purpose: To compare bio-uptake and bioelimination in rat blood for a series of fluorinated acids and fluorotelomer raw materials, surfactants and polymeric products.

Study: 10 consecutive days dosing via oral gavage, 84 day recovery period with analysis of total blood, liver and fat fluorine on selected days (3 during dosing, 4 during recovery).

Analysis: Using fluorine data to compare internal exposure to fluoro-organic materials on a dose normalized to micromolar (µmol) Fluorine basis.

Figure 6.2.2 Biopersistence Screening Study

Area under the curve (AUCINF/D) in blood for a homologous series of perfluorocarboxylic acids, fluorotelomer alcohols, and PFOS. (Serex 2008).



PFOS: perfluorooctane sulfonate
PFDA: perfluorodecanoic acid
PFOA: perfluorooctanoic acid
PFHxA: perfluorohexanoic acid

10–2 Alcohol: $C_{10}F_{21}CH_2CH_2OH$
8–2 Alcohol: $C_8F_{17}CH_2CH_2OH$
6–2 Alcohol: $C_6F_{13}CH_2CH_2OH$

Pharmacokinetic Studies

Pharmacokinetics refers to the movement of a substance into, through, and out of the body—the time course of its absorption, bioavailability, distribution, metabolism, and excretion.

Pharmacokinetic studies show the sodium salt of perfluorohexanoic acid (NaPFHx) is rapidly bioeliminated in male and female rats and mice, with blood concentration decreasing to below the level of detection (LOD) after 12 hours (Gannon, 2009; **Figure 6.2.3**). Another recent study showed that perfluorohexanoate was rapidly bioeliminated in both monkeys and rats, more rapidly than perfluorobutane sulfonate (PFBS) (Chengelis, 2009b; **Figure 6.2.4**).

Figure 6.2.3 Perfluorohexanoic acid, sodium salt (NaPFHx) is rapidly eliminated in rats. (Gannon, 2009)

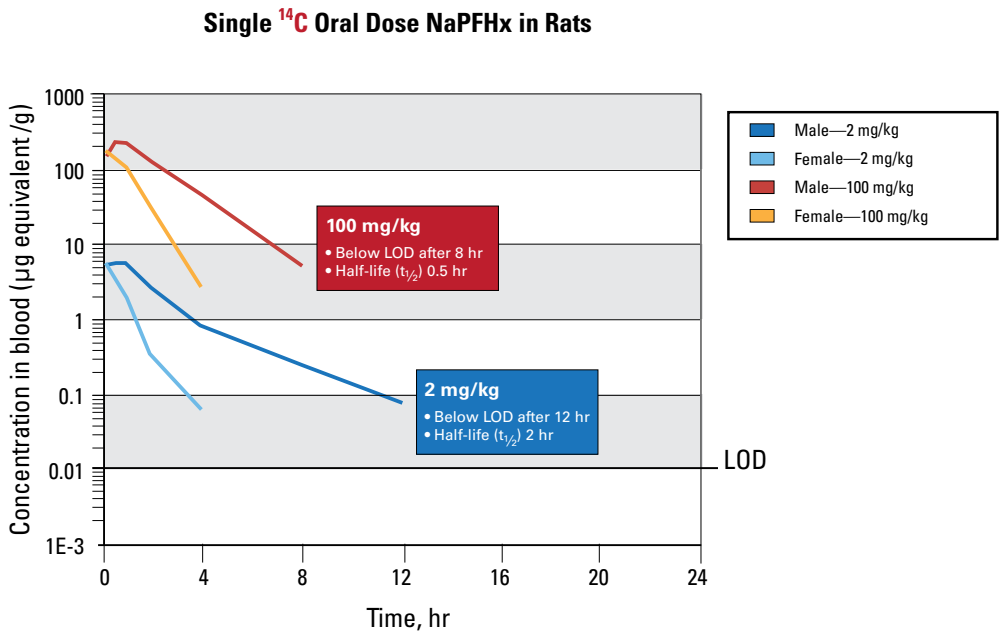
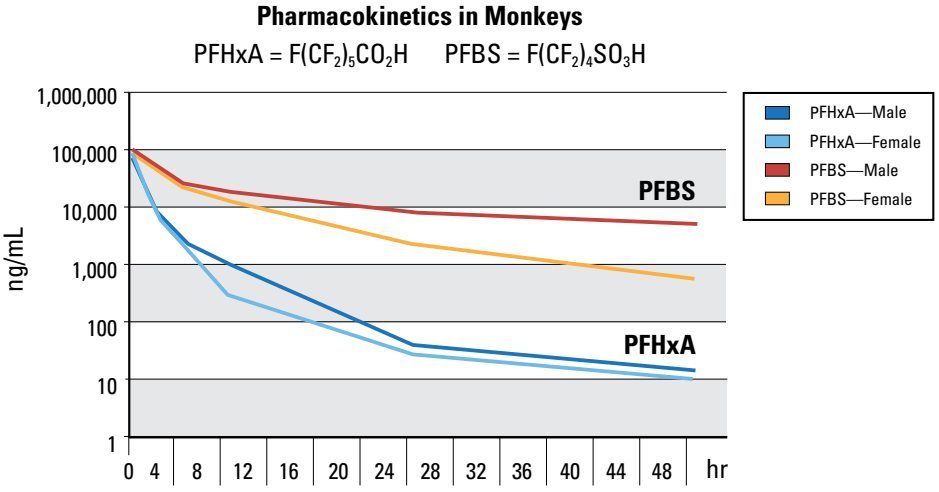


Figure 6.2.4 PFHxA and PFBS pharmacokinetics in monkeys. (Chengelis, 2009b)



6.3 Bioaccumulation

"Bioaccumulation" is the process by which, via all potential exposure routes (e.g., food, air), a chemical builds up or accumulates in a living system. Bioaccumulation is often determined in fish according to standard test protocols and the results compared to regulatory criteria (Schwarzenbach, 2003).

DuPont™ Capstone® repellent and surfactant products are not expected to bioaccumulate, based on their physical properties, the results of biopersistence (biouptake and bioelimination) screening and repeated-dose toxicology studies.

Published, peer-reviewed scientific studies (Martin, 2003a, 2003b), including a recent critical review (Conder, 2008), concluded that perfluorinated carboxylic acids (PFCAs) with less than eight total carbons, including perfluorohexanoate, are not bioaccumulative according to global regulatory criteria.

In addition, DuPont recently completed a bioconcentration/bioaccumulation study on a short-chain sulfonate, $F(CF_2)_6CH_2CH_2SO_3^-$ (6:2 FTS) a degradation product of some DuPont™ Capstone® surfactant products (DuPont, 2009). The study showed 6:2 FTS does not bioconcentrate and is not bioaccumulative.

In Summary

- DuPont™ Capstone® repellent and surfactant products, raw material such as short-chain alcohol and potential degradation products do not persist in living systems.
- Degradation products, such as PFHxA and short-chain fluorotelomer sulfonate (6:2 FTS), do not bioconcentrate and are not bioaccumulative according to global regulatory criteria.
- These results confirm that DuPont™ Capstone® repellent and surfactant products show favorable environmental, health and safety characteristics.

7. Exposure Assessment and Risk Characterization

- DuPont™ Capstone® repellent and surfactant products are safe for workers, consumers and the environment when used as intended.
- A comprehensive evaluation of the toxicology and potential exposure for products, raw material(s), and degradation product(s) provides a *knowledge foundation* for exposure assessment and risk characterization.

7.1 Hazard Assessment

Hazard assessment is the process of determining under what exposure conditions a substance can cause adverse health effects in a living system. Toxicology studies are used to identify the potential hazards of a substance by a specific exposure route (e.g., oral, dermal or inhalation). The studies are designed to find a dose (e.g., milligrams per kilogram of body weight per day, mg/kg/day) or concentration (e.g., mg/liter/day inhaled) at which toxic effects are observed and a dose at which no adverse effects are observed.

The dose or concentration at which effects are observed in a toxicology study may be vastly higher than the amount any person or creature may ever be exposed to. All substances are toxic at some dose level. It is essential that the hazards (or toxicity) of a substance *always* be compared to exposure in order to assess potential risk (Paustenbach, 2002). Simply put, it is not sufficient to say that a substance is "toxic". One must also talk about how much, (the dose at which effects are observed), and by what exposure route the "toxic" effects are observed.

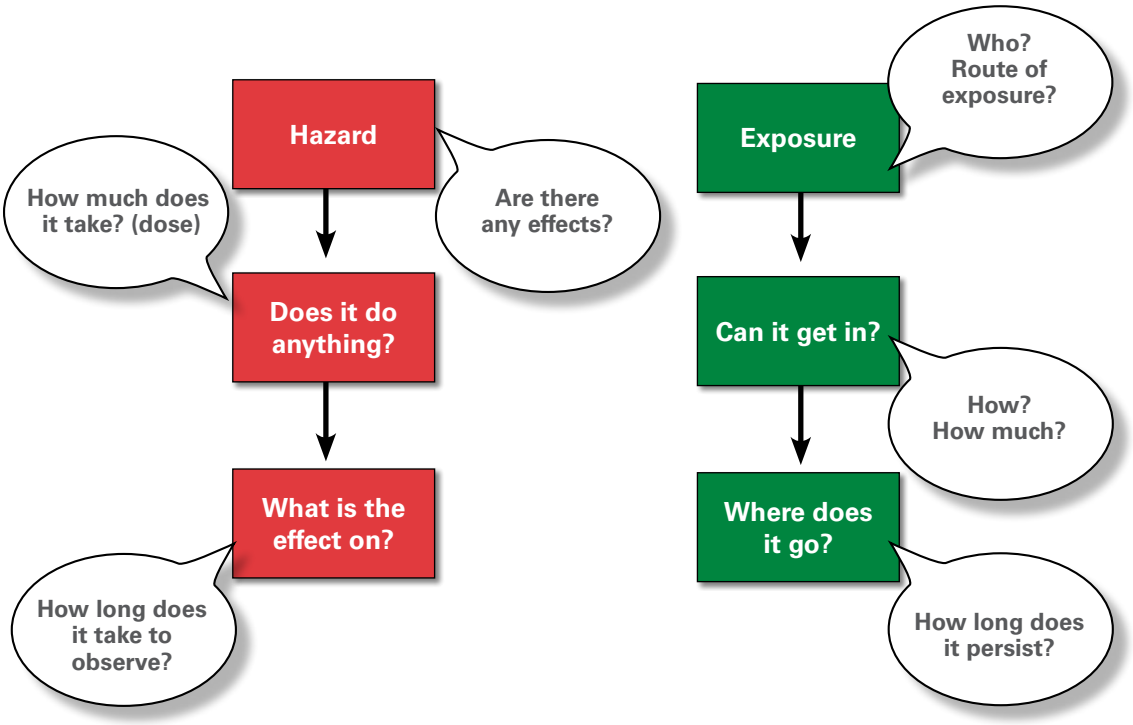
> Paracelsus wrote in 1567, "*All substances are poisons, there is none which is not a poison. The right dose differentiates a poison from a remedy.*" Paracelsus was one of the first people to recognize that a chemical can be harmless or even beneficial at low concentrations but poisonous at higher ones. It is easy to assume that a toxic chemical must also have a very high risk, but this is not necessarily true. (Trautmann, 2001)

7.2 Exposure Assessment

Exposure assessment quantifies the media (e.g., air, water), amount, and pathway (oral, dermal or inhalation) for substance intake into a living system (e.g., human, fish).

In order to put to practical use the hazard assessment from toxicology studies, an exposure assessment must be undertaken to quantify actual potential exposure in appropriate units (e.g., mg/kg/day). Both assessments begin with asking the right questions **(Figure 7.2.1)**. The assessment attempts to incorporate all potential human exposure pathways (Washburn, 2005)

Figure 7.2.1 Hazard and Exposure — Ask the right questions.

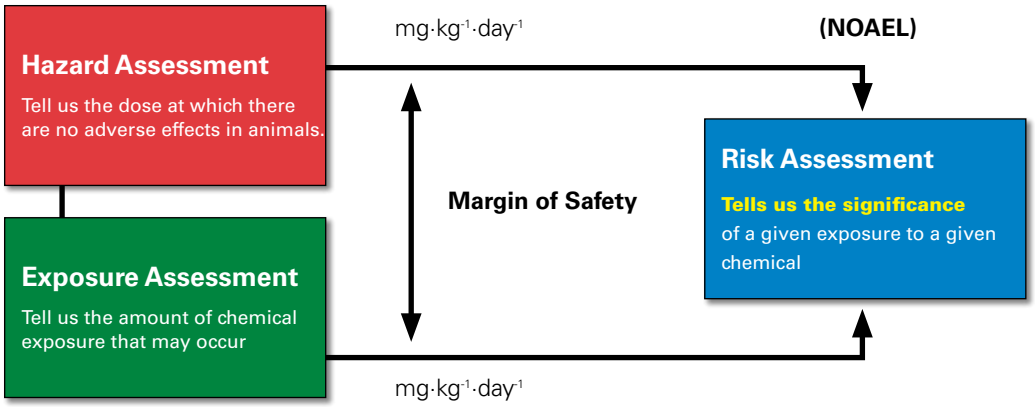


A quantitative human exposure assessment includes consideration of oral, dermal and inhalation exposure pathways -- for worker and consumer contact with a DuPont™ Capstone® repellent or surfactant product or article containing the product. Exposure may be determined by actual measurements (e.g., in workplace air, extraction of a treated textile) or by estimation using published methodologies (Paustenbach, 2002; Washburn, 2005).

7.3 Risk Assessment — DuPont™ Capstone® repellent and surfactant products are safe for their intended uses.

The exposure assessment value (mg/kg/day) is compared to the hazard assessment value (mg/kg/day), the NOAEL (no observed adverse effect level) derived from toxicology studies. Their ratio is called the "margin of safety" **(Figure 7.3.1)**. A potential exposure is generally deemed to be safe for well-studied substances like DuPont™ Capstone® repellent and surfactant products when the margin of safety is greater than one thousand (>1000).

Figure 7.3.1 Risk Assessment — Integrating Hazard and Exposure, Margin of Safety



Margins of Safety of greater than 1000 are considered of low to no concern for industrial chemicals.

The presence of trace levels (e.g., ppm, ppb or ppt) of a chemical in a consumer article by no means indicates that a consumer article is unsafe.

Models have been developed to be able to quantify potential worker and consumer exposure. The methodology has been published in a peer-reviewed scientific journal as a consumer article exposure and risk characterization (Washburn, 2005). This methodology has been used to evaluate DuPont™ Capstone® repellent and surfactant products. For example, the margin of safety for PFHxA (perfluorohexanoic acid) on a textile fabric following this methodology is greater than one million, meaning that the potential exposure is more than one million times lower than the NOAEL for PFHxA.

Please contact your local DuPont representative to discuss specific DuPont™ Capstone® repellent and surfactant products.

8. DuPont™ Capstone® Repellent and Surfactant Products Show Favorable Environmental Characteristics

Environmental Profile

- Studies to date show that DuPont™ Capstone® surfactant and repellent products have favorable environmental* characteristics and are safe for the environment when used as intended.
- Degradation products are 1) not expected to be harmful to human health or the environment at relevant environmental concentrations, 2) have rapid bioelimination and 3) are not bioaccumulative according to global regulatory criteria.

8.1 Environmental Overview

The environmental profile of DuPont™ Capstone® repellent and surfactant products is very important. DuPont scientists evaluate how each product is used and its disposition in the environment, including the active ingredient polymer or surfactant, raw material(s) and degradation product(s). Results from studies to date show that DuPont™ Capstone® repellent and surfactant products have favorable environmental characteristics.

Residual raw materials and by-products, such as PFHxA, have been minimized using patented LX Platform products technology. The removal of residual raw materials and by-products minimizes the environmental footprint of DuPont™ Capstone® repellent and surfactant products. As a result, the environmental emissions of residual raw materials and by-products are minimal.

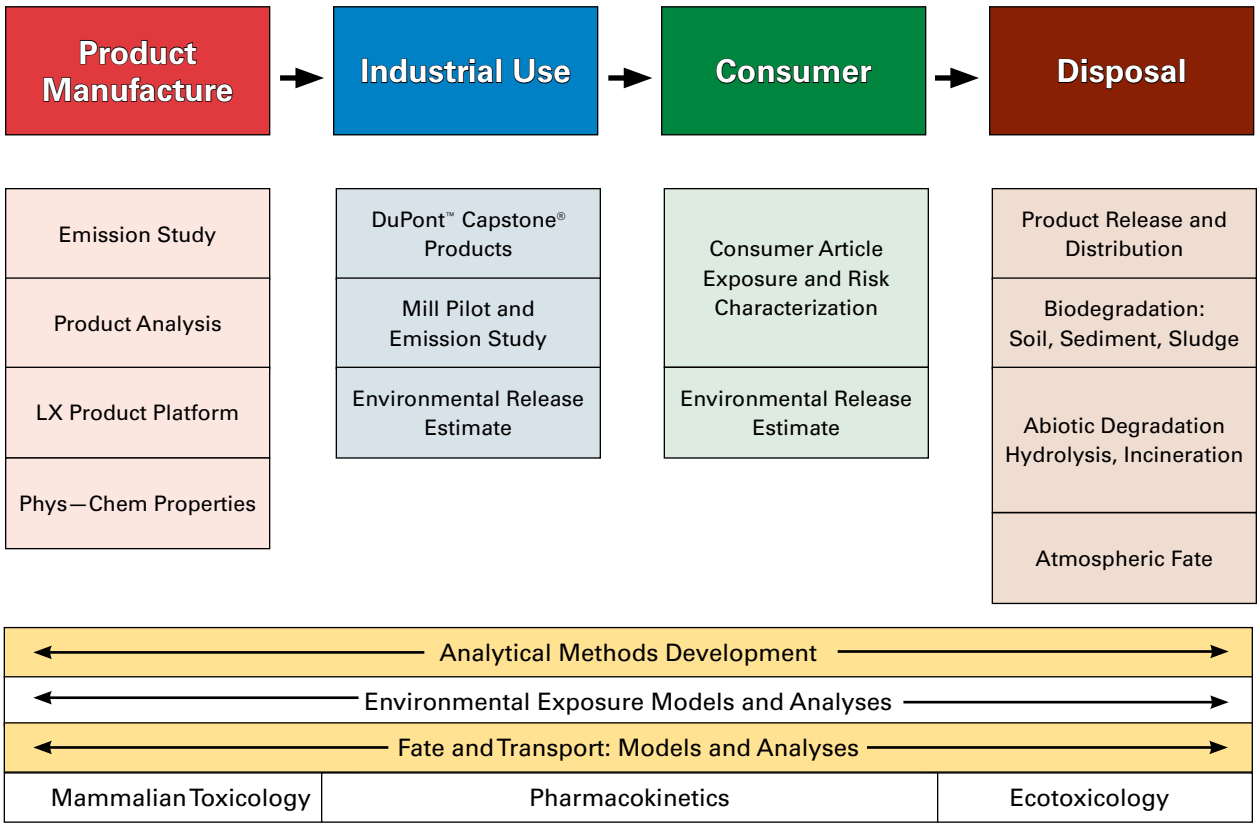
DuPont has studied the environmental profile of products, raw materials and potential degradation products. The studies include physical-chemical properties, environmental transport modeling, exposure modeling, and abiotic and biotic degradation studies. Many of the studies have been published in peer-reviewed scientific journals and presented at international scientific meetings. Also, mammalian and aquatic toxicity studies have been conducted on products, raw materials and degradation products **(see Section 5. Product Safety)**. These studies provide a *knowledge foundation* for DuPont™ Capstone® repellent and surfactant products regarding their environmental profile from industrial and consumer use and disposal.

8.2 Environmental Studies

The available scientific data to date shows that DuPont™ Capstone® repellent and surfactant products are safe for workers, people and the environment when used as intended. DuPont™ Capstone® repellent and surfactant products are expected to be stable. They may potentially degrade to form perfluorinated carboxylic acids, including PFHxA. Additional environmental studies are ongoing (e.g., long-term landfill simulation) and will be conducted on existing and new products in the future.

- A product life-cycle study of North America including emissions from the manufacture, use and disposal concluded that the life cycle was only a minor (~1%) contributor to total historic environmental emissions of perfluorocarboxylic acids (Yarwood, 2007).
- Environmental fate studies, including biodegradation studies on an acrylate polymer (Russell, 2008), urethane polymer (Russell, 2010) and alcohol raw materials (Wang, 2005a, 2005b, 2009; Liu, 2010), atmospheric fate of residual raw materials (Yarwood, 2007) and incineration of treated textiles (Yamada, 2005) have been published. In general, the studies show that products are stable and degradation results in only small amounts of perfluorinated carboxylic acids (PFCAs).
- Residual raw materials and by-products, such as PFHxA, have been minimized using patented LX Platform products technology. The types of data available are shown below **(Figure 8.2.1)**.

Figure 8.2.1 Overview of life-cycle product stewardship data



8.3 Degradation Products

DuPont™ Capstone® repellent and surfactant products are based on short-chain molecules that cannot degrade to PFOA, PFOS (perfluorooctane sulfonate) or PFHxS (perfluorohexane sulfonate) in the environment. Studies have been conducted to determine what the potential degradation products are from short-chain alcohol (Liu, 2010). Additional environmental studies are ongoing and will be conducted on existing and new products in the future. Two degradation products that may be formed at low concentrations are PFHxA and 6:2 FTS.

Perfluorohexanoic acid (PFHxA) is a degradation product that may be formed at low concentrations. PFHxA has rapid bioelimination, low toxicity, does not bioconcentrate and is not bioaccumulative according to global regulatory criteria (Conder, 2008).

6:2 Sulfonate (6:2 FTS), $F(CF_2)_6CH_2CH_2SO_3^-$, is a degradation product that may be formed at low concentrations from some DuPont™ Capstone® surfactant products. 6:2 FTS has rapid bioelimination, low toxicity, does not bioconcentrate and is not bioaccumulative according to global regulatory criteria. (DuPont 2007, DuPont, 2009).

8.4 Environmental profile comparisons

8.4.1 The Facts about Short-Chain Chemistry — C4 and C6

DuPont™ Capstone® repellents and surfactants, raw material and PFHxA, a degradation product, have Environmental, Health and Safety (EHS) characteristics that are as good as or better than comparable C4 materials.

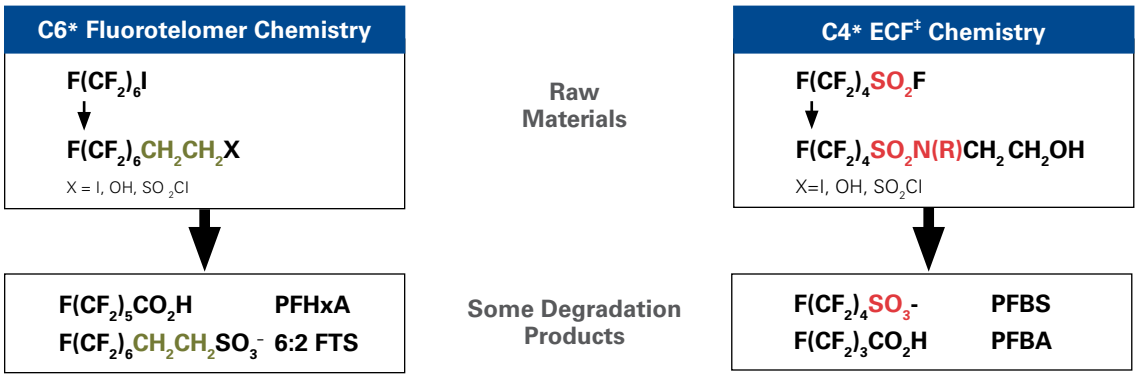
- Short-chains that do not degrade to PFOA or PFOS
- Low absorption and rapid bioelimination
- Do not bioconcentrate or bioaccumulate,
- Low mammalian and environmental toxicity

C4 or C6? It's not about the numbers. It's about having data on the product a customer purchases, the raw material used to make it and what the product may degrade to in the environment.

- For example, the scientific data shows that PFHxA, a degradation product from C6 chemistry, is eliminated faster in mammals than perfluorobutane sulfonate (PFBS), an ultimate degradation product from commercial C4 chemistry. (Chengelis, 2009b)

There are fundamental chemical, physical and biological property differences between products made from fluorotelomer chemistry and electrochemical fluorination (ECF) chemistry.

Figure 8.4.1 C6 Fluorotelomer and C4 ECF Chemistry are fundamentally different



*Number of fluorinated carbons

‡ECF = electrochemical fluorination

8.4.2 Not All "C6" are the Same

A very general, non-specific term for chemicals that contain six carbons is "C6" chemistry. When it comes to fluorinated substances, C6 chemicals are not "all the same."

The physical-chemical, bioelimination and toxicological properties of DuPont™ Capstone® repellent and surfactant products and raw materials are unique and different from other "C6" products such as perfluorohexane sulfonyl products [e.g., $C_6F_{13}SO_2N(R)$-] made by electrochemical fluorination (ECF).

- PFHxA and PFHxS both have six fluorinated carbons. The similarity ends there. These two substances are clearly very different from one another **(Table 8.4.2)**.

Table 8.4.2 Not all "C6" are the same. A Comparison: PFHxA and PFHxS

	PFHxA $F(CF_2)_5CO_2H$	**PFHxS** $F(CF_2)_6SO_3^-$
pKa (acidity)	2–3	Less than -1
Blood $t_{½}$ in Rats	0.05–0.2 days	1.5–30 days
Blood $t_{½}$ in Monkey	1 day	87–144 days
Bioaccumulation	Not Bioaccumulative	Bioaccumulative
Acute Oral LD50 (Male Rat)	2,000 mg/kg	No Data
One-Gen Repro/Developmental Toxicity NOAEL	M/F 100 mg/kg/day No effects on developmental or reproductive endpoints	M <0.3 mg/kg/day F >10 mg/kg/day No effects on developmental or reproductive endpoints at 10 mg/kg/day
Oral Repeated Dose (Male Rat) NOAEL	20 mg/kg/day 90 days	<10 mg/kg/day 28 days

- **Different physical-chemical properties:** The pKa (acidity) of PFHxA, a carboxylic acid, is three orders of magnitude (1000x) greater, therefore less acidic, than PFHxS, a sulfonic acid.

- **Different biological properties:** Perfluorohexanoic acid (PFHxA) has rapid bioelimination, low toxicity, does not bioconcentrate and is not bioaccumulative according to global regulatory criteria. PFHxA is significantly less toxic when repeatedly dosed to animals (Loveless, 2009) and has a half-life ($t_{½}$) in the blood of monkeys of less than 24-hours while the half-life for PFHxS is 100-days (Lieder, 2006).

In Summary

"C6" perfluorinated acids are not the same. Perfluorohexanoic acid (PFHxA) and perfluorohexane sulfonate (PFHxS), both "C6," are very different in physical, chemical and biological properties.

8.4.3 "C8" Sulfonates are not the same. 6:2 Fluorotelomer Sulfonate (FTS) compared to PFOS

6:2 FTS and PFOS both have eight carbons. 6:2 FTS contains two non-fluorinated carbons. This difference results in dramatic differences in physical-chemical properties and toxicity. These two substances have very different toxicity profiles **(Table 8.4.3)** and are clearly *very different* from one another.

Table 8.4.3 Comparison: 6:2 FTS and PFOS

	6:2 FTS $F(CF_2)_6CH_2CH_2SO_3^-$	**PFOS** $F(CF_2)_8SO_3^-$
pKa (acidity)	2–3	Less than -1
Acute Fish LD50	>107 mg/L	78 mg/L
Daphnia EC50	>109 mg/L	58 mg/L
Algae EC50	>96 mg/L	48.2 mg/L
90-Day Fish Early Life-Stage NOEC	2.62 mg/L	0.29 mg/L
Bioaccumulation	Not Bioaccumulative	Bioaccumulative
Acute Oral LD50 (Male Rat)	2,000 mg/kg	233 mg/kg
28-Day Rat Oral Repeated Dose NOAEL	15 mg/kg/day	1.77 mg/kg/day

In Summary

6:2 FTS is not a strong acid, has rapid bioelimination, and is not bioaccumulative. In stark contrast, PFOS is a strong acid, is biopersistent, and is bioaccumulative (European Union, 2006).

9. Chemical Management

Chemical Management

- DuPont™ Capstone® repellent and surfactant products are listed on global regulatory inventories.
- We work with customers regarding study data to qualify for specific labeling criteria, and to assure proper handling, use and disposal.
- Guidance for safe storage, handling, use and disposal of DuPont™ Capstone® repellent and surfactant products is given in technical bulletins and product safety data sheets

10. Regulatory

- DuPont™ Capstone® repellent and surfactant products are listed on existing global regulatory inventories, including the United States (TSCA) and Europe (REACH).
- The U.S. Environmental Protection Agency, Environment Canada and Health Canada, and NICNAS in Australia have reviewed and approved the manufacture, use and sale of short-chain products.
- DuPont™ Capstone® repellent and surfactant product approvals from regulatory agencies, such as the U.S. Environmental Protection Agency (EPA), U.S. Food & Drug Administration (FDA), Environment Canada and Health Canada, the German Federal Institute for Risk Assessment (BfR), and China Ministry of Health (MOH) include assessment of hazard, exposure, and risk when reviewing new chemicals before their manufacture, sale and use.
- DuPont™ Capstone® repellent and surfactant products meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.

  In January 2006, DuPont committed to participate in the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program to significantly reduce manufacturing emissions and product content levels of PFOA, its precursors and related higher homologues by 2010, and to work toward the elimination of those sources by 2015. In February 2007, the company committed to no longer make, buy or use PFOA by 2015, or earlier if possible.

  DuPont™ Capstone® repellents and surfactants have been evaluated through submissions of Pre-Manufacturing Notifications (PMNs), have been evaluated under the EPA New Chemical Program and Consent Orders have been granted. These products are alternatives under the EPA Long-Chain Perfluorinated Chemicals (PFCs) Action Plan.
- REACH: DuPont is ensuring that all DuPont™ Capstone® repellent and surfactant products sold to our EU and EEA customers by DuPont legal entities in Europe are in compliance with REACH regulatory requirements.

  DuPont™ Capstone® repellent and surfactant products to our current knowledge do not contain substances above the legal threshold that are on the Candidate List of Substances of Very High Concern (SCHC) as published on the ECHA website on 28th October 2008. Please contact your local DuPont representative if you have questions regarding the REACH status of DuPont™ Capstone® repellent and surfactant products.
- European Directive 2006/122 provides restrictions on the marketing and use of perfluorooctane sulfonate (PFOS) (amendment of Council Directive 76/769/EEC). PFOS is not used or added in the manufacture of DuPont products. In fact, DuPont products are based upon a different chemistry than that associated with PFOS. Please note that PFOA is not regulated as part of this directive, and there is no European Directive to regulate PFOA to date.

11. Broadly sharing DuPont scientific studies — DuPont continues to share broadly its scientific research.

In addition to product M/SDS and technical documents provided to customers, DuPont scientists have presented study results at international scientific conferences (e.g., Society of Toxicology, Society of Environmental Toxicology and Chemistry, American Chemical Society, and Canadian Chemical Society), trade shows/seminars, and universities around the world, and published scientific work in peer-reviewed scientific journals.

Importantly, DuPont has provided details of the studies conducted on products to regulatory agencies worldwide. These agencies include, but are not limited to, the following: U.S. Environmental Protection Agency (U.S. EPA); Environment & Health Canada; Norway: Norwegian Pollution Control Authority (SFT), Sweden: KEMI; Germany: Umwelt Bundes Amt (German EPA), Federal Institute for Risk Assessment (BfR); UK: Department of the Environment, Food and Rural Affairs, Health & Safety Executive, The Environment Agency; China: Ministry of Health and Ministry of Environment.

11.1 Peer-reviewed science

We have published papers across a broad spectrum of topical areas to openly share the results of our studies and gain reflection on our work from the global scientific community. The papers span topics including physical-chemical properties, analytical methods, toxicology, environmental fate, human exposure and risk assessment. Many of the papers are the product of collaborations with industrial and academic scientists outside DuPont. A number of the papers are highly cited (e.g., Prevedouros, 2006). A bibliography of publications is available upon request.

11.2 Analytical Methods

Reliable, robust, validated analytical methods are fundamental to sound science. We have published numerous papers to share the analytical methods we have developed. The matrices include water, air, consumer articles (Mawn, 2005), soil (Wang, 2009), and sludge (Wang, 2005a,b) as well as methods for accurate determination of physical properties such as vapor pressure, water solubility and partition coefficients.

With the widespread presence in the environment of some fluorinated substances such as PFOS and PFOA, there is interest in making measurements in many matrices. When requesting analysis on, for instance, wastewater, or any other matrix, from a contract laboratory, it is recommended to ask the laboratory for the analytical method and method validation report. The method describes the sample preparation and analysis procedures and the validation report provides documented evidence that the laboratory has validated the method for both the test sample matrix (e.g., wastewater) and the analyte(s) (e.g., PFOS, PFBS, PFOA) within the quantitation range (e.g., ppm, ppb) desired including method blanks, calibration and spiked control samples as well as the use of well characterized analyte standards.

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To learn more about DuPont™ Capstone® repellent and surfactant products, please contact your local sales representative.

Asia Pacific +886.2.2514.4412

Europe +33.1.41.97.45.59

North America 1-866-828-7009

Latin America +55.11.416.68.601

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DUPONT®

The miracles of science™

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 27.10.2015 Version number 1 Revision: 27.10.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: DX1025

1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the preparation: Fire fighting foam.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA.
Tel: +1 914-764-0202
Fax: 914 -764 - 0553.
info@dynaxcorp.com
www.dynaxcorp.com

Further information obtainable from:
REACH Only Representative
B-Lands Consulting
WTC, 5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: europa@reach-compliance.eu
Web: www.reachteam.eu

1.4 Emergency telephone number:

CHEMTREC: +1 703-741-5970.
NHS Direct: 111 (England and Scotland), 0845 46 47 (Wales).
Ireland - National Poisons Information Centre: +353 1 8379964.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
This product is not classified as hazardous according to Regulation (EC) No 1272/2008.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008: Not applicable.

Hazard pictograms: Not applicable.

Signal word: Not applicable.

Hazard statements: Not applicable.

Additional information:
Safety data sheet available on request.

2.3 Other hazards

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components:		
CAS: 107-21-1 EINECS: 203-473-3 Index number: 603-027-00-1	ethanediol Acute Tox. 4, H302	19-<22%

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CAS: 112-34-5 EINECS: 203-961-6 Index number: 603-096-00-8	2-(2-butoxyethoxy)ethanol Eye Irrit. 2, H319	7-<11%
CAS: 107-41-5 EINECS: 203-489-0 Index number: 603-053-00-3	2-methylpentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	4-<8%
CAS: 67-56-1 EINECS: 200-659-6 Index number: 603-001-00-X	Methanol Flam. Liq. 2, H225; Acute Tox. 3, H301; Acute Tox. 3, H311; Acute Tox. 3, H331; STOT SE 1, H370	1-<3%
CAS: 64-17-5 EINECS: 200-578-6 Index number: 603-002-00-5	ethanol Flam. Liq. 2, H225	1-<2%

Additional information: For the wording of the listed risk phrases refer to section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.

After skin contact: Generally the product does not irritate the skin.

After eye contact: Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing: Call for a doctor immediately.

4.2 Most important symptoms and effects, both acute and delayed
No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed
No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture
No further relevant information available.

5.3 Advice for firefighters

Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear protective clothing.

6.2 Environmental precautions Do not allow to enter sewers/ surface or ground water.

6.3 Methods and material for containment and cleaning up
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Ensure adequate ventilation.

6.4 Reference to other sections
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Ensure good ventilation/exhaustion at the workplace.

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Trade name: DX1025

Keep away from heat and direct sunlight.

Information about fire - and explosion protection: No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles:
Store in a cool, dry place in tightly closed receptacles.

Information about storage in one common storage facility: Not required.

Further information about storage conditions: None.

7.3 Specific end use(s): No further relevant information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:	
107-21-1 ethanediol	
WEL (Great Britain)	Short-term value: 104** mg/m³, 40** ppm Long-term value: 10* 52** mg/m³, 20** ppm Sk *particulate **vapour
IOELV (EU)	Short-term value: 104 mg/m³, 40 ppm Long-term value: 52 mg/m³, 20 ppm Skin
112-34-5 2-(2-butoxyethoxy)ethanol	
WEL (Great Britain)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
IOELV (EU)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
107-41-5 2-methylpentane-2,4-diol	
WEL (Great Britain)	Short-term value: 123 mg/m³, 25 ppm Long-term value: 123 mg/m³, 25 ppm
67-56-1 Methanol	
WEL (Great Britain)	Short-term value: 333 mg/m³, 250 ppm Long-term value: 266 mg/m³, 200 ppm Sk
IOELV (EU)	Long-term value: 260 mg/m³, 200 ppm Skin
64-17-5 ethanol	
WEL (Great Britain)	Long-term value: 1920 mg/m³, 1000 ppm

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures:
Wash hands before breaks and at the end of work.
Keep away from foodstuffs, beverages and feed.

Respiratory protection:
In case of brief exposure use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.

Protection of hands:

Protective gloves.

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The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.

Material of gloves:
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

Penetration time of glove material:
The exact break through time must be determined by the manufacturer of the protective gloves.

Eye protection:

Safety glasses with side-shields (EN 166).

Body protection: Protective work clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:	
Form:	Fluid
Colour:	Light yellow.
Odour:	Mild.
Odour threshold:	Not determined.
pH-value:	6-7
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
Flash point:	Not applicable.
Flammability (solid, gaseous):	Not applicable.
Ignition temperature:	Not determined.
Decomposition temperature:	Not determined.
Self-igniting:	Product is not selfigniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
Oxidising properties	Not determined.
Vapour pressure:	Not determined.
Density at 20 ℃:	1.18 g/cm³
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water:	Soluble.
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
Dynamic:	<100 cP's

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Trade name: DX1025

Kinematic: Not determined.

9.2 Other information No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity No data available.

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:
No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions
Reacts with reducing agents.
Reacts with strong oxidising agents.

10.4 Conditions to avoid No further relevant information available.

10.5 Incompatible materials No further relevant information available.

10.6 Hazardous decomposition products
Nitrogen oxides.
Carbon monoxide and carbon dioxide.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD/LC50 values:		
Oral	LD50	> 5000 mg/kg (Rat) (Not harmful)

Primary irritant effect:
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
STOT-single exposure: Based on available data, the classification criteria are not met.
STOT-repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity: No further relevant information available.

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

Additional ecological information

General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

12.5 Results of PBT and vPvB assessment
PBT: Not applicable.

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Trade name: DX1025

vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Recommendation: Disposal must be made according to official regulations.

Uncleaned packaging

Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

14.1 UN Number

ADR, ADN, IMDG, IATA Not applicable.

14.2 UN proper shipping name

ADR, ADN, IMDG, IATA Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA

Class Not applicable.

14.4 Packing group

ADR, IMDG, IATA Not applicable.

14.5 Environmental hazards

Marine pollutant: No

14.6 Special precautions for user

Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases

H225 Highly flammable liquid and vapour.
H301 Toxic if swallowed.
H302 Harmful if swallowed.
H311 Toxic in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H370 Causes damage to organs.

Abbreviations and acronyms:

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent

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LD50: Lethal dose, 50 percent
Flam. Liq. 2: Flammable liquids, Hazard Category 2
Acute Tox. 3: Acute toxicity, Hazard Category 3
Acute Tox. 4: Acute toxicity, Hazard Category 4
Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
STOT SE 1: Specific target organ toxicity - Single exposure, Hazard Category 1

DX1025

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 06/22/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DX1025

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Fire fighting foam

1.3. Details of the supplier of the safety data sheet

DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA
Tel: +1 914-764-0202
Fax: 914 -764 - 0553

Email: Chang.jho@dynaxcorp.com
info@dynaxcorp.com

Website: www.dynaxcorp.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: +1 800-424-9300 24 hours

2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Not classified

2.2. Label elements

GHS-US labelling

No labelling applicable

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixture

	Product identifier	%	GHS-US classification
Ethylene glycol	(CAS No) 107-21-1	15 - 25	Acute Tox. 4 (Oral), H302
Diethylene glycol monobutyl ether	(CAS No) 112-34-5	5 -10	Flam. Liq. 4, H227 Eye Irrit. 2A, H319
2,4-Pentanediol, 2-methyl-	(CAS No) 107-41-5	<7	Skin Irrit. 2, H315 Eye Irrit. 2A, H319
Methyl alcohol	(CAS No) 67-56-1	<3	Flam. Liq. 2, H225 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation:vapour), H331 STOT SE 1, H370

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. In all cases of doubt, or when symptoms persist, seek medical advice.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: get medical advice/attention.

First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Immediately call a POISON CENTER or doctor/physician. Obtain emergency medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: Causes eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand. Fight larger fires with spray or alcohol resistant foam.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Explosion hazard : In closed containers, pressure build up could result in distortion, blowing and in extreme cases bursting of the container. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source.

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : Thermal combustion may release carbon monoxide and dioxide. Nitrogen oxides (NOx). Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Stop leak if safe to do so. Eliminate all ignition sources if safe to do so. Spills of this product present a serious slipping hazard. Avoid breathing mist or vapor . Avoid contact with skin, eyes and clothing. Take precautionary measures against static discharge.

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labelled containers and dispose according to local legislation. Store away from other materials. Use only non-sparking tools. Take precautionary measures against static discharge. Dispose in a safe manner in accordance with local/national regulations. Do not allow to enter into surface water or drains. Ensure all national/local regulations are observed.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide good ventilation in process area to prevent formation of vapour. do not handle or store near heat, sparks, or any other potential ignition sources. Take precautionary measures against static discharge. Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools. Avoid all eye and skin contact and do not breathe vapour and mist. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle in accordance with good industrial hygiene and safety practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : A washing facility/water for eye and skin cleaning purposes should be present. Ensure adequate ventilation.

Storage conditions : Keep out of reach of children. Keep only in the original container in a cool, well ventilated place. Keep container tightly closed and dry. Keep container closed when not in use. Keep away from heat and direct sunlight. Keep away from food and drink.

Incompatible materials : Oxidizing agents. Reducing agents.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Diethylene glycol monobutyl ether (112-34-5)		
ACGIH	ACGIH TWA (ppm)	10 ppm (inhalable fraction and vapor)

Ethylene glycol (107-21-1)		
ACGIH	ACGIH Ceiling (mg/m³)	100 mg/m³ (aerosol only)

Methyl alcohol (67-56-1)		
ACGIH	ACGIH TWA (ppm)	200 ppm
ACGIH	ACGIH STEL (ppm)	250 ppm
OSHA	OSHA PEL (TWA) (mg/m³)	260 mg/m³
OSHA	OSHA PEL (TWA) (ppm)	200 ppm

2,4-Pentanediol, 2-methyl- (107-41-5)		
ACGIH	ACGIH Ceiling (ppm)	25 ppm

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment	:	Avoid all unnecessary exposure. Personal protective equipment should be selected based upon the conditions under which this product is handled or used. Protective goggles. Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection	:	Wear protective gloves. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.
Eye protection	:	Chemical goggles or safety glasses. with side-shields.
Skin and body protection	:	Long sleeved protective clothing. Antistatic non-skid safety shoes or boots.
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. In case of intensive or longer exposure use self-contained apparatus.
Other information	:	Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Yellow
Odour	:	Ammonia-like
Odour threshold	:	No data available
pH	:	5.5 - 6.5 (at 20 °C)
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	60 °C "non-flammable, does not sustain combustibility" in compliance with the requirements of the HMR and United Nations Transport of Dangerous Goods Manual of Tests and Criteria, fifth revised edition (2009), Test Method L.2 and to the CLP Annex I: 2.6.4.5 sustained combustibility test L.2, Part III, section 32 of the UN RTDG, Manual of Tests and Criteria.
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapour pressure	:	No data available
Relative vapour density at 20 °C	:	No data available
Relative density	:	No data available
Density	:	1.18 g/cm³ at 20°C
Solubility	:	Water: Fully miscible
Log Pow	:	No data available
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. heat/sparks/open flames/hot surfaces.

10.5. Incompatible materials

Oxidizing agents. Reducing agents.

10.6. Hazardous decomposition products

Fume. Carbon monoxide. Carbon dioxide. Nitrogen oxides (NOx).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

(Based on available data, the classification criteria are not met. On basis of test data.)

DX1025	
LD50 oral rat	> 5000 mg/kg (On basis of test data.)

Diethylene glycol monobutyl ether (112-34-5)	
LD50 oral rat	3384 mg/kg
LD50 dermal rabbit	2700 mg/kg
ATE US (oral)	3384.000 mg/kg bodyweight
ATE US (dermal)	2700.000 mg/kg bodyweight

Ethylene glycol (107-21-1)	
LD50 oral rat	4000 - 10200 mg/kg
LD50 dermal rat	10600 mg/kg
LD50 dermal rabbit	9530 µl/kg
ATE US (oral)	500.000 mg/kg bodyweight
ATE US (dermal)	10600.000 mg/kg bodyweight

Methyl alcohol (67-56-1)	
LC50 inhalation rat (ppm)	22500 ppm (Exposure time: 8 h)
ATE US (dermal)	300.000 mg/kg bodyweight
ATE US (vapours)	3.000 mg/l/4h

2,4-Pentanediol, 2-methyl- (107-41-5)	
LD50 oral rat	3692 mg/kg
LC50 inhalation rat (mg/l)	> 310 mg/m³ (Exposure time: 1 h)
ATE US (oral)	3692.000 mg/kg bodyweight

Skin corrosion/irritation : Not classified

(Based on available data, the classification criteria are not met)

pH: 5.5 - 6.5 (at 20 °C)

Serious eye damage/irritation : Not classified

(Conclusive but not sufficient for classification. On basis of test data.)

pH: 5.5 - 6.5 (at 20 °C)

Respiratory or skin sensitisation : Not classified

(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified

(Based on available data, the classification criteria are not met)

Carcinogenicity : Not classified

(Based on available data, the classification criteria are not met)

Reproductive toxicity : Not classified

(Based on available data, the classification criteria are not met)

Specific target organ toxicity (single exposure) : Not classified
(Based on available data, the classification criteria are not met)

Specific target organ toxicity (repeated exposure) : Not classified
(Based on available data, the classification criteria are not met)

Aspiration hazard : Not classified
(Based on available data, the classification criteria are not met)

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: Causes eye irritation.

SECTION 12: Ecological information

12.1. Toxicity

Diethylene glycol monobutyl ether (112-34-5)	
LC50 fish 1	1300 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
EC50 Daphnia 1	> 100 mg/l (Exposure time: 48 h - Species: Daphnia magna)

Ethylene glycol (107-21-1)	
LC50 fish 1	41000 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss)
EC50 Daphnia 1	46300 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	14 - 18 ml/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])

2,4-Pentanediol, 2-methyl- (107-41-5)	
LC50 fish 1	10500 - 11000 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	2700 - 3700 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	10000 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])

12.2. Persistence and degradability

DX1025	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

DX1025	
Bioaccumulative potential	Not established.

Diethylene glycol monobutyl ether (112-34-5)	
BCF fish 1	(no bioconcentration expected)

Ethylene glycol (107-21-1)	
Log Pow	-1.93

2,4-Pentanediol, 2-methyl- (107-41-5)	
Log Pow	< 0.14

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No additional information available

Effect on the global warming : No additional information available

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Dispose of in accordance with relevant local regulations. Do not allow to enter into surface water or drains.

Additional information : Prevent contamination of soil, drains and surface waters. Do not re-use empty containers. Do not allow product to reach sewage system.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA. Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

Ethylene glycol (107-21-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
EPA TSCA Regulatory Flag	Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 313 - Emission Reporting	1.0 %

Methyl alcohol (67-56-1)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 313 - Emission Reporting	1.0 %

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 3 - Combustible Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Ethylene glycol (107-21-1)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 1 Subdivision B - Toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects

2,4-Pentanediol, 2-methyl- (107-41-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Ethylene glycol (107-21-1)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]
No additional information available

Classification according to Directive 67/548/EEC or 1999/45/EC

No additional information available

15.2.2. National regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Japanese ISHL (Industrial Safety and Health Law) Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)

Ethylene glycol (107-21-1)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

Methyl alcohol (67-56-1)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
No	Yes	No	No	

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

Acute Tox. 3 (Dermal)	Acute toxicity (dermal) Category 3
Acute Tox. 3 (Inhalation:vapour)	Acute toxicity (inhalation:vapour) Category 3
Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Eye Irrit. 2A	Serious eye damage/eye irritation, Category 2A
Flam. Liq. 2	Flammable liquids Category 2
Flam. Liq. 4	Flammable liquids Category 4
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 1	Specific target organ toxicity (single exposure) Category 1
H225	Highly flammable liquid and vapour
H227	Combustible liquid
H302	Harmful if swallowed
H311	Toxic in contact with skin
H315	Causes skin irritation
H319	Causes serious eye irritation
H331	Toxic if inhaled
H370	Causes damage to organs

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Dynax Corporation
79 Westchester Avenue
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
info@dynaxcorp.com

dynax

Technical Bulletin

DYNAX DX1025 FLUOROSURFACTANT

Dynax DX1025 is a blend of all C6 fluorotelomer-based fluorosurfactants that can lower the surface tension of aqueous solutions down to 17 dyne/cm at very low concentrations. DX1025 has been designed mainly for the formulation of fire-fighting foam concentrates such as Aqueous Film Forming Foam (AFFF) and Alcohol-Resistant Aqueous Film Forming Foam (AR-AFFF).

Typical Properties[1]

Appearance	Clear, yellowish liquid
Ionic Character	Blend
Composition	39-41 % Actives 35-37 % Solvents Remainder: Water
Density	1.18 g/ml (@25^{o}C)
Viscosity	20-40 cP's (Brookfield DV-E spindle #3, speed 50, temp. 25^{0}C)
Flammability	Non Flammable
pH	6-7
Solubility	DX1025 can be diluted directly in water.
Stability	At least one year if stored in original containers at temperatures not exceeding 50^{o}C (122^{o}F).
Storage	DX1025 should be stored at temperatures above 5^{o}C. If frozen or a solid phase separates out, warm the product to room temperature and mix it well before use. Freezing and thawing will not affect the properties of the product or its performance.

[1]Not for specifications

Surface Tension Data

% Actives in distilled water	Surface Tension (dynes/cm)
0.1	15.7
0.01	16.9
0.001	27.5

By Wilhelmy Plate Method: KRÜSS Force Tensiometer K100C

Product Safety

DX1025 is not derived from PFOS (Perfluorooctyl Sulfonate) or from PFOA (Perfluorooctanoic Acid). DX1025 does not degrade into PFOS or PFOA. DX1025 meets the objectives of the US EPA 2010/15 PFOA Stewardship Program.

.

DX1025 is not an irritant on skin (Rat).
It is a minimal irritant on eyes (Rabbit).
The acute oral LD_{50} for albino rats is greater than 5000 mg/kg.

Precautions and First Aid

DX1025 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof is not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

***

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 01.10.2015 Version number 1 Revision: 01.10.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: DX1026

1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the preparation: Fire fighting foam.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA.
Tel: +1 914-764-0202
Fax: 914 -764 - 0553.
info@dynaxcorp.com
www.dynaxcorp.com

Further information obtainable from:
REACH Only Representative
B-Lands Consulting
WTC, 5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: europa@reach-compliance.eu
Web: www.reachteam.eu

1.4 Emergency telephone number:

CHEMTREC: +1 703-741-5970.
NHS Direct: 111 (England and Scotland), 0845 46 47 (Wales).
Ireland - National Poisons Information Centre: +353 1 8379964.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
This product is not classified as hazardous according to Regulation (EC) No 1272/2008.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008: Not applicable.

Hazard pictograms: Not applicable.

Signal word: Not applicable.

Hazard statements: Not applicable.

Additional information:
Safety data sheet available on request.

2.3 Other hazards

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components:		
CAS: 107-21-1 EINECS: 203-473-3 Index number: 603-027-00-1	ethanediol Acute Tox. 4, H302	28-<31%

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CAS: 112-34-5 EINECS: 203-961-6 Index number: 603-096-00-8	2-(2-butoxyethoxy)ethanol Eye Irrit. 2, H319	4-<7%
CAS: 107-41-5 EINECS: 203-489-0 Index number: 603-053-00-3	2-methylpentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	2-<5%
CAS: 75-65-0 EINECS: 200-889-7 Index number: 603-005-00-1	2-methylpropan-2-ol Flam. Liq. 2, H225; Acute Tox. 4, H332; Eye Irrit. 2, H319; STOT SE 3, H335	1-<4%

Additional information: For the wording of the listed risk phrases refer to section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.

After skin contact: Generally the product does not irritate the skin.

After eye contact: Rinse opened eye for several minutes under running water.

After swallowing: If symptoms persist consult doctor.

4.2 Most important symptoms and effects, both acute and delayed
No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed
No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture
No further relevant information available.

5.3 Advice for firefighters

Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
No special measures required.

6.2 Environmental precautions
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.

6.3 Methods and material for containment and cleaning up
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

6.4 Reference to other sections
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling No special measures required.

Information about fire - and explosion protection: No special measures required.

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Trade name: DX1026

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles: No special requirements.

Information about storage in one common storage facility: Not required.

Further information about storage conditions: None.

7.3 Specific end use(s): No further relevant information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:	
107-21-1 ethanediol	
WEL (Great Britain)	Short-term value: 104** mg/m³, 40** ppm Long-term value: 10* 52** mg/m³, 20** ppm Sk *particulate **vapour
IOELV (EU)	Short-term value: 104 mg/m³, 40 ppm Long-term value: 52 mg/m³, 20 ppm Skin
112-34-5 2-(2-butoxyethoxy)ethanol	
WEL (Great Britain)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
IOELV (EU)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
107-41-5 2-methylpentane-2,4-diol	
WEL (Great Britain)	Short-term value: 123 mg/m³, 25 ppm Long-term value: 123 mg/m³, 25 ppm
75-65-0 2-methylpropan-2-ol	
WEL (Great Britain)	Short-term value: 462 mg/m³, 150 ppm Long-term value: 308 mg/m³, 100 ppm

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures: Wash hands before breaks and at the end of work.

Respiratory protection: Not required.

Protection of hands:

Protective gloves.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Eye protection:

Safety glasses with side-shields (EN 166).

Body protection: Protective work clothing.

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Trade name: DX1026

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:	
Form:	Liquid.
Colour:	Light yellow.
Odour:	Mild.
Odour threshold:	Not determined.
pH-value at 20 ℃:	6.5-9
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
Flash point:	Not applicable.
Flammability (solid, gaseous):	Not applicable.
Ignition temperature:	Not determined.
Decomposition temperature:	Not determined.
Self-igniting:	Product is not selfigniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
Oxidising properties	Not determined.
Vapour pressure:	Not determined.
Density:	1.18 g/cm³
Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water:	Soluble.
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
Dynamic:	180 - 220 cP's
Kinematic:	Not determined.

9.2 Other information No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity No data available.

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:
No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions

Reacts with strong oxidising agents.
Reacts with reducing agents.

10.4 Conditions to avoid No further relevant information available.

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Trade name: DX1026

10.5 Incompatible materials No further relevant information available.

10.6 Hazardous decomposition products
Carbon monoxide and carbon dioxide.
Nitrogen oxides (NOx)
Sulphur oxides (SOx)
Danger of toxic fluorine based pyrolysis products.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD/LC50 values:		
Oral	LD50	5000 mg/kg (Rat) (Not harmful)

Primary irritant effect:
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
STOT-single exposure: Based on available data, the classification criteria are not met.
STOT-repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity: No further relevant information available.

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

Additional ecological information

General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

12.5 Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Recommendation:
Disposal must be made according to official regulations.
Do not allow product to reach sewage system.

Uncleaned packaging
Recommendation: Disposal must be made according to official regulations.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 01.10.2015 Version number 1 Revision: 01.10.2015

Trade name: DX1026

SECTION 14: Transport information

14.1 UN Number
ADR, ADN, IMDG, IATA Not applicable.

14.2 UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA
Class Not applicable.

14.4 Packing group
ADR, IMDG, IATA Not applicable.

14.5 Environmental hazards
Marine pollutant: No

14.6 Special precautions for user
Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.

Abbreviations and acronyms:
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
ICAO: International Civil Aviation Organisation
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Flam. Liq. 2: Flammable liquids, Hazard Category 2
Acute Tox. 4: Acute toxicity, Hazard Category 4
Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3

DX1026

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 06/22/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DX1026

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Fire fighting foam

1.3. Details of the supplier of the safety data sheet

DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA
Tel: +1 914-764-0202
Fax: 914 -764 - 0553

Email: Chang.jho@dynaxcorp.com
info@dynaxcorp.com

Website: www.dynaxcorp.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: +1 800-424-9300 24 hours

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Not classified

2.2. Label elements

GHS-US labelling

No labelling applicable

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Ethylene glycol	(CAS No) 107-21-1	25 - 50	Acute Tox. 4 (Oral), H302
Diethylene glycol monobutyl ether	(CAS No) 112-34-5	5 - 10	Flam. Liq. 4, H227 Eye Irrit. 2A, H319
2,4-Pentanediol, 2-methyl-	(CAS No) 107-41-5	<4	Skin Irrit. 2, H315 Eye Irrit. 2A, H319
tert-Butyl alcohol	(CAS No) 75-65-0	<3	Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation), H332 Eye Irrit. 2A, H319 STOT SE 3, H335

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. In all cases of doubt, or when symptoms persist, seek medical advice.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: get medical advice/attention.

First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Immediately call a POISON CENTER or doctor/physician. Obtain emergency medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: May irritate eyes.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand. Fight larger fires with spray or alcohol resistant foam.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Explosion hazard : In closed containers, pressure build up could result in distortion, blowing and in extreme cases bursting of the container. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source.

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : Thermal combustion may release carbon monoxide and dioxide. Nitrogen oxides (NOx). Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Stop leak if safe to do so. Eliminate all ignition sources if safe to do so. Spills of this product present a serious slipping hazard. Avoid breathing mist or vapor . Avoid contact with skin, eyes and clothing. Take precautionary measures against static discharge.

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labelled containers and dispose according to local legislation. Store away from other materials. Use only non-sparking tools. Take precautionary measures against static discharge. Dispose in a safe manner in accordance with local/national regulations. Do not allow to enter into surface water or drains. Ensure all national/local regulations are observed.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide good ventilation in process area to prevent formation of vapour. do not handle or store near heat, sparks, or any other potential ignition sources. Take precautionary measures against static discharge. Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools. Avoid all eye and skin contact and do not breathe vapour and mist. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle in accordance with good industrial hygiene and safety practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : A washing facility/water for eye and skin cleaning purposes should be present. Ensure adequate ventilation.

Storage conditions : Keep out of reach of children. Keep only in the original container in a cool, well ventilated place. Keep container tightly closed and dry. Keep container closed when not in use. Keep away from heat and direct sunlight. Keep away from food and drink.

Incompatible materials : Oxidizing agents. Reducing agents.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Diethylene glycol monobutyl ether (112-34-5)		
ACGIH	ACGIH TWA (ppm)	10 ppm (inhalable fraction and vapor)

Ethylene glycol (107-21-1)		
ACGIH	ACGIH Ceiling (mg/m³)	100 mg/m³ (aerosol only)

tert-Butyl alcohol (75-65-0)		
ACGIH	ACGIH TWA (ppm)	100 ppm
OSHA	OSHA PEL (TWA) (mg/m³)	300 mg/m³
OSHA	OSHA PEL (TWA) (ppm)	100 ppm

2,4-Pentanediol, 2-methyl- (107-41-5)		
ACGIH	ACGIH Ceiling (ppm)	25 ppm

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment	:	Avoid all unnecessary exposure. Personal protective equipment should be selected based upon the conditions under which this product is handled or used. Protective goggles. Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection	:	Wear protective gloves. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.
Eye protection	:	Chemical goggles or safety glasses. with side-shields.
Skin and body protection	:	Long sleeved protective clothing. Antistatic non-skid safety shoes or boots.
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. In case of intensive or longer exposure use self-contained apparatus.
Other information	:	Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Yellow
Odour	:	Ammonia-like
Odour threshold	:	No data available
pH	:	7-9 at 20°C
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	60 °C "non-flammable, does not sustain combustibility" in compliance with the requirements of the HMR and United Nations Transport of Dangerous Goods Manual of Tests and Criteria, fifth revised edition (2009), Test Method L.2 and to the CLP Annex I: 2.6.4.5 sustained combustibility test L.2, Part III, section 32 of the UN RTDG, Manual of Tests and Criteria.
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	Not applicableble
Vapour pressure	:	No data available
Relative vapour density at 20 °C	:	No data available
Relative density	:	No data available
Density	:	1.18 g/cm³ at 20°C
Solubility	:	Water: Fully miscible
Log Pow	:	No data available
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. heat/sparks/open flames/hot surfaces.

10.5. Incompatible materials

Oxidizing agents. Reducing agents.

10.6. Hazardous decomposition products

Fume. Carbon monoxide. Carbon dioxide. Nitrogen oxides (NOx).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

(Based on available data, the classification criteria are not met. On basis of test data.)

DX1026	
LD50 oral rat	> 5000 mg/kg

Diethylene glycol monobutyl ether (112-34-5)	
LD50 oral rat	3384 mg/kg
LD50 dermal rabbit	2700 mg/kg
ATE US (oral)	3384.000 mg/kg bodyweight
ATE US (dermal)	2700.000 mg/kg bodyweight

Ethylene glycol (107-21-1)	
LD50 oral rat	4000 - 10200 mg/kg
LD50 dermal rat	10600 mg/kg
LD50 dermal rabbit	9530 µl/kg
ATE US (oral)	500.000 mg/kg bodyweight
ATE US (dermal)	10600.000 mg/kg bodyweight

tert-Butyl alcohol (75-65-0)	
LD50 oral rat	2200 mg/kg
LD50 dermal rabbit	> 2 g/kg
LC50 inhalation rat (ppm)	> 10000 ppm/4h
ATE US (oral)	2200.000 mg/kg bodyweight
ATE US (gases)	4500.000 ppmv/4h
ATE US (vapours)	11.000 mg/l/4h
ATE US (dust,mist)	1.500 mg/l/4h

2,4-Pentanediol, 2-methyl- (107-41-5)	
LD50 oral rat	3692 mg/kg
LC50 inhalation rat (mg/l)	> 310 mg/m³ (Exposure time: 1 h)
ATE US (oral)	3692.000 mg/kg bodyweight

Skin corrosion/irritation : Not classified

(Based on available data, the classification criteria are not met)

pH: 6 - 7 at 20°C

Serious eye damage/irritation : Not classified

(Conclusive but not sufficient for classification. On basis of test data.)

pH: 6 - 7 at 20°C

Respiratory or skin sensitisation : Not classified

(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified

(Based on available data, the classification criteria are not met)

Carcinogenicity : Not classified

(Based on available data, the classification criteria are not met)

tert-Butyl alcohol (75-65-0)	
National Toxicology Program (NTP) Status	1 - Evidence of Carcinogenicity

Reproductive toxicity : Not classified
(Based on available data, the classification criteria are not met)

Specific target organ toxicity (single exposure) : Not classified
(Based on available data, the classification criteria are not met)

Specific target organ toxicity (repeated exposure) : Not classified
(Based on available data, the classification criteria are not met)

Aspiration hazard : Not classified
(Based on available data, the classification criteria are not met)

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: May irritate eyes.

SECTION 12: Ecological information

12.1. Toxicity

Diethylene glycol monobutyl ether (112-34-5)	
LC50 fish 1	1300 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
EC50 Daphnia 1	> 100 mg/l (Exposure time: 48 h - Species: Daphnia magna)

Ethylene glycol (107-21-1)	
LC50 fish 1	41000 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss)
EC50 Daphnia 1	46300 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	14 - 18 ml/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])

tert-Butyl alcohol (75-65-0)	
LC50 fish 1	6130 - 6700 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	933 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 Daphnia 2	4607 - 6577 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])

2,4-Pentanediol, 2-methyl- (107-41-5)	
LC50 fish 1	10500 - 11000 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	2700 - 3700 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	10000 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])

12.2. Persistence and degradability

DX1026	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

DX1026	
Bioaccumulative potential	Not established.

Diethylene glycol monobutyl ether (112-34-5)	
BCF fish 1	(no bioconcentration expected)

Ethylene glycol (107-21-1)	
Log Pow	-1.93

tert-Butyl alcohol (75-65-0)	
BCF fish 1	1.09
Log Pow	0.35

2,4-Pentanediol, 2-methyl- (107-41-5)	
Log Pow	< 0.14

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No additional information available

Effect on the global warming : No additional information available

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Dispose of in accordance with relevant local regulations. Do not allow to enter into surface water or drains.

Additional information : Prevent contamination of soil, drains and surface waters. Do not re-use empty containers. Do not allow product to reach sewage system.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA. Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

Ethylene glycol (107-21-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
EPA TSCA Regulatory Flag	Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 313 - Emission Reporting	1.0 %

tert-Butyl alcohol (75-65-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 %

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 3 - Combustible Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Ethylene glycol (107-21-1)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 1 Subdivision B - Toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects

tert-Butyl alcohol (75-65-0)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 2 - Flammable Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

2,4-Pentanediol, 2-methyl- (107-41-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Ethylene glycol (107-21-1)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

tert-Butyl alcohol (75-65-0)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]
No additional data available

Classification according to Directive 67/548/EEC or 1999/45/EC

No additional data available

15.2.2. National regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Japanese ISHL (Industrial Safety and Health Law) Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)

Ethylene glycol (107-21-1)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)

tert-Butyl alcohol (75-65-0)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

No additional data available

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Eye Irrit. 2A	Serious eye damage/eye irritation, Category 2A
Flam. Liq. 2	Flammable liquids Category 2
Flam. Liq. 4	Flammable liquids Category 4
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H225	Highly flammable liquid and vapour
H227	Combustible liquid
H302	Harmful if swallowed
H315	Causes skin irritation
H319	Causes serious eye irritation
H332	Harmful if inhaled
H335	May cause respiratory irritation

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Dynax Corporation
79 Westchester Avenue
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
info@dynaxcorp.com

Technical Bulletin

DYNAX DX1026 FLUOROSURFACTANT

Dynax DX1026 is a blend of fluorosurfactants that can lower the surface tension of aqueous solutions down to 16.5 dyne/cm at very low concentrations. DX1026 has been designed for both synthetic and protein-based film-forming foam concentrates, such as AFFF, FFFP, AR-AFFF and AR-FFFP.

Typical Properties[1]

Appearance	Clear, yellowish liquid
Ionic Character	Blend
Composition	35-37 % Actives 39-41 % Solvents Remainder: Water
Density	1.18 g/ml (@25^{o}C)
Viscosity	180-220 cP's (Brookfield DV-E spindle #3, speed 20, temp. 25^{0}C)
Flammability	Non-Flammable
pH	6.5-9
Solubility	DX1026 can be diluted directly in water.
Stability	At least one year if stored in original containers at temperatures not exceeding 50^{o}C (122^{o}F).
Storage	DX1026 should be stored at temperatures above 5^{o}C. If frozen or a solid phase separates out, warm the product to room temperature and mix it well before use. Freezing and thawing will not affect the properties of the product or its performance.

[1]Not for specifications

Surface Tension Data

% Actives in distilled water	Surface Tension (dynes/cm)
0.1	15.7
0.01	18.3
0.001	41.4

By Wilhelmy Plate Method: KRÜSS Force Tensiometer K100C

Product Safety

DX1026 is not derived from PFOS (Perfluorooctyl Sulfonate) or from PFOA (Perfluorooctanoic Acid). DX1026 does not degrade into PFOS or PFOA. DX1026 meets the objectives of the US EPA 2010/15 PFOA Stewardship Program.

DX1026 is not an irritant on skin.
It is a minimal irritant on eyes.
The acute oral LD_{50} for albino rats is greater than 5,000 mg/kg.

Precautions and First Aid

DX1026 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof is not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

***

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 30.09.2015 Version number 6 Revision: 30.09.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: DX1030

1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the preparation: Fire fighting foam.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA.
Tel: +1 914-764-0202
Fax: 914 -764 - 0553.
info@dynaxcorp.com
www.dynaxcorp.com

Further information obtainable from:
B-Lands Consulting
WTC, 5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: clients@reachteam.eu
www.reachteam.eu

1.4 Emergency telephone number:

CHEMTREC: +1 703-741-5970.
NHS Direct: 111 (England and Scotland), 0845 46 47 (Wales).
Ireland - National Poisons Information Centre: +353 1 8379964.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
This product is not classified as hazardous according to Regulation (EC) No 1272/2008.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008: Not applicable.

Hazard pictograms: Not applicable.

Signal word: Not applicable.

Hazard statements: Not applicable.

Additional information:
Safety data sheet available on request.

2.3 Other hazards

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components:		
CAS: 107-41-5 EINECS: 203-489-0 Index number: 603-053-00-3	2-methylpentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	15-<17%

Additional information: For the wording of the listed risk phrases refer to section 16.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 30.09.2015 Version number 6 Revision: 30.09.2015

Trade name: DX1030

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.

After skin contact: Generally the product does not irritate the skin.

After eye contact: Rinse opened eye for several minutes under running water.

After swallowing: If symptoms persist consult doctor.

4.2 Most important symptoms and effects, both acute and delayed

No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture

No further relevant information available.

5.3 Advice for firefighters

Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

No special measures required.

6.2 Environmental precautions Do not allow to enter sewers/ surface or ground water.

6.3 Methods and material for containment and cleaning up

Ensure adequate ventilation.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

6.4 Reference to other sections

See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling Ensure good ventilation/exhaustion at the workplace.

Information about fire - and explosion protection: No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles: No special requirements.

Information about storage in one common storage facility: Not required.

Further information about storage conditions: None.

7.3 Specific end use(s): No further relevant information available.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 30.09.2015 Version number 6 Revision: 30.09.2015

Trade name: DX1030

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:	
107-41-5 2-methylpentane-2,4-diol	
WEL (Great Britain)	Short-term value: 123 mg/m³, 25 ppm Long-term value: 123 mg/m³, 25 ppm

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures: Wash hands before breaks and at the end of work.

Respiratory protection: Not required.

Protection of hands:

Protective gloves.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Eye protection:

Safety glasses with side-shields (EN 166).

Body protection: Protective work clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:
Form: Liquid.
Colour: Light yellow.

Odour: Mild.
Odour threshold: Not determined.

pH-value: 6.5 - 7.5

Melting point/Melting range: Not determined.

Boiling point/Boiling range: Not determined.

Flash point: Not applicable.
Not determined.

Flammability (solid, gaseous): Not applicable.

Ignition temperature: Not determined.

Decomposition temperature: Not determined.

Self-igniting: Product is not selfigniting.

Danger of explosion: Product does not present an explosion hazard.

Explosion limits:
Lower: Not determined.

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Trade name: DX1030

Upper:	Not determined.
Oxidising properties	Not determined.
Vapour pressure:	Not determined.
Density:	1.23 g/cm³
Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with Water:	Soluble.
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
Dynamic:	<100 cP's
Kinematic:	Not determined.
9.2 Other information	No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity No further relevant information available.

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:
No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions

Reacts with strong oxidising agents.
Reacts with reducing agents.

10.4 Conditions to avoid No further relevant information available.

10.5 Incompatible materials No further relevant information available.

10.6 Hazardous decomposition products

Carbon monoxide and carbon dioxide.
Nitrogen oxides (NOx)
Sulphur oxides (SOx)
Danger of toxic fluorine based pyrolysis products.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD/LC50 values:		
Oral	LD50	>5000 mg/kg (Rat) (Not harmful)

Primary irritant effect:
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
STOT-single exposure: Based on available data, the classification criteria are not met.
STOT-repeated exposure: Based on available data, the classification criteria are not met.

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Trade name: DX1030

Aspiration hazard: Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity:	
LC50/48h	470 mg/L (Daphnia Magna) (Not Harmful)
LC50/96h	650 mg/L (Pimephales Promelas (Fathead Minnow)) (Not Harmful)

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

Additional ecological information

General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

12.5 Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Recommendation: Do not allow product to reach sewage system.

Uncleaned packaging
Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

14.1 UN Number
ADR, ADN, IMDG, IATA Not applicable.

14.2 UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA
Class Not applicable.

14.4 Packing group
ADR, IMDG, IATA Not applicable.

14.5 Environmental hazards
Marine pollutant: No

14.6 Special precautions for user Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

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according to 1907/2006/EC, Article 31

Printing date 30.09.2015 Version number 6 Revision: 30.09.2015

Trade name: DX1030

15.2 Chemical safety assessment A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Abbreviations and acronyms:
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
ICAO: International Civil Aviation Organisation
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2

DX1030

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 06/22/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DX1030

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Fire fighting foam

1.3. Details of the supplier of the safety data sheet

DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA
Tel: +1 914-764-0202
Fax: 914 -764 - 0553

Email: Chang.jho@dynaxcorp.com
info@dynaxcorp.com

Website: www.dynaxcorp.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: +1 800-424-9300 24 hours

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Not classified

2.2. Label elements

GHS-US labelling

No labelling applicable

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
2,4-Pentanediol, 2-methyl-	(CAS No) 107-41-5	10 - 20	Skin Irrit. 2, H315 Eye Irrit. 2A, H319

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. In all cases of doubt, or when symptoms persist, seek medical advice.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse. Obtain medical attention if irritation persists.

First-aid measures after eye contact : In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists.

First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Immediately call a POISON CENTER or doctor/physician. Get medical advice/ attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after skin contact : Prolonged or repeated contact with the skin may cause dermatitis.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: May cause eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand. Fight larger fires with spray or alcohol resistant foam.

Unsuitable extinguishing media : Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

No additional information available

5.3. Advice for firefighters

Firefighting instructions : Cool closed containers exposed to fire with water spray. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : On heating, there is a risk of bursting due to internal pressure build-up. Cool down the containers exposed to heat with a water spray. Thermal combustion may release carbon monoxide and dioxide. nitrogen oxides (NOx) and sulphur oxides. Danger of toxic fluorine based pyrolysis products.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labelled containers and dispose according to local legislation. Store away from other materials. Do not allow to enter into surface water or drains. Ensure all national/local regulations are observed. Dispose in a safe manner in accordance with local/national regulations.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide good ventilation in process area to prevent formation of vapour. Provide local exhaust or general room ventilation to minimize vapour concentrations. do not handle or store near heat, sparks, or any other potential ignition sources. Avoid all eye and skin contact and do not breathe vapour and mist.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle in accordance with good industrial hygiene and safety practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : A washing facility/water for eye and skin cleaning purposes should be present. Ensure adequate ventilation.

Storage conditions : Keep out of reach of children. Keep only in the original container in a cool, well ventilated place. Keep container tightly closed and dry. Keep container closed when not in use. Keep away from heat and direct sunlight. Keep away from food and drink.

Incompatible materials : Oxidizing agents. Reducing agents.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

2,4-Pentanediol, 2-methyl- (107-41-5)		
ACGIH	ACGIH Ceiling (ppm)	25 ppm

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation.

Personal protective equipment : Avoid all unnecessary exposure. Personal protective equipment should be selected based upon the conditions under which this product is handled or used. Protective goggles. Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection : Wear protective gloves. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

Eye protection : Chemical goggles or safety glasses. with side-shields.

Skin and body protection : Long sleeved protective clothing.

Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment.

Other information : Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid

Colour : Light yellow

Odour : No data available

Odour threshold : No data available

pH : 6.5-7.5 at 20°C

Relative evaporation rate (butyl acetate=1) : No data available

Melting point : No data available

Freezing point : No data available

Boiling point : 100 °C (212 °F)

Flash point : > 95 °C (> 203 °F) (flammability does not apply)

Auto-ignition temperature : No data available

Decomposition temperature : No data available

Flammability (solid, gas) : Not applicable

Vapour pressure : No data available

Relative vapour density at 20 °C : No data available

Relative density : No data available

Density : 1.23 g/cm³ at 20°C

Solubility : Water: Fully miscible

Log Pow : No data available

Log Kow : No data available

Viscosity, kinematic : No data available

Viscosity, dynamic : No data available

Explosive properties : No data available
Oxidising properties : No data available
Explosive limits : No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. heat/sparks/open flames/hot surfaces.

10.5. Incompatible materials

Oxidizing agents. Reducing agents.

10.6. Hazardous decomposition products

Thermal decomposition can lead to the escape of irritating gases and vapours. Fume. Carbon monoxide. Carbon dioxide. Sulfur oxides. Nitrogen oxides. Danger of toxic fluorine based pyrolysis products.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified
(Based on available data, the classification criteria are not met)

DX1030	
LD50 oral rat	> 5000 mg/kg On basis of test data

2,4-Pentanediol, 2-methyl- (107-41-5)	
LD50 oral rat	3692 mg/kg
LC50 inhalation rat (mg/l)	> 310 mg/m³ (Exposure time: 1 h)
ATE US (oral)	3692.000 mg/kg bodyweight

Skin corrosion/irritation : Not classified
(Conclusive but not sufficient for classification. On basis of test data.)
pH: 7 at 20°C

Serious eye damage/irritation : Not classified
(Conclusive but not sufficient for classification. On basis of test data.)
pH: 7 at 20°C

Respiratory or skin sensitisation : Not classified
(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified
(Based on available data, the classification criteria are not met)

Carcinogenicity : Not classified
(Based on available data, the classification criteria are not met)

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified
(Based on available data, the classification criteria are not met)

Specific target organ toxicity (repeated exposure) : Not classified
(Based on available data, the classification criteria are not met)

Aspiration hazard : Not classified
(Based on available data, the classification criteria are not met)

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after skin contact : Prolonged or repeated contact with the skin may cause dermatitis.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: May cause eye irritation.

SECTION 12: Ecological information

12.1. Toxicity

2,4-Pentanediol, 2-methyl- (107-41-5)	
LC50 fish 1	10500 - 11000 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	2700 - 3700 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	10000 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])

12.2. Persistence and degradability

DX1030	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

DX1030	
Bioaccumulative potential	Not established.

2,4-Pentanediol, 2-methyl- (107-41-5)	
Log Pow	< 0.14

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No additional information available

Effect on the global warming : No additional information available

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Ensure all national/local regulations are observed. Do not allow to enter into surface water or drains.

Additional information : Prevent contamination of soil, drains and surface waters. Do not re-use empty containers. Do not allow product to reach sewage system.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

2,4-Pentanediol, 2-methyl- (107-41-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]
No additional information available

Classification according to Directive 67/548/EEC or 1999/45/EC

No additional information available

15.2.2. National regulations

2,4-Pentanediol, 2-methyl- (107-41-5)
Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

No additional information available

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

Eye Irrit. 2A	Serious eye damage/eye irritation, Category 2A
Skin Irrit. 2	Skin corrosion/irritation Category 2
H315	Causes skin irritation
H319	Causes serious eye irritation

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Dynax Corporation
79 Westchester Avenue
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
info@dynaxcorp.com

Technical Bulletin

DYNAX DX1030 FLUOROSURFACTANT

Dynax DX1030 is a C6 fluorotelomer-based surfactant. DX1030, an anionic fluorosurfactant, can lower the surface tension of aqueous solutions below 20 dynes/cm at very low concentrations. DX1030 has been designed to provide excellent spreading, wetting and leveling performance to water-based systems in such applications as fire-fighting foam (AFFF), coating and paint formulations, inks, etc.

Typical Properties[1]

Appearance	Clear to slightly yellow liquid
Ionic Character	Anionic
Composition	45% Actives 10-20% Hexylene glycol, 1.7% Magnesium sulfate heptahydrate Remainder: water
Density	1.23 g/ml (@25°C)
Viscosity	40-60 cP's (@25°C by Brookfield DV-E spindle #3, speed 50)
Flammability	Non Flammable
pH	6.5 - 7.5
Solubility	DX1030 can be diluted directly in water.
Stability	At least one year if stored in original container at temperatures not exceeding 50°C (122°F).
Storage Stability	DX1030 should be stored at temperatures above 10°C. If frozen or a solid phase separates out of the product, warm the product to room temperature and mix it well before use. Freezing and thawing will not affect the properties of the product or its performance.

[1]Not for specifications

Surface Tension Data

% Actives in distilled water	Surface Tension (dyne/cm)
0.1	19.3
0.01	32.7
0.001	47.5

By Wilhelmy Plate Method: KRÜSS Force Tensiometer K100C

Product Safety

DX1030, a C6 fluorotelomer surfactant, cannot degrade into PFOS or PFOA.

DX1030 meets the objectives of the US EPA 2010/15 PFOA Stewardship Program.

DX1030 is a minimal irritant on skin.
It is a minimal irritant on eyes.
The acute oral LD_{50} for albino rats is greater than 5,000 mg/kg.

Precautions and First Aid

DX1030 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof is not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

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Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 01.10.2015 Version number 1 Revision: 01.10.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: DX1080

1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the preparation: Fire fighting foam.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA.
Tel: +1 914-764-0202
Fax: 914 -764 - 0553.
info@dynaxcorp.com
www.dynaxcorp.com

Further information obtainable from:
B-Lands Consulting
WTC, 5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: clients@reachteam.eu
www.reachteam.eu

1.4 Emergency telephone number:

CHEMTREC: +1 703-741-5970.
NHS Direct: 111 (England and Scotland), 0845 46 47 (Wales).
Ireland - National Poisons Information Centre: +353 1 8379964.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

STOT SE 2 H371 May cause damage to organs.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008:
The product is classified and labelled according to the CLP regulation.

Hazard pictograms:

GHS08

Signal word: Warning

Hazard-determining components of labelling:
Methanol

Hazard statements:
H371 May cause damage to organs.

Precautionary statements:

P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P308+P311	IF exposed or concerned: Call a POISON CENTER/doctor.
P501	Dispose of contents/container in accordance with local/regional/national/international regulations.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 01.10.2015 Version number 1 Revision: 01.10.2015

Trade name: DX1080

2.3 Other hazards No further relevant information available.

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components:		
CAS: 107-21-1 EINECS: 203-473-3 Index number: 603-027-00-1	ethanediol Acute Tox. 4, H302	34-<38%
CAS: 112-34-5 EINECS: 203-961-6 Index number: 603-096-00-8	2-(2-butoxyethoxy)ethanol Eye Irrit. 2, H319	13-<17%
CAS: 67-56-1 EINECS: 200-659-6 Index number: 603-001-00-X	Methanol Flam. Liq. 2, H225; Acute Tox. 3, H301; Acute Tox. 3, H311; Acute Tox. 3, H331; STOT SE 1, H370	3-<6%
CAS: 64-17-5 EINECS: 200-578-6 Index number: 603-002-00-5	ethanol Flam. Liq. 2, H225	1-<4%

Additional information: For the wording of the listed risk phrases refer to section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.

After skin contact: Generally the product does not irritate the skin.

After eye contact: Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing: Call for a doctor immediately.

4.2 Most important symptoms and effects, both acute and delayed
No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed
No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture
No further relevant information available.

5.3 Advice for firefighters

Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear protective clothing.

6.2 Environmental precautions
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.

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6.3 Methods and material for containment and cleaning up
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Ensure adequate ventilation.
Dispose contaminated material as waste according to item 13.

6.4 Reference to other sections
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling
Keep away from heat and direct sunlight.
Ensure good ventilation/exhaustion at the workplace.

Information about fire - and explosion protection: No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles:
Store in a cool, dry place in tightly closed receptacles.

Information about storage in one common storage facility: No special measures required.

Further information about storage conditions: None.

7.3 Specific end use(s): No further relevant information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:	
107-21-1 ethanediol	
WEL (Great Britain)	Short-term value: 104** mg/m³, 40** ppm Long-term value: 10* 52** mg/m³, 20** ppm Sk *particulate **vapour
IOELV (EU)	Short-term value: 104 mg/m³, 40 ppm Long-term value: 52 mg/m³, 20 ppm Skin
112-34-5 2-(2-butoxyethoxy)ethanol	
WEL (Great Britain)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
IOELV (EU)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
67-56-1 Methanol	
WEL (Great Britain)	Short-term value: 333 mg/m³, 250 ppm Long-term value: 266 mg/m³, 200 ppm Sk
IOELV (EU)	Long-term value: 260 mg/m³, 200 ppm Skin
64-17-5 ethanol	
WEL (Great Britain)	Long-term value: 1920 mg/m³, 1000 ppm

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures:
Keep away from foodstuffs, beverages and feed.

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Wash hands before breaks and at the end of work.

Respiratory protection:
In case of brief exposure use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.

Protection of hands:

Protective gloves.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Eye protection:

Safety glasses with side-shields (EN 166).

Body protection: Protective work clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:	
Form:	Liquid.
Colour:	Light yellow.
Odour:	Mild.
Odour threshold:	Not determined.
pH-value:	6 - 8
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
Flash point:	Not determined.
Flammability (solid, gaseous):	Not applicable.
Ignition temperature:	Not determined.
Decomposition temperature:	Not determined.
Self-igniting:	Product is not selfigniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
Oxidising properties	Not determined.
Vapour pressure:	Not determined.
Density:	1.17 g/cm³
Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water:	Soluble.

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Partition coefficient (n-octanol/water): Not determined.

Viscosity:
Dynamic: 200-400 cP's
Kinematic: Not determined.

9.2 Other information No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity No data available.

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:
No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions
Reacts with reducing agents.
Reacts with strong oxidising agents.

10.4 Conditions to avoid No further relevant information available.

10.5 Incompatible materials No further relevant information available.

10.6 Hazardous decomposition products
Carbon monoxide and carbon dioxide.
Nitrogen oxides (NOx)

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD/LC50 values:		
Oral	LD50	> 2000 mg/kg (Rat) (Not harmful)

Primary irritant effect:
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
STOT-single exposure:
May cause damage to organs.
STOT-repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity:	
LC50/48h	1436 mg/L (Daphnia Magna) (Not Harmful)
LC50/96h	24000 mg/L (Rainbow Trout) (Not Harmful)

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

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Additional ecological information

General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

12.5 Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods
Recommendation: Do not allow product to reach sewage system.

Uncleaned packaging
Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

14.1 UN Number
ADR, ADN, IMDG, IATA Not applicable.

14.2 UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA
Class Not applicable.

14.4 Packing group
ADR, IMDG, IATA Not applicable.

14.5 Environmental hazards
Marine pollutant: No

14.6 Special precautions for user Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases
H225 Highly flammable liquid and vapour.
H301 Toxic if swallowed.
H302 Harmful if swallowed.
H311 Toxic in contact with skin.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H370 Causes damage to organs.

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Abbreviations and acronyms:

RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
ICAO: International Civil Aviation Organisation
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Flam. Liq. 2: Flammable liquids, Hazard Category 2
Acute Tox. 3: Acute toxicity, Hazard Category 3
Acute Tox. 4: Acute toxicity, Hazard Category 4
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
STOT SE 1: Specific target organ toxicity - Single exposure, Hazard Category 1
STOT SE 2: Specific target organ toxicity - Single exposure, Hazard Category 2

DX1080

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 06/22/2015 Revision date: 04/10/2015 Version: 2.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DX1080

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Fire fighting foam

1.3. Details of the supplier of the safety data sheet

DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA
Tel: +1 914-764-0202
Fax: 914 -764 - 0553

Email: Chang.jho@dynaxcorp.com
info@dynaxcorp.com

Website: www.dynaxcorp.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: +1 800-424-9300 24 hours

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

STOT SE 2 H371

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :

GHS08

Signal word (GHS-US) : Warning

Hazard statements (GHS-US) : H371 - May cause damage to organs

Precautionary statements (GHS-US) : P260 - Do not breathe fume, mist, spray, vapours
P264 - Wash hands thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P405 - Store locked up
P501 - Dispose of contents/container to comply with applicable local, national and international regulation.

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Ethylene glycol	(CAS No) 107-21-1	25 - 50	Acute Tox. 4 (Oral), H302
Diethylene glycol monobutyl ether	(CAS No) 112-34-5	10 - 20	Flam. Liq. 4, H227 Eye Irrit. 2A, H319
Methyl alcohol	(CAS No) 67-56-1	4 - 10	Flam. Liq. 2, H225 Acute Tox. 3 (Dermal), H311 Acute Tox. 3 (Inhalation:vapour), H331 STOT SE 1, H370

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. In all cases of doubt, or when symptoms persist, seek medical advice.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: get medical advice/attention.

First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Immediately call a POISON CENTER or doctor/physician. Obtain emergency medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : May cause damage to organs.

Symptoms/injuries after skin contact : Prolonged or repeated contact with the skin may cause dermatitis.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: May cause eye irritation.

Symptoms/injuries after ingestion : Harmful if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand. Fight larger fires with spray or alcohol resistant foam.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Explosion hazard : In closed containers, pressure build up could result in distortion, blowing and in extreme cases bursting of the container. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source.

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : Thermal combustion may release carbon monoxide and dioxide. Nitrogen oxides (NOx). Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Stop leak if safe to do so. Eliminate all ignition sources if safe to do so. Spills of this product present a serious slipping hazard. Avoid breathing mist or vapor . Avoid contact with skin, eyes and clothing. Take precautionary measures against static discharge.

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labelled containers and dispose according to local legislation. Store away from other materials. Use only non-sparking tools. Take precautionary measures against static discharge. Dispose in a safe manner in accordance with local/national regulations. Do not allow to enter into surface water or drains. Ensure all national/local regulations are observed.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide good ventilation in process area to prevent formation of vapour. do not handle or store near heat, sparks, or any other potential ignition sources. Take precautionary measures against static discharge. Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools. Avoid all eye and skin contact and do not breathe vapour and mist. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle in accordance with good industrial hygiene and safety practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : A washing facility/water for eye and skin cleaning purposes should be present. Ensure adequate ventilation.

Storage conditions : Keep out of reach of children. Keep only in the original container in a cool, well ventilated place. Keep container tightly closed and dry. Keep container closed when not in use. Keep away from heat and direct sunlight. Keep away from food and drink.

Incompatible materials : Oxidizing agents. Reducing agents.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Diethylene glycol monobutyl ether (112-34-5)		
ACGIH	ACGIH TWA (ppm)	10 ppm (inhalable fraction and vapor)

Ethylene glycol (107-21-1)		
ACGIH	ACGIH Ceiling (mg/m³)	100 mg/m³ (aerosol only)

Methyl alcohol (67-56-1)		
ACGIH	ACGIH TWA (ppm)	200 ppm
ACGIH	ACGIH STEL (ppm)	250 ppm
OSHA	OSHA PEL (TWA) (mg/m³)	260 mg/m³
OSHA	OSHA PEL (TWA) (ppm)	200 ppm

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment	:	Avoid all unnecessary exposure. Personal protective equipment should be selected based upon the conditions under which this product is handled or used. Protective goggles. Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection	:	Wear protective gloves. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.
Eye protection	:	Chemical goggles or safety glasses. with side-shields.
Skin and body protection	:	Long sleeved protective clothing. Antistatic non-skid safety shoes or boots.
Respiratory protection	:	In case of insufficient ventilation, wear suitable respiratory equipment. In case of intensive or longer exposure use self-contained apparatus.
Other information	:	Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Yellow
Odour	:	Ammonia-like
Odour threshold	:	No data available
pH	:	6-7 at 20°C
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	43 °C "non-flammable, does not sustain combustibility" in compliance with the requirements of the HMR and United Nations Transport of Dangerous Goods Manual of Tests and Criteria, fifth revised edition (2009), Test Method L.2 and to the CLP Annex I: 2.6.4.5 sustained combustibility test L.2, Part III, section 32 of the UN RTDG, Manual of Tests and Criteria.
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapour pressure	:	No data available
Relative vapour density at 20 °C	:	No data available
Relative density	:	No data available
Density	:	1.17 g/cm³ at 20°C
Solubility	:	Water: Fully miscible
Log Pow	:	No data available
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. heat/sparks/open flames/hot surfaces.

10.5. Incompatible materials

Oxidizing agents. Reducing agents.

10.6. Hazardous decomposition products

Fume. Carbon monoxide. Carbon dioxide. Nitrogen oxides (NOx).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

DX1080	
LD50 oral rat	> 2000 mg/kg On basis of test data

Diethylene glycol monobutyl ether (112-34-5)	
LD50 oral rat	3384 mg/kg
LD50 dermal rabbit	2700 mg/kg
ATE US (oral)	3384.000 mg/kg bodyweight
ATE US (dermal)	2700.000 mg/kg bodyweight

Ethylene glycol (107-21-1)	
LD50 oral rat	4000 - 10200 mg/kg
LD50 dermal rat	10600 mg/kg
LD50 dermal rabbit	9530 µl/kg
ATE US (oral)	500.000 mg/kg bodyweight
ATE US (dermal)	10600.000 mg/kg bodyweight

Methyl alcohol (67-56-1)	
LC50 inhalation rat (ppm)	22500 ppm (Exposure time: 8 h)
ATE US (dermal)	300.000 mg/kg bodyweight
ATE US (vapours)	3.000 mg/l/4h

Skin corrosion/irritation : Not classified
(Based on available data, the classification criteria are not met)
pH: 6.5 at 20°C

Serious eye damage/irritation : Not classified
(Conclusive but not sufficient for classification. On basis of test data.)
pH: 6.5 at 20°C

Respiratory or skin sensitisation : Not classified
(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified
(Based on available data, the classification criteria are not met)

Carcinogenicity : Not classified
(Based on available data, the classification criteria are not met)

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : May cause damage to organs.

Specific target organ toxicity (repeated exposure) : Not classified
(Based on available data, the classification criteria are not met)

Aspiration hazard : Not classified
(Based on available data, the classification criteria are not met)

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after skin contact : Prolonged or repeated contact with the skin may cause dermatitis.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: May cause eye irritation.

Symptoms/injuries after ingestion : Harmful if swallowed.

SECTION 12: Ecological information

12.1. Toxicity

Diethylene glycol monobutyl ether (112-34-5)	
LC50 fish 1	1300 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
EC50 Daphnia 1	> 100 mg/l (Exposure time: 48 h - Species: Daphnia magna)

Ethylene glycol (107-21-1)	
LC50 fish 1	41000 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss)
EC50 Daphnia 1	46300 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	14 - 18 ml/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])

12.2. Persistence and degradability

DX1080	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

DX1080	
Bioaccumulative potential	Not established.

Diethylene glycol monobutyl ether (112-34-5)	
BCF fish 1	(no bioconcentration expected)

Ethylene glycol (107-21-1)	
Log Pow	-1.93

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No additional information available

Effect on the global warming : No additional information available

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Dispose of in accordance with relevant local regulations. Do not allow to enter into surface water or drains.

Additional information : Prevent contamination of soil, drains and surface waters. Do not re-use empty containers. Do not allow product to reach sewage system.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA. Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

Ethylene glycol (107-21-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
EPA TSCA Regulatory Flag	Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 313 - Emission Reporting	1.0 %

Methyl alcohol (67-56-1)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 313 - Emission Reporting	1.0 %

15.2. International regulations

CANADA

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 3 - Combustible Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Ethylene glycol (107-21-1)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 1 Subdivision B - Toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects

EU-Regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Ethylene glycol (107-21-1)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]

No additional information available

Classification according to Directive 67/548/EEC or 1999/45/EC

No additional information available

15.2.2. National regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

Ethylene glycol (107-21-1)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

Methyl alcohol (67-56-1)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
No	Yes	No	No	

SECTION 16: Other information

Indication of changes : 3. Composition/information on ingredients. 2.1. Classification of the substance or mixture.

Revision date : 04/10/2015

Other information : None.

Full text of H-phrases:

Acute Tox. 3 (Dermal)	Acute toxicity (dermal) Category 3
Acute Tox. 3 (Inhalation:vapour)	Acute toxicity (inhalation:vapour) Category 3
Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Eye Irrit. 2A	Serious eye damage/eye irritation, Category 2A
Flam. Liq. 2	Flammable liquids Category 2
Flam. Liq. 4	Flammable liquids Category 4
STOT SE 1	Specific target organ toxicity (single exposure) Category 1
STOT SE 2	Specific target organ toxicity (single exposure) Category 2
H225	Highly flammable liquid and vapour
H227	Combustible liquid
H302	Harmful if swallowed
H311	Toxic in contact with skin
H319	Causes serious eye irritation
H331	Toxic if inhaled
H370	Causes damage to organs
H371	May cause damage to organs

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Dynax Corporation
79 Westchester Avenue
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
info@dynaxcorp.com

Technical Bulletin

DYNAX DX1080 FLUOROSURFACTANT

Dynax DX1080 is a C6 fluorotelomer-based surfactant. DX1080, a nonionic fluorosurfactant, can lower the surface tension of aqueous solutions down to 15.3 dynes/cm at very low concentrations. DX1080 has been especially designed to be used in both synthetic and protein-based, film-forming fire fighting foam agents, such as AFFF, AR-AFFF, FFFP and AR-FFFP.

Typical Properties[1]

Appearance	Clear to slightly hazy, yellowish liquid
Ionic Character	Non-ionic
Composition	39 - 41% Actives 25 - 50% Glycols 10 – 20% Carbitols Remainder: water
Density	1.17 g/ml (@25^{o}C)
Viscosity	200-400 cP's (@25^{o}C by Brookfield DV-E spindle #3, speed 20)
Flammability	Non-Flammable
pH	6.0-8.0
Solubility	DX1080 can be diluted directly with water.
Stability	At least one year if stored in original containers at temperatures not exceeding 50^{o}C (122^{o}F
Storage Stability	DX1080 should be stored at temperatures above 0^{o}C. If frozen or a solid phase separates out of the product, warm the product to room temperature and mix it well before use. Freezing and thawing will not affect the properties of the product or its performance.
Pour point	-15^{o}C

[1]Not for specifications

Surface Tension Data

% Actives in distilled water	Surface Tension (dyne/cm)
0.1	15.3
0.01	18.0
0.001	34.5

By Wilhelmy Plate Method: KRÜSS Force Tensiometer K100C

Product Safety

DX1080, a C6 fluorotelomer surfactant, cannot degrade into PFOS or PFOA.

DX1080 meets the objectives of the US EPA 2010/15 PFOA Stewardship Program.

DX1080 is not an irritant on skin.
It is a minimal irritant on eyes.
The acute oral LD_{50} for albino rats is greater than 2,000 mg/kg.

Precautions and First Aid

DX1080 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof is not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

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Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 27.10.2015 Version number 1 Revision: 27.10.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: DX1090

1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the preparation: Fire fighting foam.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA.
Tel: +1 914-764-0202
Fax: 914 -764 - 0553.
info@dynaxcorp.com
www.dynaxcorp.com

Further information obtainable from:
B-Lands Consulting
WTC, 5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: clients@reachteam.eu
www.reachteam.eu

1.4 Emergency telephone number:

CHEMTREC: +1 703-741-5970.
NHS Direct: 111 (England and Scotland), 0845 46 47 (Wales).
Ireland - National Poisons Information Centre: +353 1 8379964.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
This product is not classified as hazardous according to Regulation (EC) No 1272/2008.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008: Not applicable.

Hazard pictograms: Not applicable.

Signal word: Not applicable.

Hazard statements: Not applicable.

2.3 Other hazards No further relevant information available.

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components:		
CAS: 107-21-1 EINECS: 203-473-3 Index number: 603-027-00-1	ethanediol Acute Tox. 4, H302	39-<43%
CAS: 112-34-5 EINECS: 203-961-6 Index number: 603-096-00-8	2-(2-butoxyethoxy)ethanol Eye Irrit. 2, H319	6-<9%

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CAS: 75-65-0 EINECS: 200-889-7 Index number: 603-005-00-1	2-methylpropan-2-ol Flam. Liq. 2, H225; Acute Tox. 4, H332; Eye Irrit. 2, H319; STOT SE 3, H335	3-<5%
CAS: 64-17-5 EINECS: 200-578-6 Index number: 603-002-00-5	ethanol Flam. Liq. 2, H225	1-<2%

Additional information: For the wording of the listed risk phrases refer to section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.

After skin contact: Generally the product does not irritate the skin.

After eye contact: Rinse opened eye for several minutes under running water.

After swallowing: If symptoms persist consult doctor.

4.2 Most important symptoms and effects, both acute and delayed
No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed
No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture
No further relevant information available.

5.3 Advice for firefighters

Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
No special measures required.

6.2 Environmental precautions
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.

6.3 Methods and material for containment and cleaning up
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Ensure adequate ventilation.

6.4 Reference to other sections
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling Ensure good ventilation/exhaustion at the workplace.

Information about fire - and explosion protection: No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles: No special requirements.

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Trade name: DX1090

Information about storage in one common storage facility: Not required.

Further information about storage conditions: None.

7.3 Specific end use(s): No further relevant information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:	
107-21-1 ethanediol	
WEL (Great Britain)	Short-term value: 104** mg/m³, 40** ppm Long-term value: 10* 52** mg/m³, 20** ppm Sk *particulate **vapour
IOELV (EU)	Short-term value: 104 mg/m³, 40 ppm Long-term value: 52 mg/m³, 20 ppm Skin
112-34-5 2-(2-butoxyethoxy)ethanol	
WEL (Great Britain)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
IOELV (EU)	Short-term value: 101.2 mg/m³, 15 ppm Long-term value: 67.5 mg/m³, 10 ppm
75-65-0 2-methylpropan-2-ol	
WEL (Great Britain)	Short-term value: 462 mg/m³, 150 ppm Long-term value: 308 mg/m³, 100 ppm
64-17-5 ethanol	
WEL (Great Britain)	Long-term value: 1920 mg/m³, 1000 ppm

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures:
Wash hands before breaks and at the end of work.
Keep away from foodstuffs, beverages and feed.

Respiratory protection: Not required.

Protection of hands:

Protective gloves.

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/the preparation/ the chemical mixture.
Select the glove material based on a consideration of the penetration times, rates of diffusion and the degradation.

Material of gloves:
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

Penetration time of glove material:
The exact break through time must be determined by the manufacturer of the protective gloves.

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Trade name: DX1090

Eye protection:

Safety glasses with side-shields (EN 166).

Body protection: Protective work clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:	
Form:	Liquid.
Colour:	Light yellow.
Odour:	Mild.
Odour threshold:	Not determined.
pH-value:	6-9
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
Flash point:	Not determined.
Flammability (solid, gaseous):	Not applicable.
Ignition temperature:	Not determined.
Decomposition temperature:	Not determined.
Self-igniting:	Product is not selfigniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
Oxidising properties	Not determined.
Vapour pressure:	Not determined.
Density at 20 ℃:	1.17 g/cm³
Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with	
Water:	Soluble.
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
Dynamic:	800-1100 cP's
Kinematic:	Not determined.

9.2 Other information No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity No further relevant information available.

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according to 1907/2006/EC, Article 31

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Trade name: DX1090

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:
No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions No dangerous reactions known.

10.4 Conditions to avoid No further relevant information available.

10.5 Incompatible materials No further relevant information available.

10.6 Hazardous decomposition products

Nitrogen oxides (NOx)
Carbon monoxide and carbon dioxide.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD/LC50 values:		
Oral	LD50	> 5000 mg/kg (Rat) (Not harmful)

Primary irritant effect:
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
STOT-single exposure: Based on available data, the classification criteria are not met.
STOT-repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity: No further relevant information available.

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

Additional ecological information

General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.
vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Recommendation: Do not allow product to reach sewage system.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 27.10.2015 Version number 1 Revision: 27.10.2015

Trade name: DX1090

Uncleaned packaging
Recommendation: Disposal must be made according to official regulations.

SECTION 14: Transport information

14.1 UN Number
ADR, ADN, IMDG, IATA Not applicable.

14.2 UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA
Class Not applicable.

14.4 Packing group
ADR, IMDG, IATA Not applicable.

14.5 Environmental hazards
Marine pollutant: No

14.6 Special precautions for user Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.2 Chemical safety assessment A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases
H225 Highly flammable liquid and vapour.
H302 Harmful if swallowed.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.

Abbreviations and acronyms:
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
ICAO: International Civil Aviation Organisation
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Flam. Liq. 2: Flammable liquids, Hazard Category 2
Acute Tox. 4: Acute toxicity, Hazard Category 4
Eye Irrit. 2: Serious eye damage/eye irritation, Hazard Category 2
STOT SE 3: Specific target organ toxicity - Single exposure, Hazard Category 3

DX1090

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 06/22/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DX1090

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Fire fighting foam

1.3. Details of the supplier of the safety data sheet

DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA
Tel: +1 914-764-0202
Fax: 914 -764 - 0553

Email: Chang.jho@dynaxcorp.com
info@dynaxcorp.com

Website: www.dynaxcorp.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: +1 800-424-9300 24 hours

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Not classified

2.2. Label elements

GHS-US labelling

No labelling applicable

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Ethylene glycol	(CAS No) 107-21-1	25 - 50	Acute Tox. 4 (Oral), H302
Diethylene glycol monobutyl ether	(CAS No) 112-34-5	5 - 8	Flam. Liq. 4, H227 Eye Irrit. 2A, H319
tert-Butyl alcohol	(CAS No) 75-65-0	3 - 5	Flam. Liq. 2, H225 Acute Tox. 4 (Inhalation), H332 Eye Irrit. 2A, H319 STOT SE 3, H335

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. In all cases of doubt, or when symptoms persist, seek medical advice.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: get medical advice/attention.

First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Immediately call a POISON CENTER or doctor/physician. Obtain emergency medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: Causes eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand. Fight larger fires with spray or alcohol resistant foam.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

Explosion hazard : In closed containers, pressure build up could result in distortion, blowing and in extreme cases bursting of the container. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source.

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : Thermal combustion may release carbon monoxide and dioxide. Nitrogen oxides (NOx). Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Stop leak if safe to do so. Eliminate all ignition sources if safe to do so. Spills of this product present a serious slipping hazard. Avoid breathing mist or vapor . Avoid contact with skin, eyes and clothing. Take precautionary measures against static discharge.

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labelled containers and dispose according to local legislation. Store away from other materials. Use only non-sparking tools. Take precautionary measures against static discharge. Dispose in a safe manner in accordance with local/national regulations. Do not allow to enter into surface water or drains. Ensure all national/local regulations are observed.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide good ventilation in process area to prevent formation of vapour. do not handle or store near heat, sparks, or any other potential ignition sources. Take precautionary measures against static discharge. Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools. Avoid all eye and skin contact and do not breathe vapour and mist. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle in accordance with good industrial hygiene and safety practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : A washing facility/water for eye and skin cleaning purposes should be present. Ensure adequate ventilation.

Storage conditions : Keep out of reach of children. Keep only in the original container in a cool, well ventilated place. Keep container tightly closed and dry. Keep container closed when not in use. Keep away from heat and direct sunlight. Keep away from food and drink.

Incompatible materials : Oxidizing agents. Reducing agents.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Diethylene glycol monobutyl ether (112-34-5)		
ACGIH	ACGIH TWA (ppm)	10 ppm (inhalable fraction and vapor)

Ethylene glycol (107-21-1)		
ACGIH	ACGIH Ceiling (mg/m³)	100 mg/m³ (aerosol only)

tert-Butyl alcohol (75-65-0)		
ACGIH	ACGIH TWA (ppm)	100 ppm
OSHA	OSHA PEL (TWA) (mg/m³)	300 mg/m³
OSHA	OSHA PEL (TWA) (ppm)	100 ppm

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment : Avoid all unnecessary exposure. Personal protective equipment should be selected based upon the conditions under which this product is handled or used. Protective goggles. Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection : Wear protective gloves. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

Eye protection : Chemical goggles or safety glasses. with side-shields.

Skin and body protection : Long sleeved protective clothing. Antistatic non-skid safety shoes or boots.

Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment. In case of intensive or longer exposure use self-contained apparatus.

Other information : Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid

Colour	:	Yellow
Odour	:	Ammonia-like
Odour threshold	:	No data available
pH	:	6.5-9 at 20°C
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	48 °C "non-flammable, does not sustain combustibility" in compliance with the requirements of the HMR and United Nations Transport of Dangerous Goods Manual of Tests and Criteria, fifth revised edition (2009), Test Method L.2 and to the CLP Annex I: 2.6.4.5 sustained combustibility test L.2, Part III, section 32 of the UN RTDG, Manual of Tests and Criteria.
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapour pressure	:	No data available
Relative vapour density at 20 °C	:	No data available
Relative density	:	No data available
Density	:	1.17 g/cm³ at 20°C
Solubility	:	Water: Fully miscible
Log Pow	:	No data available
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. heat/sparks/open flames/hot surfaces.

10.5. Incompatible materials

Oxidizing agents. Reducing agents.

10.6. Hazardous decomposition products

Fume. Carbon monoxide. Carbon dioxide. Nitrogen oxides (NOx).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

(Based on available data, the classification criteria are not met. On basis of test data.)

DX1090		
LD50 oral rat	> 5000 mg/kg	On basis of test data

Diethylene glycol monobutyl ether (112-34-5)	
LD50 oral rat	3384 mg/kg
LD50 dermal rabbit	2700 mg/kg
ATE US (oral)	3384.000 mg/kg bodyweight
ATE US (dermal)	2700.000 mg/kg bodyweight

Ethylene glycol (107-21-1)	
LD50 oral rat	4000 - 10200 mg/kg
LD50 dermal rat	10600 mg/kg
LD50 dermal rabbit	9530 µl/kg
ATE US (oral)	500.000 mg/kg bodyweight
ATE US (dermal)	10600.000 mg/kg bodyweight

tert-Butyl alcohol (75-65-0)	
LD50 oral rat	2200 mg/kg
LD50 dermal rabbit	> 2 g/kg
LC50 inhalation rat (ppm)	> 10000 ppm/4h
ATE US (oral)	2200.000 mg/kg bodyweight
ATE US (gases)	4500.000 ppmv/4h
ATE US (vapours)	11.000 mg/l/4h
ATE US (dust,mist)	1.500 mg/l/4h

Skin corrosion/irritation : Not classified
(Based on available data, the classification criteria are not met)
pH: 6.5 at 20°C

Serious eye damage/irritation : Not classified
(Conclusive but not sufficient for classification. On basis of test data.)
pH: 6.5 at 20°C

Respiratory or skin sensitisation : Not classified
(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified
(Based on available data, the classification criteria are not met)

Carcinogenicity : Not classified
(Based on available data, the classification criteria are not met)

tert-Butyl alcohol (75-65-0)	
National Toxicology Program (NTP) Status	1 - Evidence of Carcinogenicity

Reproductive toxicity : Not classified
(Based on available data, the classification criteria are not met)

Specific target organ toxicity (single exposure) : Not classified
(Based on available data, the classification criteria are not met)

Specific target organ toxicity (repeated exposure) : Not classified
(Based on available data, the classification criteria are not met)

Aspiration hazard : Not classified
(Based on available data, the classification criteria are not met)

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: Causes eye irritation.

SECTION 12: Ecological information

12.1. Toxicity

Diethylene glycol monobutyl ether (112-34-5)	
LC50 fish 1	1300 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])

Diethylene glycol monobutyl ether (112-34-5)	
EC50 Daphnia 1	> 100 mg/l (Exposure time: 48 h - Species: Daphnia magna)

Ethylene glycol (107-21-1)	
LC50 fish 1	41000 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss)
EC50 Daphnia 1	46300 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	14 - 18 ml/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [static])

tert-Butyl alcohol (75-65-0)	
LC50 fish 1	6130 - 6700 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	933 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 Daphnia 2	4607 - 6577 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])

12.2. Persistence and degradability

DX1090	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

DX1090	
Bioaccumulative potential	Not established.

Diethylene glycol monobutyl ether (112-34-5)	
BCF fish 1	(no bioconcentration expected)

Ethylene glycol (107-21-1)	
Log Pow	-1.93

tert-Butyl alcohol (75-65-0)	
BCF fish 1	1.09
Log Pow	0.35

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No additional information available

Effect on the global warming : No additional information available

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Dispose of in accordance with relevant local regulations. Do not allow to enter into surface water or drains.

Additional information : Prevent contamination of soil, drains and surface waters. Do not re-use empty containers. Do not allow product to reach sewage system.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
EPA TSCA Regulatory Flag	T - T - indicates a substance that is the subject of a Section 4 test rule under TSCA. Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

Ethylene glycol (107-21-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
EPA TSCA Regulatory Flag	Y2 - Y2 - indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.
RQ (Reportable quantity, section 304 of EPA's List of Lists)	5000 lb
SARA Section 313 - Emission Reporting	1.0 %

tert-Butyl alcohol (75-65-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
SARA Section 313 - Emission Reporting	1.0 %

15.2. International regulations

CANADA

Diethylene glycol monobutyl ether (112-34-5)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 3 - Combustible Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

Ethylene glycol (107-21-1)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 1 Subdivision B - Toxic material causing immediate and serious toxic effects Class D Division 2 Subdivision A - Very toxic material causing other toxic effects

tert-Butyl alcohol (75-65-0)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 2 - Flammable Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Ethylene glycol (107-21-1)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

tert-Butyl alcohol (75-65-0)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]

No additional information available

Classification according to Directive 67/548/EEC or 1999/45/EC

No additional information available

15.2.2. National regulations

Diethylene glycol monobutyl ether (112-34-5)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

Ethylene glycol (107-21-1)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

tert-Butyl alcohol (75-65-0)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

No additional information available

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Eye Irrit. 2A	Serious eye damage/eye irritation, Category 2A
Flam. Liq. 2	Flammable liquids Category 2
Flam. Liq. 4	Flammable liquids Category 4
STOT SE 3	Specific target organ toxicity (single exposure) Category 3
H225	Highly flammable liquid and vapour
H227	Combustible liquid
H302	Harmful if swallowed
H319	Causes serious eye irritation
H332	Harmful if inhaled
H335	May cause respiratory irritation

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Dynax Corporation
79 Westchester Avenue
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
info@dynaxcorp.com

Technical Bulletin

DYNAX DX1090 FLUOROSURFACTANT

Dynax DX1090 is a non-red-labeled nonionic fluorosurfactant. It can lower the surface tension of aqueous solutions down to 16 dynes/cm at very low concentrations. DX1090 has been especially designed to be used in both synthetic and protein-based, film-forming fire fighting foam agents, such as AFFF (Aqueous Film Forming Foam), AR-AFFF (Alcohol-Resistant Aqueous Film Forming Foam), FFFP (Film Forming Fluoroprotein) and AR-FFFP (Alcohol-Resistant Film Forming Flouroprotein).

Typical Properties[1]

Appearance	Clear to slightly hazy, yellowish liquid
Ionic Character	Non-ionic
Composition	34 - 36% Actives 40-50 % solvents Remainder: water
Density	1.17 g/ml (@ 25^{o}C)
Viscosity	800-1100 cP's (Brookfield DV-E spindle #3, speed 20, temp. 25^{0}C)
Flammability	Non-Flammable
pH	6.0-9.0
Solubility	DX1090 can be diluted directly with water.
Stability	At least one year if stored in original containers at temperatures not exceeding 50^{o}C (122^{o}F
Storage	DX1090 should be stored at temperatures above 5^{o}C. If frozen or a solid phase separates out of the product, warm the product to room temperature and mix it well before use. Freezing and thawing will not affect the properties of the product or its performance.
Pour Point	-10^{o}C

[1]Not for specifications

Surface Tension Data

% Actives in distilled water	Surface Tension (dyne/cm)
0.1	15.4
0.01	20.8
0.001	52.2

By Wilhelmy Plate Method: KRÜSS Force Tensiometer K100C

Product Safety

DX1090 is not derived from PFOS (Perfluorooctyl Sulfonate) or from PFOA (Perfluorooctanoic Acid). DX1090 does not degrade into PFOS or PFOA. DX1090 meets the objectives of the US EPA 2010/15 PFOA Stewardship Program.

DX1090 is not an irritant on skin.
It is a minimal irritant on eyes.
The acute oral LD_{50} for albino rats is > 5,000 mg/kg.

Precautions and First Aid

DX1090 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof is not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

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Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 19.08.2015 Version number 1 Revision: 19.08.2015

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name: DX5011

1.2 Relevant identified uses of the substance or mixture and uses advised against

Application of the substance / the preparation: Fire fighting foam.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier:
DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA.
Tel: +1 914-764-0202
Fax: 914 -764 - 0553.
info@dynaxcorp.com
www.dynaxcorp.com

Further information obtainable from:
REACH Only Representative
B-Lands Consulting
WTC, 5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: europa@reach-compliance.eu
Web: www.reachteam.eu

1.4 Emergency telephone number:

CHEMTREC: +1 703-741-5970.
NHS Direct: 111 (England and Scotland), 0845 46 47 (Wales).
Ireland - National Poisons Information Centre: +353 1 8379964.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
This product is not classified as hazardous according to Regulation (EC) No 1272/2008.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008: Not applicable.

Hazard pictograms: Not applicable.

Signal word: Not applicable.

Hazard statements: Not applicable.

Additional information:
Safety data sheet available on request.

2.3 Other hazards

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Hazardous components:		
CAS: 111-42-2 EINECS: 203-868-0 Index number: 603-071-00-1	2,2'-iminodiethanol STOT RE 2, H373; Eye Dam. 1, H318; Acute Tox. 4, H302; Skin Irrit. 2, H315	1-<2.5%

Additional information: For the wording of the listed risk phrases refer to section 16.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 19.08.2015 Version number 1 Revision: 19.08.2015

Trade name: DX5011

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.

After skin contact: Immediately wash with water and soap and rinse thoroughly.

After eye contact: Rinse opened eye for several minutes under running water.

After swallowing: Do not induce vomiting; call for medical help immediately.

4.2 Most important symptoms and effects, both acute and delayed

No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

5.2 Special hazards arising from the substance or mixture

No further relevant information available.

5.3 Advice for firefighters

Protective equipment: Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Wear protective clothing.

6.2 Environmental precautions

Do not allow to enter sewers/ surface or ground water.
Dilute with plenty of water.

6.3 Methods and material for containment and cleaning up

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

6.4 Reference to other sections

See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Keep away from heat and direct sunlight.

Information about fire - and explosion protection: No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles:
Store in a cool, dry place in tightly closed receptacles.

Information about storage in one common storage facility: No special measures required.

Further information about storage conditions: None.

7.3 Specific end use(s):

No further relevant information available.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 19.08.2015 Version number 1 Revision: 19.08.2015

Trade name: DX5011

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace:
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures: Wash hands before breaks and at the end of work.

Respiratory protection: Not required under normal conditions of use.

Protection of hands:

Protective gloves.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Eye protection:

Safety glasses with side-shields (EN 166).

Body protection: Protective work clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:	
Form:	Viscous
Colour:	Amber.
Odour:	Mild.
Odour threshold:	Not determined.
pH-value at 20 ℃:	7-8
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	Not determined.
Flash point:	Not determined.
Flammability (solid, gaseous):	Not applicable.
Ignition temperature:	Not determined.
Decomposition temperature:	Not determined.
Self-igniting:	Product is not selfigniting.
Danger of explosion:	Product does not present an explosion hazard.
Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 19.08.2015 Version number 1 Revision: 19.08.2015

Trade name: DX5011

Oxidising properties	Not determined.
Vapour pressure:	Not determined.
Density:	1.14 g/cm³
Relative density	Not determined.
Vapour density	Not determined.
Evaporation rate	Not determined.
Solubility in / Miscibility with Water:	Soluble.
Partition coefficient (n-octanol/water):	Not determined.
Viscosity:	
Dynamic:	1500-2500 cP's
Kinematic:	Not determined.

9.2 Other information No further relevant information available.

SECTION 10: Stability and reactivity

10.1 Reactivity No data available.

10.2 Chemical stability

Thermal decomposition / conditions to be avoided:
No decomposition if used and stored according to specifications.

10.3 Possibility of hazardous reactions No dangerous reactions known.

10.4 Conditions to avoid No further relevant information available.

10.5 Incompatible materials No further relevant information available.

10.6 Hazardous decomposition products
Nitrogen oxides.
Carbon monoxide and carbon dioxide.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD/LC50 values:		
Oral	LD50	>5000 mg/kg (rat) (Not classified as hazardous)

Primary irritant effect:
Skin corrosion/irritation: Based on available data, the classification criteria are not met.
Serious eye damage/irritation: Based on available data, the classification criteria are not met.

Respiratory or skin sensitisation: Based on available data, the classification criteria are not met.

CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):
Germ cell mutagenicity: Based on available data, the classification criteria are not met.
Carcinogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity: Based on available data, the classification criteria are not met.
STOT-single exposure: Based on available data, the classification criteria are not met.
STOT-repeated exposure: Based on available data, the classification criteria are not met.
Aspiration hazard: Based on available data, the classification criteria are not met.

Safety Data Sheet

according to 1907/2006/EC, Article 31

Printing date 19.08.2015 Version number 1 Revision: 19.08.2015

Trade name: DX5011

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity:	
LC50/48h	2236 mg/L (Daphnia Magna) (Not harmful)
LC50/96h	17678 mg/L (Rainbow Trout) (Not harmful)

12.2 Persistence and degradability No further relevant information available.

12.3 Bioaccumulative potential No further relevant information available.

12.4 Mobility in soil No further relevant information available.

12.5 Results of PBT and vPvB assessment

PBT: Not applicable.
vPvB: Not applicable.

12.6 Other adverse effects No further relevant information available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Recommendation:
Disposal must be made according to official regulations.
Do not allow product to reach sewage system.

Uncleaned packaging
Recommendation:
Disposal must be made according to official regulations.
Packaging that may not be cleansed must be disposed of in the same manner as the product.
Recommended cleansing agents: Water, if necessary together with cleansing agents.

SECTION 14: Transport information

14.1 UN Number
ADR, ADN, IMDG, IATA Not applicable.

14.2 UN proper shipping name
ADR, ADN, IMDG, IATA Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA
Class Not applicable.

14.4 Packing group
ADR, IMDG, IATA Not applicable.

14.5 Environmental hazards
Marine pollutant: No

14.6 Special precautions for user Not applicable.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Directive 2012/18/EU
Named dangerous substances - ANNEX I None of the ingredients are listed.

Safety Data Sheet

according to 1907/2006/EC, Article 31

15.2 Chemical safety assessment A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Relevant phrases
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H373 May cause damage to organs through prolonged or repeated exposure.

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
Acute Tox. 4: Acute toxicity, Hazard Category 4
Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2
Eye Dam. 1: Serious eye damage/eye irritation, Hazard Category 1
STOT RE 2: Specific target organ toxicity - Repeated exposure, Hazard Category 2

DX5011

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 06/22/2015 Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : DX5011

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Fire Fighting Foam

1.3. Details of the supplier of the safety data sheet

DYNAX CORPORATION
79 Westchester Ave. Pound Ridge NY 10576 USA
Tel: +1 914-764-0202
Fax: 914 -764 - 0553

Email: Chang.jho@dynaxcorp.com
info@dynaxcorp.com

Website: www.dynaxcorp.com

1.4. Emergency telephone number

Emergency number : CHEMTREC: +1 800-424-9300 24 hours

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Carc. 2 H351
STOT RE 2 H373

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :

GHS08

Signal word (GHS-US) : Warning

Hazard statements (GHS-US) : H351 - Suspected of causing cancer
H373 - May cause damage to organs (blood, liver, kidneys) through prolonged or repeated exposure (oral)

Precautionary statements (GHS-US) : P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe fume, mist, spray, vapours
P280 - Wear eye protection, protective clothing, protective gloves
P308+P313 - If exposed or concerned: Get medical advice/attention
P314 - Get medical advice/attention if you feel unwell
P405 - Store locked up
P501 - Dispose of contents/container to comply with applicable local, national and international regulation.

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixture

Name	Product identifier	%	GHS-US classification
Diethanolamine	(CAS No) 111-42-2	< 2.5	Acute Tox. 4 (Oral), H302 Skin Irrit. 2, H315 Eye Dam. 1, H318 Carc. 2, H351 STOT RE 2, H373

Full text of H-phrases: see section 16

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general : Never give anything by mouth to an unconscious person. IF exposed or concerned: Get medical advice/attention.

First-aid measures after inhalation : Allow victim to breathe fresh air. Allow the victim to rest. In all cases of doubt, or when symptoms persist, seek medical advice.

First-aid measures after skin contact : Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.

First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: get medical advice/attention.

First-aid measures after ingestion : If swallowed, rinse mouth with water (only if the person is conscious). Immediately call a POISON CENTER or doctor/physician. Obtain emergency medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries : May cause damage to organs (blood, liver, kidneys) through prolonged or repeated exposure.

Symptoms/injuries after skin contact : Repeated exposure to this material can result in absorption through skin causing significant health hazard.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: Causes eye irritation.

Symptoms/injuries after ingestion : Swallowing a small quantity of this material will result in serious health hazard.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand. Fight larger fires with spray or alcohol resistant foam.

Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

No additional information available

5.3. Advice for firefighters

Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.

Protective equipment for firefighters : Do not enter fire area without proper protective equipment, including respiratory protection.

Other information : Thermal combustion may release carbon monoxide and dioxide. Nitrogen oxides (NOx).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Stop leak if safe to do so. Eliminate all ignition sources if safe to do so. Spills of this product present a serious slipping hazard. Avoid breathing mist or vapor . Avoid contact with skin, eyes and clothing. Take precautionary measures against static discharge.

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection.

Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Ensure adequate ventilation. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect all waste in suitable and labelled containers and dispose according to local legislation. Store away from other materials. Use only non-sparking tools. Take precautionary measures against static discharge. Dispose in a safe manner in accordance with local/national regulations. Do not allow to enter into surface water or drains. Ensure all national/local regulations are observed.

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide good ventilation in process area to prevent formation of vapour. do not handle or store near heat, sparks, or any other potential ignition sources. Take precautionary measures against static discharge. Proper grounding procedures to avoid static electricity should be followed. Use only non-sparking tools. Avoid all eye and skin contact and do not breathe vapour and mist. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle in accordance with good industrial hygiene and safety practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : A washing facility/water for eye and skin cleaning purposes should be present. Ensure adequate ventilation.

Storage conditions : Keep out of reach of children. Keep only in the original container in a cool, well ventilated place. Keep container tightly closed and dry. Keep container closed when not in use. Keep away from heat and direct sunlight. Keep away from food and drink.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Diethanolamine (111-42-2)		
ACGIH	ACGIH TWA (mg/m³)	1 mg/m³ (inhalable fraction and vapor)

8.2. Exposure controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Personal protective equipment : Avoid all unnecessary exposure. Personal protective equipment should be selected based upon the conditions under which this product is handled or used. Protective goggles. Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection : Wear protective gloves. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

Eye protection : Chemical goggles or safety glasses. with side-shields.

Skin and body protection : Long sleeved protective clothing. Antistatic non-skid safety shoes or boots.

Respiratory protection : In case of insufficient ventilation, wear suitable respiratory equipment. In case of intensive or longer exposure use self-contained apparatus.

Other information : Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Appearance	:	Viscous.
Colour	:	Amber
Odour	:	Mild.
Odour threshold	:	No data available
pH	:	7-8 at 20°C
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	No data available
Freezing point	:	No data available
Boiling point	:	No data available
Flash point	:	> 100 °C (flammability does not apply)
Auto-ignition temperature	:	No data available
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	Not applicable
Vapour pressure	:	No data available
Relative vapour density at 20 °C	:	No data available
Relative density	:	No data available
Density	:	1.14 g/cm³ at 20°C
Solubility	:	Water: Soluble
Log Pow	:	No data available
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. heat/sparks/open flames/hot surfaces.

10.5. Incompatible materials

No additional information available

10.6. Hazardous decomposition products

Fume. Carbon monoxide. Carbon dioxide. Nitrogen oxides (NOx).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

(Based on available data, the classification criteria are not met. On basis of test data.)

DX5011		
LD50 oral rat	> 5000 mg/kg	On basis of test data

Diethanolamine (111-42-2)	
LD50 oral rat	0.62 ml/kg
ATE US (oral)	500.000 mg/kg

Skin corrosion/irritation : Not classified
(Based on available data, the classification criteria are not met)
pH: 7.3 at 20°C

Serious eye damage/irritation : Not classified
(Conclusive but not sufficient for classification. On basis of test data.)
pH: 7.3 at 20°C

Respiratory or skin sensitisation : Not classified
(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Not classified
(Based on available data, the classification criteria are not met)

Carcinogenicity : Suspected of causing cancer.

Diethanolamine (111-42-2)	
IARC group	2B - Possibly carcinogenic to humans
National Toxicology Program (NTP) Status	1 - Evidence of Carcinogenicity

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : Not classified

Specific target organ toxicity (repeated exposure) : May cause damage to organs (blood, liver, kidneys) through prolonged or repeated exposure (oral).

Aspiration hazard : Not classified
(Based on available data, the classification criteria are not met)

Potential Adverse human health effects and symptoms : Based on available data, the classification criteria are not met.

Symptoms/injuries after skin contact : Repeated exposure to this material can result in absorption through skin causing significant health hazard.

Symptoms/injuries after eye contact : In fine dispersion/spraying/misting: Causes eye irritation.

Symptoms/injuries after ingestion : Swallowing a small quantity of this material will result in serious health hazard.

SECTION 12: Ecological information

12.1. Toxicity

Diethanolamine (111-42-2)	
LC50 fish 1	4460 - 4980 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	55 mg/l (Exposure time: 48 h - Species: Daphnia magna)
LC50 fish 2	1200 - 1580 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])

12.2. Persistence and degradability

DX5011	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

DX5011	
Bioaccumulative potential	Not established.

Diethanolamine (111-42-2)	
BCF fish 1	(no significant bioconcentration)
Log Pow	-2.18 (at 25 °C)

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer : No additional information available

Effect on the global warming : No additional information available

Other information : Avoid release to the environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Dispose in a safe manner in accordance with local/national regulations. Dispose of in accordance with relevant local regulations. Do not allow to enter into surface water or drains.

Additional information : Prevent contamination of soil, drains and surface waters. Do not re-use empty containers. Do not allow product to reach sewage system.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with DOT

Not regulated for transport

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

Diethanolamine (111-42-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on United States SARA Section 313	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	100 lb
SARA Section 313 - Emission Reporting	1.0 %

15.2. International regulations

CANADA

Diethanolamine (111-42-2)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

Diethanolamine (111-42-2)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]

No additional information available

Classification according to Directive 67/548/EEC or 1999/45/EC

No additional information availble

15.2.2. National regulations

Diethanolamine (111-42-2)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

Diethanolamine (111-42-2)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
Yes	No	No	No	

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Carc. 2	Carcinogenicity, Category 2
Eye Dam. 1	Serious eye damage/eye irritation, Category 1
Skin Irrit. 2	Skin corrosion/irritation Category 2
STOT RE 2	Specific target organ toxicity (repeated exposure) Category 2
H302	Harmful if swallowed
H315	Causes skin irritation
H318	Causes serious eye damage
H351	Suspected of causing cancer
H373	May cause damage to organs through prolonged or repeated exposure

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product

Dynax Corporation
79 Westchester Avenue
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
info@dynaxcorp.com

Technical Bulletin

DYNAX DX5011
FLUOROCHEMICAL FOAM STABILIZER

DX5011 is an anionic fluorochemical foam stabilizer, miscible with water in all proportions. DX5011 is designed to be used in synthetic and protein-based alcohol-resistant fire-fighting foam agents, such as AR-AFFF (Alcohol-Resistant Aqueous Film Forming Foam) and AR-FFFP (Alcohol-Resistant Film Forming Fluoroprotein). DX5011 imparts to the alcohol-resistant foam agents exceptional foam stability against fires of polar solvents, such as alcohols, ketones and ethers.

DX5011 is especially recommended for the development of low viscosity alcohol-resistant foam agents, such as 3x3, 1x3 and 1x1 AR-AFFF and AR-FFFP agents.

Typical Properties[1]

Appearance	Amber liquid
Viscosity	1,500 – 2,000 cP's at 20°C
Ionic Character	Anionic
Composition	43 - 45% actives 5-6% Tripropylene Glycol Methyl Ether Balance: water
Density (@25°C)	1.13 g/ml
pH	6.5 to 7.5
Flash Point	>93°C (>200°F) (PM Closed Cup)
Storage	DX5011 should preferably be stored in original containers at temperatures not exceeding 50°C (122°F).
Stability	One year if stored in original containers at temperatures not exceeding 50°C (122°F).

[1]Not for specifications

Product Safety

DX5011 is not derived from PFOS (Perfluorooctyl Sulfonate) or from PFOA (Perfluorooctanoic Acid). DX5011 does not degrade into PFOS or PFOA. DX5011 is made from C6 fluorotelomers containing less than 0.3% C8 and higher homologs. C6 fluorotelomers are not subject to either the EPA's fluoropolymer/fluorotelomer stewardship program or a TSCA consent order.

DX5011 is not an irritant on skin; it is a minimal irritant on eyes.
The acute oral LD_{50} for albino rats is greater than 5,000 mg/kg.

Precautions and First Aid

DX5011 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof are not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

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Dynax Corporation
79 Westchester Avenue
PO Box 285
Pound Ridge, NY 10576
T 914 764 0202 F 914 764 0553
dynaxcorp.com

dynax

Technical Bulletin

DYNAX DX5044
C6 FLUOROCHEMICAL FOAM STABILIZER

DX5044 is a low-viscosity C6 Foam Stabilizer composed of DX5011M (67%) and DX1025 (33%). DX5011M is a high-viscosity C6 Foam Stabilizer developed to provide similar or superior performance compared to the phased-out DX5022. DX1025, Dynax's most efficient C6 Fluorosurfactant blend, is responsible for the low-viscosity of DX5044 and is an integral part of the DX5044 production process.

When formulated with additional DX1025 or other Dynax C6 Fluorosurfactants, DX5044 allows the production of low-viscosity and Newtonian 1x1, 1x3 and 3x3 AR-AFFF and AR-FFFP.

Typical Properties[1]

Appearance	Amber liquid
Ionic Character	Anionic
Composition	42 - 44% actives 11-14%: Solvents Remainder: Water
Density	1.16 g/ml (@25°C)
Viscosity	550 - 750 cP (Brookfield DV-E/#3/20rpm @25°C)
Flammability	Non-flammable
pH	6.5 - 7.5
Solubility	DX5044 can be diluted directly with water.
Stability	At least one year if stored in original containers at temperatures not exceeding 50°C (122°F).
Storage	DX5044 should be stored at temperatures above 5°C. If frozen or a separation is observed, warm the product to room temperature and mix it well before use. Freezing and thawing will not affect the properties of the product or its performance.

[1]Not for specification purposes

Surface Tension Data[1]

% Actives in distilled water	Surface Tension (dynes/cm)
0.1	18.0
0.01	20.7

By Wilhelmy Plate Method: KRÜSS Tensiometer K100C
[1] Typical values, not for specification purposes

Product Safety

DX5044, a C6 telomer-based fluorochemical, cannot degrade into PFOS or PFOA.

DX5044 meets the objectives of the US EPA 2010/15 PFOA Stewardship Program.

DX5044 is not an irritant on skin (Rat).
It is a minimal irritant on eyes (Rabbit).
The acute oral LD_{50} for albino rats is greater than 5,000 mg/kg.

Precautions and First Aid

DX5044 should be handled with good industrial precautions. Safety goggles and rubber gloves, as well as protective clothing suitable to avoid skin contact should be worn. In case of contact with eyes, flush eyes with plenty of water and consult a physician. In case of skin contact, wash skin with plenty of water and soap.

Important Notice to Purchaser: All statements, technical information and recommendations contained herein are based on information and tests we believe to be reliable. The accuracy or completeness thereof are not guaranteed. Since conditions of use are outside our control, the purchaser should determine the suitability of the product for his intended use and assumes all risk and liability in connection therewith.

01004

SAFETY DATA SHEET

Capstone™ 1157-D Fire Fighting Foam Fluorosurfactant

Version	Revision Date:	SDS Number:	Date of last issue: 02/28/2017
4.0	09/13/2017	1336273-00031	Date of first issue: 02/27/2017

SECTION 1. IDENTIFICATION

Product name : Capstone™ 1157-D Fire Fighting Foam Fluorosurfactant, Capstone™ 1157-D Fire Fighting Foam Fluorosurfactant

Product code : D15360110, D15360110

SDS-Identcode : 130000050530

Manufacturer or supplier's details

Company name of supplier : The Chemours Company FC, LLC

Address : 1007 Market Street
Wilmington, DE 19899 United States of America (USA)

Telephone : 1-844-773-CHEM (outside the U.S. 1-302-773-1000)

Emergency telephone : Medical emergency: 1-866-595-1473 (outside the U.S. 1-302-773-2000) ; Transport emergency: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

Recommended use of the chemical and restrictions on use

Recommended use : Fluoroadditive

Restrictions on use : This material shall not be distributed to consumers for use in spray applications., For industrial use only.
Do not use or resell Chemours™ materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless agreed to by Seller in a written agreement covering such use. For further information, please contact your Chemours representative.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Additional Labeling

The following percentage of the mixture consists of ingredient(s) with unknown acute toxicity:
2.5 %

Other hazards

Inhalation of decomposition products in high concentration may cause shortness of breath (lung edema).

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous ingredients

Chemical name	CAS-No.	Concentration (% w/w)
Propylene glycol	57-55-6	>= 20 - < 30
Ethanol	64-17-5	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : Wash with water and soap as a precaution.
Get medical attention if symptoms occur.

In case of eye contact : Flush eyes with water as a precaution.
Get medical attention if irritation develops and persists.

If swallowed : If swallowed, DO NOT induce vomiting.
Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed : None known.

Protection of first-aiders : No special precautions are necessary for first aid responders.

Notes to physician : Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : None known.

Specific hazards during fire fighting : Vapors may form explosive mixtures with air.
Exposure to combustion products may be a hazard to health.

Hazardous combustion products : Hydrogen fluoride
carbonyl fluoride
potentially toxic fluorinated compounds
aerosolized particulates
Carbon oxides

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

		Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.
Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Follow safe handling advice and personal protective equipment recommendations.
Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	Use only with adequate ventilation.
Advice on safe handling	:	Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Take care to prevent spills, waste and minimize release to the environment.
Conditions for safe storage	:	Keep in properly labeled containers. Store in accordance with the particular national regulations.

Materials to avoid	:	Do not store with the following product types: Strong oxidizing agents

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Propylene glycol	57-55-6	TWA	10 mg/m³	US WEEL
Ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m³	NIOSH REL
		STEL	1,000 ppm	ACGIH
		TWA	1,000 ppm 1,900 mg/m³	OSHA Z-1

Occupational exposure limits of decomposition products

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrofluoric acid	7664-39-3	TWA	3 ppm 2.5 mg/m³	NIOSH REL
		C	6 ppm 5 mg/m³	NIOSH REL
		TWA	3 ppm	OSHA Z-2
		TWA	0.5 ppm (Fluorine)	ACGIH
		C	2 ppm (Fluorine)	ACGIH
Carbonyl difluoride	353-50-4	TWA	2 ppm	ACGIH
		STEL	5 ppm	ACGIH
		ST	5 ppm 15 mg/m³	NIOSH REL
		TWA	2 ppm 5 mg/m³	NIOSH REL
Carbon dioxide	124-38-9	TWA	5,000 ppm	ACGIH
		STEL	30,000 ppm	ACGIH
		TWA	5,000 ppm 9,000 mg/m³	OSHA Z-1
		TWA	5,000 ppm 9,000 mg/m³	NIOSH REL
		ST	30,000 ppm 54,000 mg/m³	NIOSH REL
Carbon monoxide	630-08-0	TWA	25 ppm	ACGIH
		TWA	35 ppm 40 mg/m³	NIOSH REL

		C	200 ppm 229 mg/m³	NIOSH REL
		TWA	50 ppm 55 mg/m³	OSHA Z-1

Engineering measures : Processing may form hazardous compounds (see section 10).
Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection

Remarks : Wash hands before breaks and at the end of workday.

Eye protection : Wear the following personal protective equipment:
Safety glasses

Skin and body protection : Skin should be washed after contact.

Hygiene measures : Ensure that eye flushing systems and safety showers are located close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Color : amber, clear

Odor : alcohol-like

Odor Threshold : No data available

pH : 4.3

Melting point/freezing point : No data available

Initial boiling point and boiling range	:	82 °C
Flash point	:	> 93 °C
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	53 hPa (20 °C)
Relative vapor density	:	No data available
Relative density	:	1.13 (20 °C)
Solubility(ies)		
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	> 200 °C
Viscosity		
Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Vapors may form explosive mixture with air. Can react with strong oxidizing agents. Hazardous decomposition products will be formed at elevated temperatures.

Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents

Hazardous decomposition products

Thermal decomposition	:	Hydrofluoric acid Carbonyl difluoride Carbon dioxide Carbon monoxide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg
Acute inhalation toxicity	:	LC50 (Rabbit): > 159 mg/l Exposure time: 4 h Test atmosphere: dust/mist
Acute dermal toxicity	:	LD50 (Rabbit): > 2,000 mg/kg Assessment: The substance or mixture has no acute dermal toxicity

Ethanol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg Method: OECD Test Guideline 401
Acute inhalation toxicity	:	LC50 (Rat): 124.7 mg/l Exposure time: 4 h Test atmosphere: vapor

Skin corrosion/irritation

Not classified based on available information.

Ingredients:

Propylene glycol:

Species: Rabbit
Method: OECD Test Guideline 404

Result: No skin irritation

Ethanol:

Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Ingredients:

Propylene glycol:

Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405

Ethanol:

Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Ingredients:

Propylene glycol:

Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative

Ethanol:

Test Type: Local lymph node assay (LLNA)
Routes of exposure: Skin contact
Species: Mouse
Result: negative

Germ cell mutagenicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)

Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Result: negative

Ethanol:

Genotoxicity in vitro : Test Type: In vitro mammalian cell gene mutation test
Result: negative

Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Genotoxicity in vivo : Test Type: Rodent dominant lethal test (germ cell) (in vivo)
Species: Mouse
Application Route: Ingestion
Result: equivocal

Carcinogenicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Species: Rat
Application Route: Ingestion
Exposure time: 2 Years
Result: negative

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Effects on fertility : Test Type: Three-generation reproduction toxicity study
Species: Mouse
Application Route: Ingestion
Result: negative

Effects on fetal development : Test Type: Embryo-fetal development
Species: Mouse
Application Route: Ingestion
Result: negative

Ethanol:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Mouse
Application Route: Ingestion
Result: negative

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Not classified based on available information.

Repeated dose toxicity

Ingredients:

Propylene glycol:

Species: Rat, male
NOAEL: 1,700 mg/kg
Application Route: Ingestion
Exposure time: 2 y

Ethanol:

Species: Rat
NOAEL: 1,280 mg/kg
LOAEL: 3,156 mg/kg
Application Route: Ingestion
Exposure time: 90 Days

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ingredients:

Propylene glycol:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 40,613 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 18,340 mg/l
Exposure time: 48 h

Toxicity to algae	:	ErC50 (Skeletonema costatum (marine diatom)): 19,300 mg/l Exposure time: 72 h Method: OECD Test Guideline 201
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Ceriodaphnia dubia (water flea)): 13,020 mg/l Exposure time: 7 d
Toxicity to microorganisms	:	NOEC (Pseudomonas putida): > 20,000 mg/l Exposure time: 18 h

Ethanol:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): > 1,000 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Ceriodaphnia (water flea)): > 1,000 mg/l Exposure time: 48 h
Toxicity to algae	:	ErC50 (Chlorella vulgaris (Fresh water algae)): 275 mg/l Exposure time: 72 h EC10 (Chlorella vulgaris (Fresh water algae)): 11.5 mg/l Exposure time: 72 h
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 9.6 mg/l Exposure time: 9 d
Toxicity to microorganisms	:	EC50 (Pseudomonas putida): 6,500 mg/l Exposure time: 16 h

Persistence and degradability

Ingredients:

Propylene glycol:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 98.3 % Exposure time: 28 d Method: OECD Test Guideline 301F

Ethanol:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 84 % Exposure time: 20 d

Bioaccumulative potential

Ingredients:

Propylene glycol:

Partition coefficient: n-	:	log Pow: -1.07

octanol/water

Ethanol:

Partition coefficient: n-octanol/water : log Pow: -0.35

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number : UN 3082
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Amphoteric Fluorinated Surfactant)
Class : 9
Packing group : III
Labels : 9

IATA-DGR

UN/ID No. : UN 3082
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.
(Amphoteric Fluorinated Surfactant)
Class : 9
Packing group : III
Labels : Miscellaneous
Packing instruction (cargo aircraft) : 964
Packing instruction (passenger aircraft) : 964
Environmentally hazardous : yes

IMDG-Code

UN number : UN 3082
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Amphoteric Fluorinated Surfactant)

Class	:	9
Packing group	:	III
Labels	:	9
EmS Code	:	F-A, S-F
Marine pollutant	:	yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number	:	UN 3082
Proper shipping name	:	Environmentally hazardous substance, liquid, n.o.s. (Amphoteric Fluorinated Surfactant)
Class	:	9
Packing group	:	III
Labels	:	CLASS 9
ERG Code	:	171
Marine pollutant	:	yes(Amphoteric Fluorinated Surfactant)
Remarks	:	Above applies only to containers over 119 gallons or 450 liters., Shipment by ground under DOT is non-regulated; however it may be shipped per the applicable hazard classification to facilitate multi-modal transport involving ICAO (IATA) or IMO.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

Ingredients	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Butanone	78-93-3	5000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	No SARA Hazards
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Pennsylvania Right To Know

Water	7732-18-5
Amphoteric Fluorinated Surfactant	Trade secret

Propylene glycol	57-55-6
Ethanol	64-17-5
Butanone	78-93-3
Propan-2-ol	67-63-0

California Prop. 65

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

California List of Hazardous Substances

Ethanol	64-17-5

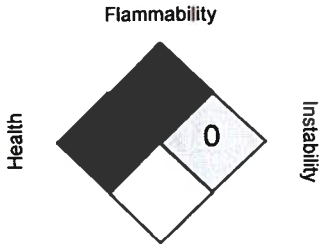
California Permissible Exposure Limits for Chemical Contaminants

Ethanol	64-17-5

SECTION 16. OTHER INFORMATION

Further information

NFPA:



Special hazard.

HMIS® IV:

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

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Before use read Chemours safety information.
For further information contact the local Chemours office or nominated distributors.
All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA Z-2	:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
US WEEL	:	USA. Workplace Environmental Exposure Levels (WEEL)
ACGIH / TWA	:	8-hour, time-weighted average

ACGIH / STEL	:	Short-term exposure limit
ACGIH / C	:	Ceiling limit
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA Z-1 / TWA	:	8-hour time weighted average
OSHA Z-2 / TWA	:	8-hour time weighted average
US WEEL / TWA	:	8-hr TWA

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	09/13/2017

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

Other hazards
Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema)., Inhalation of aerosol or fine spray mist may cause serious respiratory problems.

The following percentage of the mixture consists of ingredient(s) with unknown acute toxicity: 75.6696 %

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Partially Fluorinated Surfactant		40 %
Ethanol	64-17-5	30.1 %

Any component and/or concentration (exact percentage) not specifically identified is considered a trade secret.

SECTION 4. FIRST AID MEASURES

General advice : When symptoms persist or in all cases of doubt seek medical advice.

Inhalation : Move to fresh air. Oxygen or artificial respiration if needed. Symptoms may be delayed. Call a physician immediately.

Skin contact : Wash off immediately with plenty of water. Wash contaminated clothing before reuse.

Eye contact : Immediately flush eyes for at least 15 minutes. Get medical attention.

Ingestion	:	Call a physician or poison control centre immediately. If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
Most important symptoms/effects, acute and delayed	:	Eye contact may provoke the following symptoms: Pain, tearing, swelling, redness, or temporary visual impairment.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection and use the recommended protective clothing
Notes to physician	:	Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Foam, Dry chemical, Carbon dioxide (CO2)
Unsuitable extinguishing media	:	No applicable data available.
Specific hazards	:	Flammable liquid Hazardous decomposition products formed under fire conditions. Hazardous combustion products Hydrogen fluoride Carbon dioxide (CO2) Carbon monoxide Other hazardous decomposition products may be formed.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	:	Evacuate personnel to safe areas. Cool containers/tanks with water spray. Do not allow run-off from fire fighting to enter drains or water courses.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel)	:	Evacuate personnel to safe areas. Use personal protective equipment. Ventilate the area.
Environmental precautions	:	Do not discharge to streams, ponds, lakes or sewers. Avoid subsoil penetration.
Spill Cleanup	:	Remove all sources of ignition. Use only non-sparking tools. Dam up. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Pick up and transfer to properly labelled containers.
Accidental Release Measures	:	For disposal considerations see section 13.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Do not use sparking tools. Ground containers when transferring material. Do not generate respirable particles unless suitable ventilation or respirator are used. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before re-use.
Handling (Physical Aspects)	:	Vapours may form explosive mixtures with air. Keep away from open flames, hot surfaces and sources of ignition. To avoid thermal decomposition, do not overheat. Thermal decomposition can lead to release of irritating gases and vapours.
Dust explosion class	:	No applicable data available.
Storage	:	Keep containers tightly closed in a dry, cool and well-ventilated place. Store in accordance with National Fire Protection Association recommendations. Stable under normal conditions.
Storage period	:	No applicable data available.
Storage temperature	:	No applicable data available.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls : Use of non-sparking and explosion-proof equipment may be necessary depending on type of operation. Use only in area provided with appropriate exhaust ventilation. Use appropriate workplace ventilation to remove fumes that may be released on heating.

Personal protective equipment

Respiratory protection : In case of mist, spray or aerosol exposure wear suitable personal respiratory protection and protective suit.

Hand protection : Additional protection: Impervious gloves

Eye protection : Wear safety glasses or coverall chemical splash goggles.

Skin and body protection : Where there is potential for skin contact, have available and wear as appropriate, impervious gloves, apron, pants, jacket, hood and boots.

Exposure Guidelines

Exposure Limit Values

Partially Fluorinated Surfactant

No applicable data available.

Ethanol

Permissible exposure limit:	(OSHA)	1,000 ppm	1,900 mg/m3	8 hr. TWA
TLV	(ACGIH)	1,000 ppm	STEL	

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state : liquid

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Form	:	liquid
Color	:	clear, amber
Odor	:	alcohol-like
Odor threshold	:	No applicable data available.
pH	:	7.1
Melting point/range	:	No applicable data available.
Boiling point/boiling range	:	Boiling point/boiling range 80 °C (176 °F) at 1,013 hPa
Flash point	:	25 °C closed cup
Evaporation rate	:	No applicable data available.
Flammability (solid, gas)	:	No applicable data available.
Upper explosion limit	:	No applicable data available.
Lower explosion limit	:	No applicable data available.
Vapour Pressure	:	No applicable data available.
Vapour density	:	No applicable data available.
Specific gravity (Relative density)	:	1.07 at 20 °C (68 °F)
Water solubility	:	ca. 100 g/l at 20 °C (68 °F)
Solubility(ies)	:	No applicable data available.
Partition coefficient: n-octanol/water	:	No applicable data available.
Auto-ignition temperature	:	No applicable data available.

Ignition temperature	:	> 100 °C
Decomposition temperature	:	> 200 °C Thermal decomposition can lead to release of irritating gases and vapours.
Viscosity, kinematic	:	No applicable data available.
Viscosity, dynamic	:	No applicable data available.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Highly flammable.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No applicable data available.
Conditions to avoid	:	To avoid thermal decomposition, do not overheat.
Incompatible materials	:	No applicable data available.
Hazardous decomposition products	:	Incompletely burned carbon products , Carbon dioxide , Carbon monoxide, Hydrofluoric acid...% Other hazardous decomposition products may be formed.

SECTION 11. TOXICOLOGICAL INFORMATION

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Sensitisation	:	Did not cause sensitisation on laboratory animals., Guinea pig

Partially Fluorinated Surfactant

Carcinogenicity	:	no data available
Mutagenicity	:	no data available
Reproductive toxicity	:	no data available
Teratogenicity	:	no data available

Ethanol

Inhalation 4 h LC50	:	124.7 mg/l , Rat Vapour
Oral LD50	:	10,470 mg/kg , Rat Narcotic effects
Skin irritation	:	No skin irritation, Rabbit
Eye irritation	:	Eye irritation, Rabbit
Repeated dose toxicity	:	Oral Rat - No toxicologically significant effects were found. Inhalation Rat - No toxicologically significant effects were found.
Carcinogenicity	:	Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity	:	No toxicity to reproduction Animal testing showed effects on reproduction at levels equal to or above those causing parental toxicity.
Teratogenicity	:	Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

Carcinogenicity

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The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ from those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

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72 h EC50	:	Skeletonema costatum (Diatom) 8.5 mg/l
48 h EC50	:	Daphnia magna (Water flea) 13 mg/l
EC50	:	Growth inhibition Bacteria 1,750 mg/l

Ethanol

96 h LC50	:	Pimephales promelas (fathead minnow) 14,200 mg/l
30 d	:	NOEC Fish (unspecified species) 245 mg/l

Environmental Fate

Capstone™ 1183

Biodegradability	:	Not readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste disposal methods - Product	:	In accordance with local and national regulations.
Contaminated packaging	:	If recycling is not practicable, dispose of in compliance with local regulations.

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SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 1170
	Proper shipping name	: Ethanol solutions
	Class	: 3
	Packing group	: III
	Labelling No.	: 3
IATA_C	UN number	: 1170
	Proper shipping name	: Ethanol solution
	Class	: 3
	Packing group	: III
	Labelling No.	: 3
IMDG	UN number	: 1170
	Proper shipping name	: ETHANOL SOLUTION
	Class	: 3
	Packing group	: III
	Labelling No.	: 3
	Marine pollutant	: yes (Partially Fluorinated Surfactant)

SECTION 15. REGULATORY INFORMATION

TSCA	: On the inventory, or in compliance with the inventory
SARA 313 Regulated Chemical(s)	: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
California Prop. 65	: WARNING! This product contains a chemical or chemicals known to the State of California to cause cancer.Ethanol WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.Ethanol

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SECTION 16. OTHER INFORMATION

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Significant change from previous version is denoted with a double bar.

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Capstone™ 1157 Fire Fighting Foam Fluorosurfactant

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This SDS adheres to the standards and regulatory requirements of the United States and may not meet the regulatory requirements in other countries.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Capstone™ 1157 Fire Fighting Foam Fluorosurfactant
Product Use	:	Component for fire extinguishing formulations, Fluoroadditive, For professional users only.
Restrictions on use	:	Do not use product for anything outside of the above specified uses
Manufacturer/Supplier	:	The Chemours Company FC, LLC 1007 Market Street Wilmington, DE 19899 United States of America
Product Information	:	1-844-773-CHEM (outside the U.S. 1-302-773-1000)
Medical Emergency	:	1-866-595-1473 (outside the U.S. 1-302-773-2000)
Transport Emergency	:	CHEMTREC: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

SECTION 2. HAZARDS IDENTIFICATION

Product hazard category

Flammable liquids	Category 3
Serious eye damage/eye irritation	Category 2A

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Label content

Pictogram :

Signal word : Warning

Hazardous warnings : Flammable liquid and vapour.
Causes serious eye irritation.

Hazardous prevention measures : Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting/ equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Wash skin thoroughly after handling.
Wear protective gloves/ eye protection/ face protection.
IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing.
Rinse skin with water/ shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/ attention.
In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
Store in a well-ventilated place. Keep cool.
Dispose of contents/ container to an approved waste disposal plant.

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Other hazards
Inhalation of decomposition products in high concentration may cause shortness of breath (lung oedema)., Inhalation of aerosol or fine spray mist may cause serious respiratory problems.

The following percentage of the mixture consists of ingredient(s) with unknown acute toxicity: 60.801 %

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Concentration
Ethanol	64-17-5	31.3 %

SECTION 4. FIRST AID MEASURES

General advice	:	When symptoms persist or in all cases of doubt seek medical advice.
Inhalation	:	Move to fresh air. Oxygen or artificial respiration if needed. Symptoms may be delayed. Call a physician immediately.
Skin contact	:	Wash off immediately with plenty of water. Wash contaminated clothing before reuse.
Eye contact	:	Immediately flush eyes for at least 15 minutes. Get medical attention.
Ingestion	:	Call a physician or poison control centre immediately. If swallowed, DO NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.
Most important symptoms/effects, acute and delayed	:	Eye contact may provoke the following symptoms: Pain, tearing, swelling, redness, or temporary visual impairment.

Protection of first-aiders	:	First Aid responders should pay attention to self-protection and use the recommended protective clothing
Notes to physician	:	Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Foam, Dry chemical, Carbon dioxide (CO2)
Unsuitable extinguishing media	:	No applicable data available.
Specific hazards	:	Flammable liquid Hazardous decomposition products formed under fire conditions. Hazardous combustion products Hydrogen fluoride Carbon dioxide (CO2) Carbon monoxide Other hazardous decomposition products may be formed.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	:	Evacuate personnel to safe areas. Cool containers/tanks with water spray. Do not allow run-off from fire fighting to enter drains or water courses.

SECTION 6. ACCIDENTAL RELEASE MEASURES

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Safeguards (Personnel)	:	Evacuate personnel to safe areas. Use personal protective equipment. Ventilate the area.
Environmental precautions	:	Do not discharge to streams, ponds, lakes or sewers. Avoid subsoil penetration.

Spill Cleanup	:	Remove all sources of ignition. Use only non-sparking tools. Dam up. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Pick up and transfer to properly labelled containers.
Accidental Release Measures	:	For disposal considerations see section 13.

SECTION 7. HANDLING AND STORAGE

Handling (Personnel)	:	Do not use sparking tools. Ground containers when transferring material. Do not generate respirable particles unless suitable ventilation or respirator are used. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before re-use.
Handling (Physical Aspects)	:	Vapours may form explosive mixtures with air. Keep away from open flames, hot surfaces and sources of ignition. To avoid thermal decomposition, do not overheat. Thermal decomposition can lead to release of irritating gases and vapours.
Dust explosion class	:	No applicable data available.
Storage	:	Keep containers tightly closed in a dry, cool and well-ventilated place. Store in accordance with National Fire Protection Association recommendations.
Storage period	:	No applicable data available.
Storage temperature	:	No applicable data available.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering controls	:	Use of non-sparking and explosion-proof equipment may be necessary depending on type of operation. Use only in area provided with appropriate exhaust ventilation. Use appropriate workplace ventilation to remove fumes that may be released on heating.

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Personal protective equipment

Respiratory protection	:	In case of mist, spray or aerosol exposure wear suitable personal respiratory protection and protective suit.
Hand protection	:	Additional protection: Impervious gloves
Eye protection	:	Wear safety glasses or coverall chemical splash goggles.
Skin and body protection	:	Where there is potential for skin contact, have available and wear as appropriate, impervious gloves, apron, pants, jacket, hood and boots.

Exposure Guidelines

Exposure Limit Values

Ethanol				
Permissible exposure limit:	(OSHA)	1,000 ppm	1,900 mg/m3	8 hr. TWA
TLV	(ACGIH)	1,000 ppm	STEL	

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	:	liquid
Form	:	liquid
Color	:	amber, clear
Odor	:	alcohol-like
Odor threshold	:	No applicable data available.
pH	:	6.5
Melting point/range	:	No applicable data available.
Boiling point/boiling range	:	Boiling point/boiling range

		82 °C (180 °F) at 760 mm Hg
Flash point	:	25 °C closed cup
Evaporation rate	:	No applicable data available.
Flammability (solid, gas)	:	No applicable data available.
Upper explosion limit	:	No applicable data available.
Lower explosion limit	:	No applicable data available.
Vapor pressure	:	40 mm Hg at 20 °C (68 °F)
Vapour density	:	No applicable data available.
Specific gravity (Relative density)	:	1.03 at 20 °C (68 °F)
Water solubility	:	completely soluble
Solubility(ies)	:	No applicable data available.
Partition coefficient: n-octanol/water	:	No applicable data available.
Auto-ignition temperature	:	No applicable data available.
Decomposition temperature	:	> 200 °C Thermal decomposition can lead to release of irritating gases and vapours.
Viscosity, kinematic	:	No applicable data available.
Viscosity, dynamic	:	No applicable data available.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Highly flammable.

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Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No applicable data available.
Conditions to avoid	:	To avoid thermal decomposition, do not overheat.
Incompatible materials	:	Strong oxidizing agents active metals (such as sodium, potassium, magnesium)
Hazardous decomposition products	:	Incompletely burned carbon products , Carbon dioxide , Carbon monoxide, Hydrofluoric acid...% Other hazardous decomposition products may be formed.

SECTION 11. TOXICOLOGICAL INFORMATION

Capstone™ 1157 Fire Fighting Foam Fluorosurfactant

Oral LD50	:	> 20,000 mg/kg , Rat
Skin irritation	:	No skin irritation, Rabbit
Eye irritation	:	Eye irritation, Rabbit
Sensitisation	:	Did not cause sensitisation on laboratory animals., Guinea pig

Ethanol

Inhalation 4 h LC50	:	124.7 mg/l , Rat Vapour
Carcinogenicity	:	Not classifiable as a human carcinogen. Overall weight of evidence indicates that the substance is not carcinogenic.
Mutagenicity	:	Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects.
Reproductive toxicity	:	No toxicity to reproduction Animal testing showed effects on reproduction at levels equal to or

above those causing parental toxicity.

Teratogenicity : Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

Carcinogenicity

The carcinogenicity classifications for this product and/or its ingredients have been determined according to HazCom 2012, Appendix A.6. The classifications may differ from those listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or those found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition).

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, or OSHA, as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity

Capstone™ 1157 Fire Fighting Foam Fluorosurfactant

24 h EC50	:	Daphnia (water flea) 1,500 mg/l
16 h EC50	:	Growth inhibition Pseudomonas putida 28 mg/l

Ethanol

96 h LC50	:	Pimephales promelas (fathead minnow) 14,200 mg/l
96 h ErC50	:	Pseudokirchneriella subcapitata (green algae) 675 mg/l OECD Test Guideline 201
30 d	:	NOEC Fish (unspecified species) 245 mg/l

Environmental Fate

Capstone™ 1157 Fire Fighting Foam Fluorosurfactant

Biodegradability	:	Not readily biodegradable.
Bioaccumulation 28 d	:	Cyprinus carpio (Carp) OECD Test Guideline 305 Bioconcentration factor (BCF) : < 5.1

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Estimation based on data obtained on active ingredient.
Does not bioaccumulate.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste disposal methods - Product	:	In accordance with local and national regulations.
Contaminated packaging	:	No applicable data available.

SECTION 14. TRANSPORT INFORMATION

DOT	UN number	: 1170
	Proper shipping name	: Ethanol solutions
	Class	: 3
	Packing group	: III
	Labelling No.	: 3
IATA_C	UN number	: 1170
	Proper shipping name	: Ethanol solution
	Class	: 3
	Packing group	: III
	Labelling No.	: 3
IMDG	UN number	: 1170
	Proper shipping name	: ETHANOL SOLUTION
	Class	: 3
	Packing group	: III
	Labelling No.	: 3

SECTION 15. REGULATORY INFORMATION

TSCA : On the inventory, or in compliance with the inventory

Chemours™

Capstone™ 1157 Fire Fighting Foam Fluorosurfactant

Version 3.0

Revision Date 10/16/2015 Ref. 130000042672

PA Right to Know Regulated Chemical(s)	:	Substances on the Pennsylvania Hazardous Substances List present at a concentration of 1% or more (0.01% for Special Hazardous Substances): Ethanol
NJ Right to Know Regulated Chemical(s)	:	Substances on the New Jersey Workplace Hazardous Substance List present at a concentration of 1% or more (0.1% for substances identified as carcinogens, mutagens or teratogens): Ethanol

SECTION 16. OTHER INFORMATION

Capstone™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC.
Chemours™ and the Chemours Logo are trademarks of The Chemours Company.

Revision Date : 10/16/2015

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Significant change from previous version is denoted with a double bar.

SAFETY DATA SHEET

Capstone™ 1157 Fire Fighting Foam Fluoro-surfactant

Version	Revision Date:	SDS Number:	Date of last issue: 10/10/2019
5.3	04/16/2020	1334856-00038	Date of first issue: 02/27/2017

SECTION 1. IDENTIFICATION

Product name : Capstone™ 1157 Fire Fighting Foam Fluorosurfactant

SDS-Identcode : 130000042672

Manufacturer or supplier's details

Company name of supplier : The Chemours Company FC, LLC

Address : 1007 Market Street
Wilmington, DE 19801 United States of America (USA)

Telephone : 1-844-773-CHEM (outside the U.S. 1-302-773-1000)

Emergency telephone : Medical emergency: 1-866-595-1473 (outside the U.S. 1-302-773-2000) ; Transport emergency: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

Recommended use of the chemical and restrictions on use

Recommended use : Fluoroadditive

Restrictions on use : For industrial use only.
Do not use or resell Chemours™ materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless agreed to by Seller in a written agreement covering such use. For further information, please contact your Chemours representative.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Flammable liquids : Category 3

GHS label elements

Hazard pictograms :

Signal Word : Warning

Hazard Statements : H226 Flammable liquid and vapor.

Precautionary Statements : **Prevention:**

P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.

P233 Keep container tightly closed.
P241 Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P280 Wear protective gloves/ eye protection/ face protection.

Response:

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.

Storage:

P403 + P235 Store in a well-ventilated place. Keep cool.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Additional Labeling

The following percentage of the mixture consists of ingredient(s) with unknown acute toxicity:
2.5 %

Other hazards

Inhalation of decomposition products in high concentration may cause shortness of breath (lung edema).
Vapors may form explosive mixture with air.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Chemical nature : Fluoroadditive
Alcoholic solution
Aqueous surfactant solution.

Components

Chemical name	CAS-No.	Concentration (% w/w)
Ethanol	64-17-5	>= 30 - < 50

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : In case of contact, immediately flush skin with plenty of water.
Remove contaminated clothing and shoes.

In case of eye contact : Flush eyes with water as a precaution.
Get medical attention if irritation develops and persists.

If swallowed : If swallowed, DO NOT induce vomiting.

Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed : Inhalation may provoke the following symptoms:
Dizziness
Blurred vision
Headache
Irritation
Nausea
Pain
Lachrymation
Vomiting
Eye contact may provoke the following symptoms
Pain
tearing
Swelling of tissue
Redness
Impairment of vision

Protection of first-aiders : No special precautions are necessary for first aid responders.

Notes to physician : Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : High volume water jet

Specific hazards during fire fighting : Do not use a solid water stream as it may scatter and spread fire.
Flash back possible over considerable distance.
Vapors may form explosive mixtures with air.
Exposure to combustion products may be a hazard to health.

Hazardous combustion products : Carbon oxides
Hydrogen fluoride
carbonyl fluoride
potentially toxic fluorinated compounds
aerosolized particulates

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Use water spray to cool unopened containers.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.

Special protective equipment : Wear self-contained breathing apparatus for firefighting if

for fire-fighters		necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Remove all sources of ignition. Follow safe handling advice and personal protective equipment recommendations.
Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Non-sparking tools should be used. Soak up with inert absorbent material. Suppress (knock down) gases/vapors/mists with a water spray jet. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	If sufficient ventilation is unavailable, use with local exhaust ventilation. If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.
Advice on safe handling	:	Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Non-sparking tools should be used. Keep container tightly closed. Keep away from heat and sources of ignition. Take precautionary measures against static discharges. Take care to prevent spills, waste and minimize release to the

environment.

Conditions for safe storage : Keep in properly labeled containers.
Keep tightly closed.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.
Keep away from heat and sources of ignition.

Materials to avoid : Do not store with the following product types:
Strong oxidizing agents
Organic peroxides
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Self-heating substances and mixtures
Substances and mixtures which in contact with water emit flammable gases
Explosives
Gases

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m³	NIOSH REL
		STEL	1,000 ppm	ACGIH
		TWA	1,000 ppm 1,900 mg/m³	OSHA Z-1

Occupational exposure limits of decomposition products

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrofluoric acid	7664-39-3	TWA	3 ppm 2.5 mg/m³	NIOSH REL
		C	6 ppm 5 mg/m³	NIOSH REL
		TWA	3 ppm	OSHA Z-2
		TWA	0.5 ppm (Fluorine)	ACGIH
		C	2 ppm (Fluorine)	ACGIH
Carbonyl difluoride	353-50-4	TWA	2 ppm	ACGIH
		STEL	5 ppm	ACGIH
		ST	5 ppm 15 mg/m³	NIOSH REL

		TWA	2 ppm 5 mg/m³	NIOSH REL
Carbon dioxide	124-38-9	TWA	5,000 ppm	ACGIH
		STEL	30,000 ppm	ACGIH
		TWA	5,000 ppm 9,000 mg/m³	OSHA Z-1
		TWA	5,000 ppm 9,000 mg/m³	NIOSH REL
		ST	30,000 ppm 54,000 mg/m³	NIOSH REL
Carbon monoxide	630-08-0	TWA	25 ppm	ACGIH
		TWA	35 ppm 40 mg/m³	NIOSH REL
		C	200 ppm 229 mg/m³	NIOSH REL
		TWA	50 ppm 55 mg/m³	OSHA Z-1

Engineering measures : Processing may form hazardous compounds (see section 10).
Minimize workplace exposure concentrations.
If sufficient ventilation is unavailable, use with local exhaust ventilation.
If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection

Remarks : Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. Take note that the product is flammable, which may impact the selection of hand protection. Wash hands before breaks and at the end of workday.

Eye protection : Wear the following personal protective equipment:
Safety glasses

Skin and body protection	:	Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential. Wear the following personal protective equipment: If assessment demonstrates that there is a risk of explosive atmospheres or flash fires, use flame retardant antistatic protective clothing. Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).
Hygiene measures	:	If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Color	:	amber, clear
Odor	:	alcohol-like
Odor Threshold	:	No data available
pH	:	6.5
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	180 °F / 82 °C (1,013 hPa)
Flash point	:	77 °F / 25 °C
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	Ignitable (see flash point)
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available

Vapor pressure	:	53 hPa (68 °F / 20 °C)
Relative vapor density	:	No data available
Relative density	:	1.03 (68 °F / 20 °C)
Solubility(ies)		
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	> 392 °F / > 200 °C
Viscosity		
Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Flammable liquid and vapor. Vapors may form explosive mixture with air. Can react with strong oxidizing agents. Hazardous decomposition products will be formed at elevated temperatures.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Oxidizing agents

Hazardous decomposition products

Thermal decomposition	:	Hydrofluoric acid Carbonyl difluoride Carbon dioxide Carbon monoxide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Components:

Ethanol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg Method: OECD Test Guideline 401
Acute inhalation toxicity	:	LC50 (Rat): 124.7 mg/l Exposure time: 4 h Test atmosphere: vapor

Skin corrosion/irritation

Not classified based on available information.

Components:

Ethanol:

Species	:	Rabbit
Method	:	OECD Test Guideline 404
Result	:	No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Components:

Ethanol:

Species	:	Rabbit
Result	:	Irritation to eyes, reversing within 21 days
Method	:	OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Components:

Ethanol:

Test Type	:	Local lymph node assay (LLNA)

Routes of exposure	:	Skin contact
Species	:	Mouse
Result	:	negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Ethanol:

Genotoxicity in vitro	:	Test Type: In vitro mammalian cell gene mutation test Result: negative Test Type: Bacterial reverse mutation assay (AMES) Result: negative
Genotoxicity in vivo	:	Test Type: Rodent dominant lethal test (germ cell) (in vivo) Species: Mouse Application Route: Ingestion Result: equivocal

Carcinogenicity

Not classified based on available information.

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Components:

Ethanol:

Effects on fertility	:	Test Type: Two-generation reproduction toxicity study Species: Mouse Application Route: Ingestion Result: negative

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Not classified based on available information.

Repeated dose toxicity

Components:

Ethanol:

Species	:	Rat
NOAEL	:	1,280 mg/kg
LOAEL	:	3,156 mg/kg
Application Route	:	Ingestion
Exposure time	:	90 Days

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Ethanol:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): > 1,000 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Ceriodaphnia (water flea)): > 1,000 mg/l Exposure time: 48 h
Toxicity to algae/aquatic plants	:	ErC50 (Chlorella vulgaris (Fresh water algae)): 275 mg/l Exposure time: 72 h
		EC10 (Chlorella vulgaris (Fresh water algae)): 11.5 mg/l Exposure time: 72 h
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 9.6 mg/l Exposure time: 9 d
Toxicity to microorganisms	:	EC50 (Pseudomonas putida): 6,500 mg/l Exposure time: 16 h

Persistence and degradability

Components:

Ethanol:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 84 % Exposure time: 20 d

Bioaccumulative potential

Components:

Ethanol:

Partition coefficient: n-octanol/water : log Pow: -0.35

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
Empty containers retain residue and can be dangerous.
Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	UN 1170
Proper shipping name	:	ETHANOL SOLUTION
Class	:	3
Packing group	:	III
Labels	:	3

IATA-DGR

UN/ID No.	:	UN 1170
Proper shipping name	:	Ethanol solution
Class	:	3
Packing group	:	III
Labels	:	Flammable Liquids
Packing instruction (cargo aircraft)	:	366
Packing instruction (passenger aircraft)	:	355

IMDG-Code

UN number	:	UN 1170
Proper shipping name	:	ETHANOL SOLUTION (Carboxymethyldimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-

tridecafluorooctyl)sulphonyl]amino]propylammonium hydroxide)

Class	:	3
Packing group	:	III
Labels	:	3
EmS Code	:	F-E, S-D
Marine pollutant	:	yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number	:	UN 1170
Proper shipping name	:	Ethanol solutions
Class	:	3
Packing group	:	III
Labels	:	FLAMMABLE LIQUID
ERG Code	:	127
Marine pollutant	:	yes(Carboxymethyldimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulphonyl]amino]propylammonium hydroxide)

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Butanone	78-93-3	5000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Pennsylvania Right To Know

Water	7732-18-5
Ethanol	64-17-5
Carboxymethyldimethyl-3-[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulphonyl]amino]propylammonium hydroxide	34455-29-3
Butanone	78-93-3
Propan-2-ol	67-63-0

California Prop. 65

WARNING: This product can expose you to chemicals including pentadecafluorooctanoic acid, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. Note to User: This product is not made with PFOA nor is PFOA intentionally present in the product; however, it is possible that PFOA may be present as an impurity at background (environmental) levels.

California List of Hazardous Substances

Ethanol	64-17-5

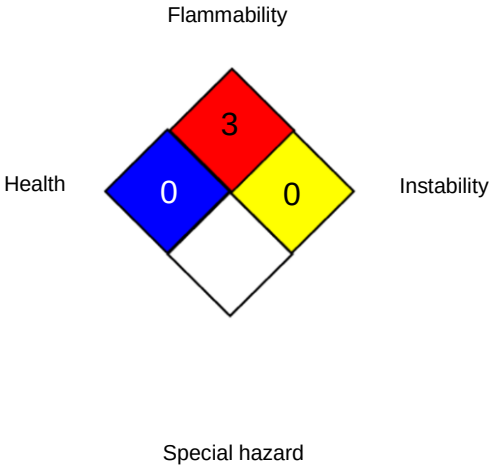
California Permissible Exposure Limits for Chemical Contaminants

Ethanol	64-17-5

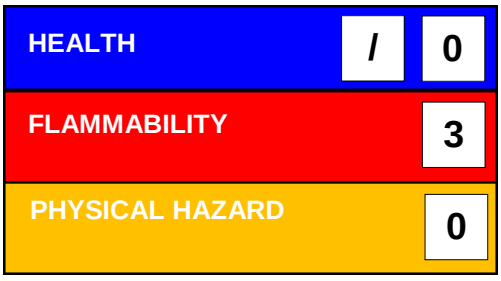
SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:



HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

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Before use read Chemours safety information.
For further information contact the local Chemours office or nominated distributors.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA Z-2	:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit
ACGIH / C	:	Ceiling limit
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA Z-1 / TWA	:	8-hour time weighted average
OSHA Z-2 / TWA	:	8-hour time weighted average

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to : Internal technical data, data from raw material SDSs, OECD

compile the Material Safety Data Sheet		eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	04/16/2020

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

Safety Data Sheet

This safety data sheet complies with the requirements of: 2012 OSHA Hazard Communication Standard (29CFR 1910.1200)

Product name CHEMGUARD FP-5100

1. Identification

1.1. Product Identifier

Product name CHEMGUARD FP-5100

1.2. Other means of identification

Product code FP-5100D440D
Synonyms None
Chemical Family surfactant

1.3. Recommended use of the chemical and restrictions on use

Recommended use surfactant.
Uses advised against None known.

1.4. Details of the Supplier of the Safety Data Sheet

Company Name Chemguard, Inc
204 South 6th Ave
Mansfield, TX 76063
Telephone: 817-473-9964
www.chemguard.com
Contact point Product Stewardship at 1-715-735-7411
E-mail address psra@tycofp.com

1.5. Emergency Telephone Number

Emergency telephone CHEMTREC 001-800-424-9300 or 001-703-527-3887

2. Hazards Identification

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Inhalation (Dusts/Mists) - Category 4
Serious eye damage/eye irritation - Category 2A
Specific target organ toxicity (single exposure) - Category 1

2.2. Label Elements

Signal Word
DANGER

Hazard Statements
Harmful if inhaled
Causes serious eye irritation
Causes damage to organs

Precautionary Statements

Prevention
Use only outdoors or in a well-ventilated area. Wash face, hands and any exposed skin thoroughly after handling. Wear eye/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product.

Response
IF exposed: Call a POISON CENTER or doctor/physician.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

Storage
Store locked up.

Disposal
Dispose of contents/container to an approved waste disposal plant.

2.3. Hazards Not Otherwise Classified (HNOC)
Not Applicable.

2.4. Other Information
Causes mild skin irritation.

3. Composition/information on Ingredients

3.1. Mixture
The following component(s) in this product are considered hazardous under applicable OSHA(USA)

Chemical name	CAS No.	weight-%
Sodium chloride	7647-14-5	3 - 7
Potassium chloride	7447-40-7	1 - 5
Sodium iodide	7681-82-5	1 - 5
2-Methyl-2,4-pentanediol	107-41-5	1 - 5
n-Butanol	71-36-3	1 - 5

4. First aid measures

4.1. Description of first aid measures

General Advice Call 911 or emergency medical service. Remove and isolate contaminated clothing and shoes. If symptoms persist, call a physician.

Eye Contact In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin contact Wash skin with soap and water. Immediate medical attention is not required. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. If skin irritation persists, call a physician.

Inhalation Move victim to fresh air. If breathing is irregular or stopped, administer artificial respiration. Administer oxygen if breathing is difficult. Immediate medical attention is not required. If

	symptoms persist, call a physician. Move to fresh air in case of accidental inhalation of vapors or decomposition products.
Ingestion	Do not induce vomiting without medical advice. Rinse mouth. Get medical attention. Drink 1 or 2 glasses of water. Never give anything by mouth to an unconscious person. Clean mouth with water and drink afterwards plenty of water. Call a physician. Do NOT induce vomiting.
Self-Protection of the First Aider	Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Use personal protective equipment as required.

4.2. Most Important Symptoms and Effects, Both Acute and Delayed

Symptoms No information available.

4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

Note to physicians Keep victim warm and quiet. Treat symptomatically.

5. Fire-fighting measures

5.1. Suitable Extinguishing Media

Dry chemical, CO2, water spray or regular foam. Water spray, fog or regular foam. Use water spray or fog; do not use straight streams. Move containers from fire area if you can do it without risk. Use. Dry chemical. Carbon dioxide (CO2). Water spray (fog). Alcohol resistant foam.

5.2. Unsuitable Extinguishing Media

CAUTION: All these products have a very low flash point. Use of water spray when fighting fire may be inefficient.

5.3. Specific Hazards Arising from the Chemical

Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Those substances designated with a "P" may polymerize explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Substance may be transported hot. Keep product and empty container away from heat and sources of ignition. Risk of ignition.

Hazardous Combustion Products Carbon oxides, Fluorinated oxides, Oxides of sulfur, Nitrogen oxides (NOx)

5.4. Explosion Data

Sensitivity to Mechanical Impact None.

Sensitivity to Static Discharge None.

5.5. Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal Precautions Do not touch or walk through spilled material. Stop leak if you can do it without risk. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Remove all sources of ignition.

Pay attention to flashback. Take precautionary measures against static discharges. Use personal protective equipment as required.

OTHER INFORMATION Water spray may reduce vapor; but may not prevent ignition in closed spaces.

For emergency responders Use personal protection recommended in Section 8.

6.2. Environmental Precautions

Environmental Precautions Prevent entry into waterways, sewers, basements or confined areas. Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. See Section 12 for additional Ecological Information.

6.3. Methods and material for containment and cleaning up

Methods for Containment A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Dike far ahead of liquid spill for later disposal.

Methods for Cleaning Up Use clean non-sparking tools to collect absorbed material. Dam up. Soak up with inert absorbent material. Pick up and transfer to properly labeled containers. Take precautionary measures against static discharges.

7. Handling and Storage

7.1. Precautions for Safe Handling

Advice on safe handling Use with local exhaust ventilation. All equipment used when handling the product must be grounded. Keep away from heat/sparks/open flames/hot surfaces. — No smoking. Use personal protective equipment as required. Do not breathe dust/fume/gas/mist/vapors/spray. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors).

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a cool, well-ventilated place. Keep at temperatures between 1 and 49 °C. Keep away from heat. Keep in properly labeled containers.

Incompatible Materials Strong oxidizing agents.

8. Exposure Controls/Personal Protection

8.1. Control Parameters

Exposure guidelines

Chemical name	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL
Sodium iodide 7681-82-5	TWA: 0.01 ppm inhalable fraction and vapor	-	-	-
2-Methyl-2,4-pentanediol 107-41-5	STEL: 50 ppm vapor fraction STEL: 10 mg/m³ inhalable particulate matter, aerosol only TWA: 25 ppm vapor fraction	-	Ceiling: 25 ppm Ceiling: 125 mg/m³	25 ppm (Ceiling) 125 mg/m³ (Ceiling)
n-Butanol 71-36-3	TWA: 20 ppm	-	IDLH: 1400 ppm Ceiling: 50 ppm Ceiling: 150 mg/m³	50 ppm (Ceiling) 150 mg/m³ (Ceiling)

ACGIH (American Conference of Governmental Industrial Hygienists) OSHA (Occupational Safety and Health Administration of the

US Department of Labor) NIOSH IDLH Immediately Dangerous to Life or Health

8.2. Appropriate Engineering Controls

Engineering controls	Ensure adequate ventilation, especially in confined areas.

8.3. Individual protection measures, such as personal protective equipment

Eye/Face Protection	Avoid contact with eyes. Tight sealing safety goggles.
Skin and Body Protection	Wear protective gloves and protective clothing.
Respiratory Protection	If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.
Ventilation	Use local exhaust or general dilution ventilation to control exposure with applicable limits

8.4. General hygiene considerations

When using do not eat, drink or smoke. Regular cleaning of equipment, work area and clothing is recommended.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State	Liquid		
Odor	Slight solvent	**Color**	Dark amber
Odor Threshold	No data available		

Property	**Values**	**Remarks • Method**
pH	8.5 - 10.5	
Melting point/freezing point	No data available	
Boiling point / boiling range	No data available	
Flash Point	No data available	
Evaporation Rate	No data available	
Flammability (solid, gas)	No data available	
Flammability limit in air		
Upper flammability limit:	No data available	
Lower flammability limit:	No data available	
Vapor Pressure	No data available	
Vapor Density	No data available	
Specific gravity	1.2 - 1.3	
Water Solubility	Miscible in water	
Solubility in Other Solvents	No data available	
Partition coefficient	No data available	
Autoignition Temperature	No data available	
Decomposition Temperature	No data available	
Kinematic viscosity	No data available	

VOC content (%) 3

10. Stability and Reactivity

10.1. Chemical Stability

Stable under recommended storage conditions.

10.2. Reactivity
No data available

10.3. Possibility of hazardous reactions

None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

10.4. Conditions to Avoid

Heat, flames and sparks.

10.5. Incompatible Materials

Strong oxidizing agents.

10.6. Hazardous decomposition products

Carbon oxides. Oxides of sulfur. Nitrogen oxides (NOx). Fluorinated oxides.

11. Toxicological Information

11.1. Information on Likely Routes of Exposure

Product information No data available

Inhalation No data available.

Eye Contact Severely irritating to eyes.

Skin contact May cause irritation.

Ingestion No data available.

Component Information
Acute Toxicity

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Sodium chloride 7647-14-5	= 3 g/kg (Rat)	> 10 g/kg (Rabbit)	> 42 g/m³ (Rat) 1 h
Potassium chloride 7447-40-7	= 2600 mg/kg (Rat)	-	-
Sodium iodide 7681-82-5	= 4340 mg/kg (Rat)	-	-
2-Methyl-2,4-pentanediol 107-41-5	= 3700 mg/kg (Rat)	= 12300 mg/kg (Rabbit) = 8560 µL/kg (Rabbit)	> 310 mg/m³ (Rat) 1 h
n-Butanol 71-36-3	= 790 mg/kg (Rat) = 700 mg/kg (Rat)	= 3402 mg/kg (Rabbit) = 3400 mg/kg (Rabbit)	> 8000 ppm (Rat) 4 h

11.2. Information on Toxicological Effects

Symptoms No information available.

11.3. Delayed and immediate effects as well as chronic effects from short and long-term exposure
Skin Corrosion/Irritation Irritating to skin.
Serious eye damage/eye irritation Severely irritating to eyes.

Carcinogenicity	No information available.
Reproductive Toxicity	No information available.
STOT - Single Exposure	May cause damage to organs.
STOT - Repeated Exposure	No information available.
Target organ effects	Respiratory System, Eyes, Skin, Central Nervous System.
Aspiration Hazard	No information available.

11.4. Numerical Measures of Toxicity - Product information

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	22201 mg/kg
ATEmix (inhalation-dust/mist)	2 mg/l

12. Ecological Information

12.1. Ecotoxicity

Chemical name	Algae/aquatic plants	Fish	Crustacea
Sodium chloride 7647-14-5	-	LC50 (96h) flow-through 4747 - 7824 mg/L Oncorhynchus mykiss LC50 (96h) semi-static = 7050 mg/L Pimephales promelas LC50 (96h) static = 12946 mg/L Lepomis macrochirus LC50 (96h) static 6020 - 7070 mg/L Pimephales promelas LC50 (96h) flow-through 5560 - 6080 mg/L Lepomis macrochirus LC50 (96h) static 6420 - 6700 mg/L Pimephales promelas	EC50 (48h) Static 340.7 - 469.2 mg/L Daphnia magna EC50 (48h) = 1000 mg/L Daphnia magna
Potassium chloride 7447-40-7	EC50 (72h) = 2500 mg/L Desmodesmus subspicatus	LC50 (96h) static 750 - 1020 mg/L Pimephales promelas LC50 (96h) static = 1060 mg/L Lepomis macrochirus	EC50 (48h) = 825 mg/L Daphnia magna EC50 (48h) Static = 83 mg/L Daphnia magna
2-Methyl-2,4-pentanediol 107-41-5	-	LC50 (96h) static = 10700 mg/L Pimephales promelas LC50 (96h) static = 10000 mg/L Lepomis macrochirus LC50 (96h) flow-through = 8690 mg/L Pimephales promelas LC50 (96h) flow-through 10500 - 11000 mg/L Pimephales promelas	EC50 (48h) 2700 - 3700 mg/L Daphnia magna
n-Butanol 71-36-3	EC50 (96h) > 500 mg/L Desmodesmus subspicatus EC50 (72h) > 500 mg/L Desmodesmus subspicatus	LC50 (96h) static = 1910000 µg/L Pimephales promelas LC50 (96h) static 1730 - 1910 mg/L Pimephales promelas LC50 (96h) flow-through = 1740 mg/L Pimephales promelas LC50 (96h) static 100000 - 500000 µg/L Lepomis macrochirus	EC50 (48h) Static 1897 - 2072 mg/L Daphnia magna EC50 (48h) = 1983 mg/L Daphnia magna

12.2. Persistence and Degradability

No information available.

12.3. Bioaccumulation

No information available.

Chemical name	Partition coefficient
2-Methyl-2,4-pentanediol	<0.14

107-41-5	
n-Butanol 71-36-3	0.785

12.4. Other Adverse Effects
No information available

13. Disposal Considerations

13.1. Waste Treatment Methods
Disposal of wastes This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261).

Contaminated Packaging Do not reuse container.

14. Transport Information

DOT NOT REGULATED

TDG NOT REGULATED

MEX NOT REGULATED

ICAO (air) NOT REGULATED

IATA NOT REGULATED

IMDG NOT REGULATED

15. Regulatory Information

15.1. International Inventories
TSCA Complies
DSL/NDSL Does not comply
ENCS Does not comply
IECSC Does not comply
KECL Does not comply
PICCS Does not comply
AICS Does not comply

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

15.2. US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical name	SARA 313 - Threshold Values %
n-Butanol - 71-36-3	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic health hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
n-Butanol 71-36-3	5000 lb	-	RQ 5000 lb final RQ RQ 2270 kg final RQ

15.3. US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical name	California Proposition 65
Perfluorooctanoic acid - 335-67-1	Developmental Toxicity

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
2-Methyl-2,4-pentanediol 107-41-5	X	X	X
n-Butanol 71-36-3	X	X	X

16. Other information, including date of preparation of the last revision

NFPA	**Health Hazards** 2	**Flammability** 0	**Instability** 0	**Physical and chemical properties** -
HMIS	**Health Hazards** 2	**Flammability** 0	**Physical Hazards** 0	**Personal Protection** X

Revision date 22-Feb-2019
Revision note No information available.
Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

01004

SAFETY DATA SHEET

Capstone™ 1157-D Fire Fighting Foam Fluorosurfactant

Version	Revision Date:	SDS Number:	Date of last issue: 02/28/2017
4.0	09/13/2017	1336273-00031	Date of first issue: 02/27/2017

SECTION 1. IDENTIFICATION

Product name : Capstone™ 1157-D Fire Fighting Foam Fluorosurfactant, Capstone™ 1157-D Fire Fighting Foam Fluorosurfactant

Product code : D15360110, D15360110

SDS-Identcode : 130000050530

Manufacturer or supplier's details

Company name of supplier : The Chemours Company FC, LLC

Address : 1007 Market Street
Wilmington, DE 19899 United States of America (USA)

Telephone : 1-844-773-CHEM (outside the U.S. 1-302-773-1000)

Emergency telephone : Medical emergency: 1-866-595-1473 (outside the U.S. 1-302-773-2000) ; Transport emergency: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

Recommended use of the chemical and restrictions on use

Recommended use : Fluoroadditive

Restrictions on use : This material shall not be distributed to consumers for use in spray applications., For industrial use only.
Do not use or resell Chemours™ materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless agreed to by Seller in a written agreement covering such use. For further information, please contact your Chemours representative.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Additional Labeling

The following percentage of the mixture consists of ingredient(s) with unknown acute toxicity:
2.5 %

Other hazards

Inhalation of decomposition products in high concentration may cause shortness of breath (lung edema).

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous ingredients

Chemical name	CAS-No.	Concentration (% w/w)
Propylene glycol	57-55-6	>= 20 - < 30
Ethanol	64-17-5	>= 1 - < 5

SECTION 4. FIRST AID MEASURES

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : Wash with water and soap as a precaution.
Get medical attention if symptoms occur.

In case of eye contact : Flush eyes with water as a precaution.
Get medical attention if irritation develops and persists.

If swallowed : If swallowed, DO NOT induce vomiting.
Get medical attention if symptoms occur.
Rinse mouth thoroughly with water.

Most important symptoms and effects, both acute and delayed : None known.

Protection of first-aiders : No special precautions are necessary for first aid responders.

Notes to physician : Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : None known.

Specific hazards during fire fighting : Vapors may form explosive mixtures with air.
Exposure to combustion products may be a hazard to health.

Hazardous combustion products : Hydrogen fluoride
carbonyl fluoride
potentially toxic fluorinated compounds
aerosolized particulates
Carbon oxides

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

		Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.
Special protective equipment for fire-fighters	:	Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Follow safe handling advice and personal protective equipment recommendations.
Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	Use only with adequate ventilation.
Advice on safe handling	:	Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Take care to prevent spills, waste and minimize release to the environment.
Conditions for safe storage	:	Keep in properly labeled containers. Store in accordance with the particular national regulations.

Materials to avoid	:	Do not store with the following product types: Strong oxidizing agents

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Propylene glycol	57-55-6	TWA	10 mg/m³	US WEEL
Ethanol	64-17-5	TWA	1,000 ppm 1,900 mg/m³	NIOSH REL
		STEL	1,000 ppm	ACGIH
		TWA	1,000 ppm 1,900 mg/m³	OSHA Z-1

Occupational exposure limits of decomposition products

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrofluoric acid	7664-39-3	TWA	3 ppm 2.5 mg/m³	NIOSH REL
		C	6 ppm 5 mg/m³	NIOSH REL
		TWA	3 ppm	OSHA Z-2
		TWA	0.5 ppm (Fluorine)	ACGIH
		C	2 ppm (Fluorine)	ACGIH
Carbonyl difluoride	353-50-4	TWA	2 ppm	ACGIH
		STEL	5 ppm	ACGIH
		ST	5 ppm 15 mg/m³	NIOSH REL
		TWA	2 ppm 5 mg/m³	NIOSH REL
Carbon dioxide	124-38-9	TWA	5,000 ppm	ACGIH
		STEL	30,000 ppm	ACGIH
		TWA	5,000 ppm 9,000 mg/m³	OSHA Z-1
		TWA	5,000 ppm 9,000 mg/m³	NIOSH REL
		ST	30,000 ppm 54,000 mg/m³	NIOSH REL
Carbon monoxide	630-08-0	TWA	25 ppm	ACGIH
		TWA	35 ppm 40 mg/m³	NIOSH REL

		C	200 ppm 229 mg/m³	NIOSH REL
		TWA	50 ppm 55 mg/m³	OSHA Z-1

Engineering measures : Processing may form hazardous compounds (see section 10).
Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection

Remarks : Wash hands before breaks and at the end of workday.

Eye protection : Wear the following personal protective equipment:
Safety glasses

Skin and body protection : Skin should be washed after contact.

Hygiene measures : Ensure that eye flushing systems and safety showers are located close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Color : amber, clear

Odor : alcohol-like

Odor Threshold : No data available

pH : 4.3

Melting point/freezing point : No data available

Initial boiling point and boiling range	:	82 °C
Flash point	:	> 93 °C
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	53 hPa (20 °C)
Relative vapor density	:	No data available
Relative density	:	1.13 (20 °C)
Solubility(ies)		
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	> 200 °C
Viscosity		
Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Vapors may form explosive mixture with air. Can react with strong oxidizing agents. Hazardous decomposition products will be formed at elevated temperatures.

Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents

Hazardous decomposition products

Thermal decomposition	:	Hydrofluoric acid Carbonyl difluoride Carbon dioxide Carbon monoxide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg
Acute inhalation toxicity	:	LC50 (Rabbit): > 159 mg/l Exposure time: 4 h Test atmosphere: dust/mist
Acute dermal toxicity	:	LD50 (Rabbit): > 2,000 mg/kg Assessment: The substance or mixture has no acute dermal toxicity

Ethanol:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg Method: OECD Test Guideline 401
Acute inhalation toxicity	:	LC50 (Rat): 124.7 mg/l Exposure time: 4 h Test atmosphere: vapor

Skin corrosion/irritation

Not classified based on available information.

Ingredients:

Propylene glycol:

Species: Rabbit
Method: OECD Test Guideline 404

Result: No skin irritation

Ethanol:

Species: Rabbit
Method: OECD Test Guideline 404
Result: No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Ingredients:

Propylene glycol:

Species: Rabbit
Result: No eye irritation
Method: OECD Test Guideline 405

Ethanol:

Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Ingredients:

Propylene glycol:

Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative

Ethanol:

Test Type: Local lymph node assay (LLNA)
Routes of exposure: Skin contact
Species: Mouse
Result: negative

Germ cell mutagenicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)

Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Result: negative

Ethanol:

Genotoxicity in vitro : Test Type: In vitro mammalian cell gene mutation test
Result: negative

Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Genotoxicity in vivo : Test Type: Rodent dominant lethal test (germ cell) (in vivo)
Species: Mouse
Application Route: Ingestion
Result: equivocal

Carcinogenicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Species: Rat
Application Route: Ingestion
Exposure time: 2 Years
Result: negative

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Ingredients:

Propylene glycol:

Effects on fertility : Test Type: Three-generation reproduction toxicity study
Species: Mouse
Application Route: Ingestion
Result: negative

Effects on fetal development : Test Type: Embryo-fetal development
Species: Mouse
Application Route: Ingestion
Result: negative

Ethanol:

Effects on fertility : Test Type: Two-generation reproduction toxicity study
Species: Mouse
Application Route: Ingestion
Result: negative

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Not classified based on available information.

Repeated dose toxicity

Ingredients:

Propylene glycol:

Species: Rat, male
NOAEL: 1,700 mg/kg
Application Route: Ingestion
Exposure time: 2 y

Ethanol:

Species: Rat
NOAEL: 1,280 mg/kg
LOAEL: 3,156 mg/kg
Application Route: Ingestion
Exposure time: 90 Days

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ingredients:

Propylene glycol:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 40,613 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 18,340 mg/l
Exposure time: 48 h

Toxicity to algae	:	ErC50 (Skeletonema costatum (marine diatom)): 19,300 mg/l Exposure time: 72 h Method: OECD Test Guideline 201
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Ceriodaphnia dubia (water flea)): 13,020 mg/l Exposure time: 7 d
Toxicity to microorganisms	:	NOEC (Pseudomonas putida): > 20,000 mg/l Exposure time: 18 h

Ethanol:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): > 1,000 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Ceriodaphnia (water flea)): > 1,000 mg/l Exposure time: 48 h
Toxicity to algae	:	ErC50 (Chlorella vulgaris (Fresh water algae)): 275 mg/l Exposure time: 72 h EC10 (Chlorella vulgaris (Fresh water algae)): 11.5 mg/l Exposure time: 72 h
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 9.6 mg/l Exposure time: 9 d
Toxicity to microorganisms	:	EC50 (Pseudomonas putida): 6,500 mg/l Exposure time: 16 h

Persistence and degradability

Ingredients:

Propylene glycol:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 98.3 % Exposure time: 28 d Method: OECD Test Guideline 301F

Ethanol:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 84 % Exposure time: 20 d

Bioaccumulative potential

Ingredients:

Propylene glycol:

Partition coefficient: n-	:	log Pow: -1.07

octanol/water

Ethanol:

Partition coefficient: n-octanol/water : log Pow: -0.35

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number : UN 3082
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Amphoteric Fluorinated Surfactant)
Class : 9
Packing group : III
Labels : 9

IATA-DGR

UN/ID No. : UN 3082
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.
(Amphoteric Fluorinated Surfactant)
Class : 9
Packing group : III
Labels : Miscellaneous
Packing instruction (cargo aircraft) : 964
Packing instruction (passenger aircraft) : 964
Environmentally hazardous : yes

IMDG-Code

UN number : UN 3082
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Amphoteric Fluorinated Surfactant)

Class	:	9
Packing group	:	III
Labels	:	9
EmS Code	:	F-A, S-F
Marine pollutant	:	yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number	:	UN 3082
Proper shipping name	:	Environmentally hazardous substance, liquid, n.o.s. (Amphoteric Fluorinated Surfactant)
Class	:	9
Packing group	:	III
Labels	:	CLASS 9
ERG Code	:	171
Marine pollutant	:	yes(Amphoteric Fluorinated Surfactant)
Remarks	:	Above applies only to containers over 119 gallons or 450 liters., Shipment by ground under DOT is non-regulated; however it may be shipped per the applicable hazard classification to facilitate multi-modal transport involving ICAO (IATA) or IMO.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

Ingredients	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Butanone	78-93-3	5000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	No SARA Hazards
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Pennsylvania Right To Know

Water	7732-18-5
Amphoteric Fluorinated Surfactant	Trade secret

Propylene glycol	57-55-6
Ethanol	64-17-5
Butanone	78-93-3
Propan-2-ol	67-63-0

California Prop. 65

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

California List of Hazardous Substances

Ethanol	64-17-5

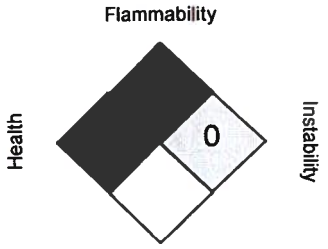
California Permissible Exposure Limits for Chemical Contaminants

Ethanol	64-17-5

SECTION 16. OTHER INFORMATION

Further information

NFPA:



Special hazard.

HMIS® IV:

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

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For further information contact the local Chemours office or nominated distributors.
All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA Z-2	:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
US WEEL	:	USA. Workplace Environmental Exposure Levels (WEEL)
ACGIH / TWA	:	8-hour, time-weighted average

ACGIH / STEL	:	Short-term exposure limit
ACGIH / C	:	Ceiling limit
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA Z-1 / TWA	:	8-hour time weighted average
OSHA Z-2 / TWA	:	8-hour time weighted average
US WEEL / TWA	:	8-hr TWA

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	09/13/2017

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

SAFETY DATA SHEET

Capstone™ 1470

Version	Revision Date:	SDS Number:	Date of last issue: 05/22/2019
5.2	10/15/2019	1341069-00036	Date of first issue: 02/27/2017

SECTION 1. IDENTIFICATION

Product name : Capstone™ 1470

SDS-Identcode : 130000124316

Manufacturer or supplier's details

Company name of supplier : The Chemours Company FC, LLC

Address : 1007 Market Street
Wilmington, DE 19801 United States of America (USA)

Telephone : 1-844-773-CHEM (outside the U.S. 1-302-773-1000)

Emergency telephone : Medical emergency: 1-866-595-1473 (outside the U.S. 1-302-773-2000) ; Transport emergency: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

Recommended use of the chemical and restrictions on use

Recommended use : Fluoroadditive

Restrictions on use : Do not use or resell Chemours™ materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless agreed to by Seller in a written agreement covering such use. For further information, please contact your Chemours representative.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Other hazards

Inhalation of decomposition products in high concentration may cause shortness of breath (lung edema).

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Components

Chemical name	CAS-No.	Concentration (% w/w)
2-Methyl-2,4-pentanediol	107-41-5	>= 10 - < 20
Propylene glycol	57-55-6	>= 10 - < 20

Actual concentration is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice	:	In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.
If inhaled	:	If inhaled, remove to fresh air. Get medical attention if symptoms occur.
In case of skin contact	:	Wash with water and soap as a precaution. Get medical attention if symptoms occur.
In case of eye contact	:	Flush eyes with water as a precaution. Get medical attention if irritation develops and persists.
If swallowed	:	If swallowed, DO NOT induce vomiting. Get medical attention if symptoms occur. Rinse mouth thoroughly with water.
Most important symptoms and effects, both acute and delayed	:	None known.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).
Notes to physician	:	Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	None known.
Specific hazards during fire fighting	:	Vapors may form explosive mixtures with air. Exposure to combustion products may be a hazard to health.
Hazardous combustion products	:	Hydrogen fluoride carbonyl fluoride potentially toxic fluorinated compounds aerosolized particulates Carbon oxides
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so.

Evacuate area.

Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Follow safe handling advice and personal protective equipment recommendations.
Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	Use only with adequate ventilation.
Advice on safe handling	:	Avoid inhalation of vapor or mist. Do not swallow. Avoid contact with eyes. Avoid prolonged or repeated contact with skin. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Take care to prevent spills, waste and minimize release to the environment.
Conditions for safe storage	:	Keep in properly labeled containers. Store in accordance with the particular national regulations.
Materials to avoid	:	Do not store with the following product types:

Strong oxidizing agents

Recommended storage temperature : > 50 °F / > 10 °C

Further information on storage stability : Freezing will affect the physical condition but will not damage the material. Thaw and mix before using.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
2-Methyl-2,4-pentanediol	107-41-5	C	25 ppm 125 mg/m³	NIOSH REL
		TWA (Vapor)	25 ppm	ACGIH
		STEL (Vapor)	50 ppm	ACGIH
		STEL (Inhalable fraction, Aerosol only)	10 mg/m³	ACGIH
Propylene glycol	57-55-6	TWA	10 mg/m³	US WEEL

Occupational exposure limits of decomposition products

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrofluoric acid	7664-39-3	TWA	3 ppm 2.5 mg/m³	NIOSH REL
		C	6 ppm 5 mg/m³	NIOSH REL
		TWA	3 ppm	OSHA Z-2
		TWA	0.5 ppm (Fluorine)	ACGIH
		C	2 ppm (Fluorine)	ACGIH
Carbonyl difluoride	353-50-4	TWA	2 ppm	ACGIH
		STEL	5 ppm	ACGIH
		ST	5 ppm 15 mg/m³	NIOSH REL
		TWA	2 ppm 5 mg/m³	NIOSH REL
Carbon dioxide	124-38-9	TWA	5,000 ppm	ACGIH
		STEL	30,000 ppm	ACGIH
		TWA	5,000 ppm 9,000 mg/m³	OSHA Z-1
		TWA	5,000 ppm 9,000 mg/m³	NIOSH REL

		ST	30,000 ppm 54,000 mg/m³	NIOSH REL
Carbon monoxide	630-08-0	TWA	25 ppm	ACGIH
		TWA	35 ppm 40 mg/m³	NIOSH REL
		C	200 ppm 229 mg/m³	NIOSH REL
		TWA	50 ppm 55 mg/m³	OSHA Z-1

Engineering measures : Processing may form hazardous compounds (see section 10).
Ensure adequate ventilation, especially in confined areas.
Minimize workplace exposure concentrations.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection
Material : Viton (R)

Remarks : Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Eye protection : Wear the following personal protective equipment:
Safety glasses

Skin and body protection : Skin should be washed after contact.

Hygiene measures : If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Color	:	amber
Odor	:	alcohol-like
Odor Threshold	:	No data available
pH	:	8.5 - 11.1
Melting point/freezing point	:	> 14 °F / > -10 °C
Initial boiling point and boiling range	:	212 °F / 100 °C (1,013 hPa)
Flash point	:	> 199.9 °F / > 93.3 °C Method: Pensky-Martens closed cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	17.5 hPa (68 °F / 20 °C)
Relative vapor density	:	No data available
Relative density	:	1.0 - 1.2
Solubility(ies)		
Water solubility	:	No data available
Solubility in other solvents	:	soluble
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	> 392 °F / > 200 °C
Viscosity		

Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Vapors may form explosive mixture with air. Can react with strong oxidizing agents. Hazardous decomposition products will be formed at elevated temperatures.
Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents

Hazardous decomposition products

Thermal decomposition	:	Hydrofluoric acid Carbonyl difluoride Carbon dioxide Carbon monoxide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Product:

Acute oral toxicity	:	LD50 (Rat): 3,129 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): > 5.6 mg/l Exposure time: 4 h Test atmosphere: dust/mist Assessment: The substance or mixture has no acute inhalation toxicity
Acute dermal toxicity	:	LD50 (Rat): > 5,000 mg/kg

Components:

2-Methyl-2,4-pentanediol:

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Propylene glycol:

Acute oral toxicity : LD50 (Rat): > 5,000 mg/kg

Acute inhalation toxicity : LC50 (Rabbit): > 159 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist

Acute dermal toxicity : LD50 (Rabbit): > 2,000 mg/kg
Assessment: The substance or mixture has no acute dermal toxicity

Skin corrosion/irritation

Not classified based on available information.

Product:

Species : Rabbit
Result : No skin irritation

Components:

2-Methyl-2,4-pentanediol:

Species : Rabbit
Method : OECD Test Guideline 404
Result : No skin irritation

Propylene glycol:

Species : Rabbit
Method : OECD Test Guideline 404
Result : No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Product:

Species : Rabbit
Result : No eye irritation

Components:

2-Methyl-2,4-pentanediol:

Species : Rabbit

Result : Irritation to eyes, reversing within 21 days

Propylene glycol:

Species : Rabbit
Result : No eye irritation
Method : OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Product:

Test Type : Local lymph node assay (LLNA)
Species : Mouse
Assessment : Does not cause skin sensitization.

Components:

2-Methyl-2,4-pentanediol:

Test Type : Maximization Test
Routes of exposure : Skin contact
Species : Guinea pig
Method : OECD Test Guideline 406
Result : negative

Propylene glycol:

Test Type : Maximization Test
Routes of exposure : Skin contact
Species : Guinea pig
Result : negative

Germ cell mutagenicity

Not classified based on available information.

Product:

Germ cell mutagenicity - Assessment : Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Components:

2-Methyl-2,4-pentanediol:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

Test Type: Chromosome aberration test in vitro
Result: negative

Propylene glycol:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: Intraperitoneal injection
Result: negative

Carcinogenicity

Not classified based on available information.

Components:

Propylene glycol:

Species : Rat
Application Route : Ingestion
Exposure time : 2 Years
Result : negative

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Components:

2-Methyl-2,4-pentanediol:

Effects on fertility : Test Type: Reproduction/Developmental toxicity screening test
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 421
Result: negative

Effects on fetal development : Test Type: Embryo-fetal development
Species: Rat
Application Route: Ingestion
Method: OECD Test Guideline 414
Result: negative

Propylene glycol:

Effects on fertility	:	Test Type: Three-generation reproduction toxicity study Species: Mouse Application Route: Ingestion Result: negative
Effects on fetal development	:	Test Type: Embryo-fetal development Species: Mouse Application Route: Ingestion Result: negative

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Not classified based on available information.

Repeated dose toxicity

Product:

Species	:	Rat
Application Route	:	Ingestion
Remarks	:	No significant adverse effects were reported

Components:

2-Methyl-2,4-pentanediol:

Species	:	Rat
NOAEL	:	>= 450 mg/kg
Application Route	:	Ingestion
Exposure time	:	90 Days
Method	:	OECD Test Guideline 408

Propylene glycol:

Species	:	Rat, male
NOAEL	:	1,700 mg/kg
Application Route	:	Ingestion
Exposure time	:	2 y

Aspiration toxicity

Not classified based on available information.

Experience with human exposure

Components:

2-Methyl-2,4-pentanediol:

Eye contact	:	Target Organs: Eyes Symptoms: Irritation

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to soil dwelling organisms : (Eisenia fetida (earthworms)): > 1,000 mg/kg
Exposure time: 14 d

Components:

2-Methyl-2,4-pentanediol:

Toxicity to fish : LC50 (Gambusia affinis (Mosquito fish)): 8,510 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 2,800 mg/l
Exposure time: 48 h

Toxicity to algae/aquatic plants : ErC50 (Pseudokirchneriella subcapitata (green algae)): > 429 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

EC10 (Pseudokirchneriella subcapitata (green algae)): > 429 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to microorganisms : NOEC: 200 mg/l
Exposure time: 10 d

Propylene glycol:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 40,613 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 18,340 mg/l
Exposure time: 48 h

Toxicity to algae/aquatic plants : ErC50 (Skeletonema costatum (marine diatom)): 19,300 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Ceriodaphnia dubia (water flea)): 13,020 mg/l
Exposure time: 7 d

Toxicity to microorganisms : NOEC (Pseudomonas putida): > 20,000 mg/l
Exposure time: 18 h

Persistence and degradability

Product:

Biodegradability : Result: Not readily biodegradable.

Method: OECD Test Guideline 301

Components:

2-Methyl-2,4-pentanediol:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 81 %
Exposure time: 28 d
Method: OECD Test Guideline 301F

Propylene glycol:

Biodegradability : Result: Readily biodegradable.
Biodegradation: 98.3 %
Exposure time: 28 d
Method: OECD Test Guideline 301F

Bioaccumulative potential

Components:

2-Methyl-2,4-pentanediol:

Partition coefficient: n-octanol/water : log Pow: 0
Remarks: Calculation

Propylene glycol:

Partition coefficient: n-octanol/water : log Pow: -1.07

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

IMDG-Code
Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

Domestic regulation

49 CFR
Not regulated as a dangerous good

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Sodium hydroxide	1310-73-2	1000	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity
This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Pennsylvania Right To Know

Water	7732-18-5
Amphoteric Fluorinated Surfactant	Trade secret
2-Methyl-2,4-pentanediol	107-41-5
Propylene glycol	57-55-6
Sodium hydroxide	1310-73-2

California Prop. 65

WARNING: This product can expose you to chemicals including pentadecafluorooctanoic acid, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov. Note to User: This product is not made with PFOA nor is PFOA intentionally present in the product; however, it is possible that PFOA may be present as an impurity at background (environmental) levels.

California List of Hazardous Substances

2-Methyl-2,4-pentanediol	107-41-5

California Permissible Exposure Limits for Chemical Contaminants

2-Methyl-2,4-pentanediol	107-41-5

Additional regulatory information

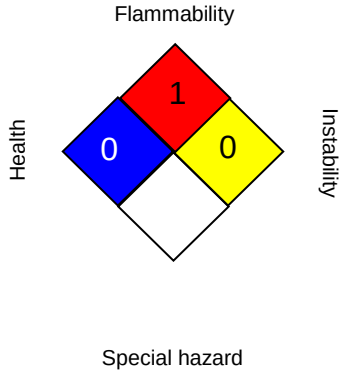
Amphoteric Fluorinated Surfactant Trade secret

The United States Environmental Protection Agency (USEPA) has established a Significant New Use Rule (SNUR) for one of the components in this product.
See 40 CFR § 721.10727
This material contains one or more substances which are subject to a TSCA Section 5 Consent Order or Significant New Use Rule (SNUR).
This material contains one or more substances which requires export notification under TSCA Section 12(b) and 40 CFR Part 707 Subpart D:
P-11-0526

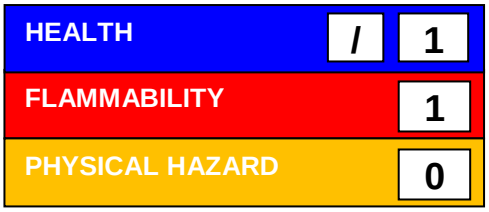
SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:



HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

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For further information contact the local Chemours office or nominated distributors.
All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
OSHA Z-2	:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
US WEEL	:	USA. Workplace Environmental Exposure Levels (WEEL)
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit
ACGIH / C	:	Ceiling limit
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek

NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA Z-1 / TWA	:	8-hour time weighted average
OSHA Z-2 / TWA	:	8-hour time weighted average
US WEEL / TWA	:	8-hr TWA

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	10/15/2019

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their

intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

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