



## Safety Data Sheet

### 1. IDENTIFICATION

**Product Identifier:** DFO, HFE 7100 Formula

**Product Code(s):** PF30023

**Synonyms:** 1,8-Diazafluoren-9-one, HFE7100 Formula

**Recommended Use:** For manufacturing, industrial, and laboratory use only. Use as a laboratory reagent.

**Uses Advised Against:** Not for food, drug, or household use.

**Supplier:** Pioneer Forensics, LLC  
6801 West 20th Street, Suite 204  
Greeley, CO 80634  
Phone: (970) 515-5420

**Emergency Phone Number:** For health emergency, call poison control: (800) 222-1222.

### 2. HAZARDS IDENTIFICATION

**Hazard Classifications:**

Skin Corrosion/Irritation:	Category 2
Eye Damage/Irritation:	Category 2A
Specific Target Organ Toxicity (Single Exposure):	Category 1

**Signal Word:** DANGER

**Hazard Statements:**

- Causes skin irritation.
- Causes serious eye irritation.
- Causes damage to organs.

**Pictograms:**



**Precautionary Statements:**

**Prevention:** Wash thoroughly after handling.  
Wear protective gloves, eye protection, and face protection.

Do not breathe fumes, mist, vapors, or spray.  
Do not eat, drink, or smoke when using this product.

**Response:** If exposed: Call a poison center or doctor.  
If on skin: Wash with plenty of water. If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.  
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 attention.

**Storage:** Store locked up.

**Disposal:** Dispose of contents and container in accordance with local, regional, national, and international regulations.

**Hazards Not Otherwise Classified:** Not applicable.

**Toxicity Statement:** Not applicable.

### 3. COMPOSITION AND INFORMATION ON INGREDIENTS

Component	Common Name / Synonyms	CAS#	Chemical Formula	% by Weight
Methyl Nonafluorobutyl Ether	-	163702-07-6	C <sub>5</sub> H <sub>3</sub> F <sub>9</sub> O	19.3 – 77.1
Methyl Nonafluoroisobutyl Ether	-	163702-08-7	C <sub>5</sub> H <sub>3</sub> F <sub>9</sub> O	19.3 – 77.1
Ethanol	Ethyl Alcohol	141-78-6	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	< 2.00
Acetic Acid	Ethanoic Acid	64-19-7	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	< 2.00
Isopropanol	Isopropyl Alcohol	67-63-0	C <sub>3</sub> H <sub>7</sub> OH	< 0.200
Methanol	Methyl Alcohol	67-56-1	CH <sub>3</sub> OH	< 0.200
DFO	1,8-Diazafluoren-9-one	54078-29-4	C <sub>11</sub> H <sub>6</sub> N <sub>2</sub> O	< 0.100

**Trade Secret Statement:** Not applicable.

### 4. FIRST AID MEASURES

#### First Aid Procedures:

**Inhalation:** Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a physician if symptoms occur.

**Ingestion:** Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, keep head low so that vomit does not enter lungs. Never give anything by mouth to an unconscious person. Call a physician or poison control center if symptoms occur.

**Skin Contact:** Wash skin with soap and plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician if symptoms occur.

**Eye Contact:** Check for and remove contact lenses, if present and easy to do. Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician if symptoms occur.

**General Advice:** Poison information centers in each state can provide additional assistance for scheduled poisons. Ensure that those providing first aid and medical personnel are aware of the material(s) involved and take precautions to protect themselves.

**Symptoms and Effects:** Inhalation may cause headache, coughing, suffocation, shortness of breath, and bronchitis. Ingestion may cause nausea, vomiting, blood in vomit, diarrhea, constipation, abdominal

pain, visual disturbances, drowsiness, dizziness, numbness, loss of coordination, blindness, and shock. Skin contact may cause irritation and blistering. Eye contact may cause severe irritation.

**Immediate Medical Care/  
Special Treatment:**

Get medical attention if feeling unwell or concerned. Treat symptomatically. Symptoms may be delayed.

## 5. FIREFIGHTING MEASURES

**Suitable Extinguishing Media:** Water spray, dry powder, alcohol resistant foam, carbon dioxide.

**Unsuitable Extinguishing Media:** Do not use a solid (straight) water stream, as it may scatter and spread fire.

**Hazardous Combustion Products:** Carbon oxides, hydrogen fluoride, perfluoroisobutylene, nitrogen oxides.

**Specific Hazards:** Excessive thermal conditions may cause decomposition and yield corrosive and/or toxic fumes.

**Special Protective Equipment/  
Precautions for Firefighters:** As in any fire, wear MSHA/NIOSH-approved (or equivalent), self-contained, positive-pressure or pressure-demand breathing apparatus and full protective gear. Use water spray to cool unopened containers. Move containers from fire area, if you can do so without risk.

## 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions and Protective Equipment:** Ventilate area of leak or spill. Isolate hazard area and keep unnecessary and unprotected personnel away from the area of the leak or spill. Keep upwind. Keep out of low areas. Wear appropriate personal protective equipment (see Section 8). Avoid contact with eyes, skin, and clothing.

**Emergency Procedures:** In case of chemical emergency, or if unsure how to address an accidental release, consult a professional (see Section 1).

**Methods for Containment:** Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements, or confined areas. Dike the spilled material where possible. Product should not be released to the environment. Contain and recover liquid when possible.

**Methods for Cleanup:** Absorb spill with an inert material (e.g. vermiculite, dry sand, earth, cloth, or fleece) and place in a non-combustible container for reclamation or disposal. Do not flush to sewer. Clean contaminated surface thoroughly. Never return spills in original containers for reuse. Clean up in accordance with all applicable regulations.

## 7. HANDLING AND STORAGE

**Handling:** Do not handle, store, or open near sources of extreme heat (> 150 °C). Wear personal protective equipment (see Section 8). Use only in well-ventilated areas. Provide sufficient air exchange and/or exhaust in work areas. Limit exposure to light. Avoid contact with skin, eyes, and clothing. Do not breathe vapors or spray mist. Do not ingest. When using, do not eat, drink, or smoke. Keep away from incompatible materials (see Section 10). Handle in accordance with good industrial hygiene and safety practice. Wash thoroughly after handling. Containers of this material may be hazardous when empty, as they retain product residues. Observe all warnings and precautions listed for this product.

**Storage:** Store in a cool, dry, ventilated area. Store in a segregated and approved area away from heat and incompatible materials (see Section 10). Store in original container. Keep out of light. Keep containers tightly closed and upright. Keep away from food, drink, and animal

foodstuffs. Keep out of the reach of children. Ground container and transfer equipment. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of this product.

## 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

<b>Exposure Limits:</b>	Methyl Nonafluorobutyl Ether:	AHIA (TWA):	750 ppm
	Methyl Nonafluoroisobutyl Ether:	AHIA (TWA):	750 ppm
	Ethanol:	ACGIH: STEL:	1000 ppm
		OSHA: PEL:	1000 ppm 1900 mg/m <sup>3</sup>
	Acetic Acid:	ACGIH: TWA:	10 ppm
		STEL:	15 ppm
		OSHA: PEL:	10 ppm
	NIOSH: IDLH:	50 ppm	
	TWA:	10 ppm	
	STEL:	15 ppm	
	Isopropanol:	ACGIH: TWA:	200 ppm
		STEL:	400 ppm
		BEL:	40 mg/L
	OSHA: PEL:	400 ppm 980 mg/m <sup>3</sup>	
	Methanol:	ACGIH: TWA:	200 ppm
		STEL:	250 ppm
		BEL:	15 mg/L
	OSHA: PEL:	200 ppm 260 mg/m <sup>3</sup>	
	DFO:	No information found.	

**Engineering Controls:** Ensure adequate ventilation. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

### Personal Protective Measures:

**Eye/Face Protection:** Wear safety glasses with side shields or safety goggles. Maintain approved eye wash station and accessible rinse facilities in work area.

**Skin Protection:** Wear appropriate chemical resistant clothing (with long sleeves) and appropriate chemical resistant gloves.

**Respiratory Protection:** An air-purifying, NIOSH-approved respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Use a positive-pressure, air-supplied respirator if there is any potential for an uncontrolled release, if exposure levels are unknown, or if any other circumstances exist where air-purifying respirators may not provide adequate protection.

**Specific Requirements for Personal Protective Equipment:** Ensure that glove material is compatible with this product. This information is available from glove manufacturers.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

*Unless otherwise indicated, all properties are given at 25 °C and standard pressure.*

<b>Appearance:</b>	Brownish-yellow, transparent liquid.
<b>Odor:</b>	Characteristic, ethereal.
<b>Odor Threshold:</b>	No information found.
<b>Formula Weight:</b>	Mixture.
<b>pH:</b>	No information found.
<b>Melting/Freezing Point:</b>	No information found.
<b>Boiling Point/Range:</b>	No information found.
<b>Decomposition Temperature:</b>	No information found.
<b>Flash Point:</b>	Not applicable.
<b>Auto-ignition Temperature:</b>	Not applicable.
<b>Flammability:</b>	Not flammable.
<b>Flammability/Explosive Limits:</b>	Not applicable.
<b>Solubility:</b>	Miscible with alcohol, acetone, ether.
<b>Vapor Pressure:</b>	No information found.
<b>Vapor Density:</b>	No information found.
<b>Specific Gravity:</b>	1.46 (Water = 1)
<b>Evaporation Rate:</b>	No information found.
<b>Viscosity:</b>	No information found.
<b>Partition Coefficient (n-octanol/water):</b>	No information found.

## 10. STABILITY AND REACTIVITY

<b>Reactivity Data:</b>	No information found.
<b>Chemical Stability:</b>	Stable under normal conditions.
<b>Conditions to Avoid:</b>	Heat, light, incompatible materials.
<b>Incompatible Materials:</b>	Oxidizers, strong acids, strong bases, metals, amines, carbonates, phosphates, halogens, isocyanates, inorganic salts, inorganic hydrides, organic materials, hydrazine, acid anhydrides.
<b>Hazardous Decomposition Products:</b>	Carbon oxides, hydrogen fluoride, perfluoroisobutylene, nitrogen oxides.
<b>Possibility of Hazardous Reactions:</b>	May react vigorously or violently if exposed to extreme thermal conditions or in contact with the incompatible materials listed above.
<b>Hazardous Polymerization:</b>	Will not occur.

## 11. TOXICOLOGICAL INFORMATION

<b>Routes of Exposure:</b>	Inhalation, ingestion, skin contact, eye contact.		
<b>Acute Effects:</b>	Harmful if exposed to the eyes or skin. May be harmful if inhaled or ingested. May cause blindness or visual disturbances if absorbed into the blood stream. May affect the central nervous system, mucous membranes, blood, brain, urinary system, liver, eyes, kidneys, spleen, cardiovascular system, and pancreas.		
<b>Chronic Effects:</b>	Prolonged or repeated exposure may affect the liver, kidneys, brain, cardiovascular system, blood, spleen, and heart; may cause conjunctivitis, mutagenic effects, skin sensitization, adverse reproductive effects, and dermatitis.		
<b>Toxicological Data:</b>	Methyl Nonafluorobutyl Ether:	LD <sub>50</sub> Oral, Rat: LC <sub>50</sub> Inhalation, Rat:	> 5000 mg/kg > 100,000 ppm, 4 h
	Methyl Nonafluoroisobutyl Ether:	LD <sub>50</sub> Oral, Rat: LC <sub>50</sub> Inhalation, Rat:	> 5000 mg/kg > 100,000 ppm, 4 h
	Ethanol:	LD <sub>50</sub> Oral, Rat: LC <sub>50</sub> Inhalation, Rat:	7060 mg/kg 124.7 mg/L 4 h May cause adverse reproductive effects. May cause drowsiness or dizziness.
	Acetic Acid:	LD <sub>50</sub> Oral, Rat: LC <sub>50</sub> Inhalation, Rat: LD <sub>50</sub> Dermal, Rabbit:	3310 mg/kg 11.4 mg/L 4 h 1060 mg/kg Corrosive to skin and eyes based on animal data. May cause reproductive effects based on animal data.
	Isopropanol:	LD <sub>50</sub> Oral, Rat: LD <sub>50</sub> Dermal, Rabbit: LC <sub>50</sub> Inhalation, Rat:	5045 mg/kg 12,800 mg/kg 72.6 mg/L 4 h May cause adverse reproductive effects. May cause drowsiness or dizziness.
	Methanol:	LD <sub>50</sub> Oral, Rat: LD <sub>50</sub> Dermal, Rabbit: LC <sub>50</sub> Inhalation, Rat:	5628 mg/kg 15,800 mg/kg 87.5 mg/L 6 h May cause adverse reproductive effects. May cause drowsiness or dizziness.
	DFO:	No information found.	
<b>Symptoms of Exposure:</b>	Irritation, blistering, visual disturbances, nausea, vomiting, diarrhea, constipation, blood in vomit, abdominal pain, drowsiness, dizziness, blindness, numbness, loss of coordination, shock, metabolic acidosis, headache, coughing, suffocation, shortness of breath, bronchitis.		
<b>Carcinogenic Effects:</b>	No component of this product is considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.		
<b>ACGIH:</b>	Isopropanol:	A4 – Not classifiable as a human carcinogen	
<b>IARC:</b>	Isopropanol:	3 – Not classifiable to humans	

## 12. ECOLOGICAL INFORMATION

<b>Ecotoxicological Data:</b>	Methyl Nonafluorobutyl Ether:	
	EC <sub>50</sub> Water Flea ( <i>Daphnia magna</i> ):	> 10 mg/L 48 h
	LC <sub>50</sub> Fathead Minnow ( <i>Pimephales promelas</i> ):	> 7.9 mg/L 96 h
	Methyl Nonafluoroisobutyl Ether:	
	EC <sub>50</sub> Water Flea ( <i>Daphnia magna</i> ):	> 10 mg/L 48 h
	LC <sub>50</sub> Fathead Minnow ( <i>Pimephales promelas</i> ):	> 7.9 mg/L 96 h
	Ethanol:	
	EC <sub>50</sub> Water Flea ( <i>Daphnia magna</i> ):	7.7 mg/L 48 h
	LC <sub>50</sub> Fathead Minnow ( <i>Pimephales promelas</i> ):	> 100 mg/L 96 h
	Acetic Acid:	
	EC <sub>50</sub> Water Flea ( <i>Daphnia magna</i> ):	47 mg/L 24 h
	LC <sub>50</sub> Fathead Minnow ( <i>Pimephales promelas</i> ):	88 mg/L 96 h
	LC <sub>50</sub> Rainbow Trout ( <i>Oncorhynchus mykiss</i> ):	> 1000 mg/L 96 h
	Isopropanol:	
	LC <sub>50</sub> Western Mosquitofish ( <i>Gambusia affinis</i> ):	>1400 mg/L 96 h
	Methanol:	
	EC <sub>50</sub> Water Flea ( <i>Daphnia magna</i> ):	> 10,000 mg/L 48 h
	LC <sub>50</sub> Fathead Minnow ( <i>Pimephales promelas</i> ):	> 100 mg/L 96 h
	DFO:	No information found.

**Persistence and Degradability:** This product is unlikely to bioaccumulate. Not expected to be readily biodegradable.

**Environmental Effects:** May be hazardous to aquatic organisms. Avoid release to the environment.

## 13. DISPOSAL INFORMATION

**Disposal Instructions:** Dispose of this material and its container to an approved waste collection point. Minimize exposure to product waste (see Section 8). Do not dispose unused waste down drains or into sewers. All wastes must be handled in accordance with local, state, and federal regulations.

**Contaminated Packaging:** Because containers retain product residue, follow label warnings even after container is emptied. Offer rinsed packaging material to local recycling facilities.

**Waste Codes:** Methanol: U154 (US RCRA Hazardous Waste U List – Ignitable Waste)

## 14. TRANSPORT INFORMATION

**DOT:** Not regulated.

**Environmental Hazard Regulations:** No information found.

**Other Transport Precautions:** DOT Reportable Quantity: Methanol: 5000 lb  
Acetic Acid: 5000 lb

## 15. REGULATORY INFORMATION

### U.S. Federal Regulations:

**OSHA:** This product is considered a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**TSCA Inventory:** All components of this product are on the United States TSCA Inventory.

### U.S. EPCRA (SARA Title III):

**Section 302:** No information found.

#### Sections 311/312:

Hazard Category	List (Yes/No)
Section 311 – Hazardous Chemical	Yes
Immediate Hazard	Yes
Delayed Hazard	No
Fire Hazard	No
Pressure Hazard	No
Reactivity Hazard	No

**Section 313:** De Minimis Concentration: Isopropyl Alcohol: 1.0%  
Methanol: 1.0%

**CERCLA Reportable Quantities:** Methanol: 5000 lb  
Acetic Acid: 5000 lb

### International Inventories:

Country or Region	Inventory Name	On Inventory (Yes/No)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes

\*A "Yes" indicates that the listed components of this product comply with the inventory requirements administered by the governing country or region.



## 16. OTHER INFORMATION

**Disclaimer:** Pioneer Forensics, LLC provides the information in this Safety Data Sheet in the belief that it is reliable but assumes no responsibility for its completeness or accuracy. The physical properties reported in this SDS are obtained from literature and do not constitute product specifications. Pioneer Forensics, LLC makes and gives no representations or warranties with respect to the information contained herein or the product to which it refers, whether express, implied, or statutory, including without limitation, warranties of accuracy, completeness, merchantability, non-infringement, performance, safety, suitability, stability, and fitness for a particular purpose. No warranty against infringement of any patent, copyright or trademark is made or implied. This SDS is intended only as a guide to the appropriate handling of the material by a properly trained person. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. Accordingly, Pioneer Forensics, LLC assumes no liability whatsoever for the use of or reliance upon this information including results obtained, incidental or consequential damages, or lost profits.

**Issue Date:** January 9, 2023

**Reason for Revision:** Update of property conditions in Section 9. Supersedes 05/10/2017 version.