

## Chemical Stability

### Product Information

**Krytox™ perfluoropolyether (PFPE) oils and greases thickened with polytetrafluoroethylene (PTFE) exhibit exceptional chemical stability.**

Chemical stability and inertness are critical characteristics of Krytox™ perfluorinated lubricants (PFPE). Krytox™ oils and greases will not react with most chemicals\* and other lubricants, nor cause them to degrade. In addition, as a result of their solubility characteristics and density, Krytox™ lubricants do not mix well with most chemicals and other hydrocarbon-based lubricants, and will separate out. Krytox™ oils and greases are completely insoluble in water.

Krytox™ PFPE oils are essentially inert to most chemicals. No reaction is observed with boiling sulfuric acid, fluorine gas at 200 °C (392 °F), molten sodium hydroxide, chlorine trifluoride at 10–50 °C (50–122 °F), uranium hexafluoride gas at 50 °C (122 °F), or any of the following materials at room temperature: JP-4 turbine fuel, unsymmetrical dimethyl hydrazine, hydrazine, diethylenetriamine, ethyl alcohol, aniline, 90% hydrogen peroxide, red fuming nitric acid, or nitrogen tetroxide. Krytox™ oils are slightly soluble in hydrazine and have moderate (25–30%) solubility in nitrogen tetroxide.

Krytox™ oils are not soluble in common organic solvents, acids, and bases, although some solvents will dissolve PFPE oils. Krytox™ oils are completely miscible in highly fluorinated solvents and refrigerant gases, such as:

- Trichlorotrifluoroethane (Freon™ 113)
- Hexafluorobenzene
- 2,3-dihydrodecafluoropentane (Vertrel™ XF)
- Perfluorooctane

- Perfluorohexane
- Perfluorodimethylcyclobutane isomers
- 1,1 dichloro-1-fluoroethane

These fluorinated solvents will not react with PFPE oils, but the oils will be carried away from the lubricating point. PFPEs are freely soluble in supercritical CO<sub>2</sub>.

Krytox™ lubricants have also been tested and used in the presence of gaseous, liquid oxygen and chlorine with no reactivity noted.

Krytox™ lubricants are safe for use with rubber, elastomers, plastics, and metals commonly used as seals and bearings.

A type of chemical known as a Lewis acid (electron pair acceptor) can react with PFPE oils and will limit the temperature at which they can be used. Typical Lewis acids are boron trifluoride, aluminum chloride, iron (III) chloride, and titanium tetrachloride. At elevated temperatures, these materials can lead to decomposition of any PFPE.

Caution should be taken with metallic alkalai, such as sodium and lithium metals, as reactions could occur readily.

Some grease grades contain additives for anti-corrosion or extreme pressure, and these additives do not have the same chemical stability as the oils and thickeners. In chemical contact applications, it is typically common to use greases without additives.

Krytox™ performance lubricants are not only resistant to oxygen and reactive gases, but they are inert to virtually all chemicals commonly used in most industries.

\*Exceptions include Lewis acids and alkali metals

Krytox™ lubricants have been used in contact with the following chemicals, in addition to many others not listed:

Acetone	Ethane	Methane	Phosphoric Acids
Acrylonitrile	Ethanol	Methanol	Phosgene
Alcohol	Ethyl Alcohol	Methylamine	Polyalkylene Glycols
Acetylene	Ethyl Chloride	Methylchloride	Polyalpholefins
Hydrocarbon Oils	Ethylene	Methylbromide	Polyol Ester Oils
Ammonia	Ethylene Glycol	Methylmercaptan	Polyphenyleneoxide (PPO)
Ammonium Nitrate	Ethylene Oxide	Methylsilane	Potassium Hydroxide
Aniline	Fluorine	Methylene Oxide	Potassium Permanganate
Aqueous Caustic	Formaldehyde	Mineral Acids	Propane
Benzene	Gasoline	Monosilane	Propylene
Boiling Sulfuric Acid	Helium	Molten Caustic	Red Fuming Nitric Acid
Brake Fluids	Heptane	Natural Gas	Silicone Products
Bromine	Hexafluoropropylene	Nitric Acid	Sodium Hydroxide
Butadiene	Hexane	Nitrogen	Sulfur Hexafluoride
Butane	Hydrobromic Acid	Nitrogen Oxide	Sulfuric Acid
Butylene	Hydrocarbon Compounds	Nitrogen Oxides	Sulfur Oxides
Carbon Dioxide	Hydrocyanic Acid	Nitrogen Trifluoride	Unsymmetrical Dimethyl Hydrazine
Carbon Monoxide	Hydrochloric Acid	Nitrotrifluorine	Uranium Hexafluoride
Carbon Tetrachloride	Hydrofluoric Acid	Nitrous Oxide (Anesthesia)	Trifluoroacetylchloride
Chlorine, Liquid or Gas	Hydrogen	Organic Acids	Trimethylamine
Chlorine Trifluoride	Hydrogen Bromide	Organic Compounds	Vinyl Chloride
Chloroform	Hydrogen Chloride	Oxygen, Liquid or Gas	Vinyl Bromide
Compressed Air	Hydrogen Peroxide	Ozone	Vinyl Fluoride
Dichlorosilane	Hydrogen Sulfide	Pentane	Water, Steam
Dimethylether	Iodine	Polyalphaolefin	
Diesel Fuel	Isopropyl Alcohol	Potassium Chloride	
Diethylenetriamine	JP 4 and 8 Turbine Fuel	Potassium Hydroxide	
Ester Oils	Lithium Glycol	Perchloroethylene	

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For product information, industry applications, technical assistance, or global distributor contacts, visit [krytox.com](http://krytox.com) or within the U.S. and Canada, call 1-844-773-CHEM/2436 or outside of the U.S., call 1-302-773-1000.

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