

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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Chemical Product

Ruthenium Tetroxide Dissolved in HFE-7100 (RTX)

This MSDS prepared on August 4, 1998,
and last modified on October 1, 2019.

2. COMPOSITION / INFORMATION ON INGREDIENTS

0.2% Ruthenium Tetroxide Dissolved in HFE-7100 by weight to volume ratio. HFE-7100 is a mixture of between 30-50 % by weight methyl nonafluorobutylether and 50-70 % by weight methyl nonafluoroisobutylether (see 3M MSDS No. 184625).

The percentages by weight and the CAS numbers are:

<u>Chemical</u>	<u>CAS#</u>	<u>%/Wt.</u>
Ruthenium Tetroxide	20427-56-9	0.2
Methyl Nonafluorobutyl ether	163702-07-6	30-50
Methyl Nonafluoroisobutyl ether	163702-08-7	50-70

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Appearance:

Deep Yellow Clear Liquid

Potential Health Effects:

The toxicological properties of this material have not been investigated. Use appropriate procedures to prevent opportunities for direct contact with the skin or eyes and to prevent inhalation.

This substance is not known to be carcinogenic.

4. FIRST AID MEASURES

Eyes:

Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:

Flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk and water. Do not induce vomiting. Allow the victim to rinse his/her mouth and then to drink 2-4 cupfuls of water, and seek medical advice.

Inhalation:

Remove from exposed area and into area with fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Contact a physician.

Notes to Physician:

Treat symptomatically and supportively.

5. FIRE FIGHTING MEASURES

Flash Point.....None
NFPA Rating.....None
Upper Explosion Limits.....None
Lower Explosion Limits.....None
Autoignition Temperature.....Not Available

Extinguishing Media

Nonflammable

Special Fire Fighting Procedures

When fire fighting conditions are severe and total thermal decomposition of the product is possible, wear full protective clothing, including helmet, self-contained breathing apparatus, bunker coat and pants, bands around arms, waist and legs, face mask, and protective covering for exposed areas of the head. No

unusual effects are anticipated during fire extinguishing operations. Avoid breathing the products and substances that may result from the thermal decomposition of the product or the other substances in the fire zone. Keep containers cool with water spray when exposed to fire to avoid rupture.

6. ACCIDENTAL RELEASE MEASURES

General Information

Use proper personal protective equipment as indicated in Section 8 of this MSDS.

Spills/Leaks

Clean up spills immediately, observing precautions in the Protective Equipment section. Place in a suitable container for disposal.

7. HANDLING AND STORAGE

Handling

Avoid contact with clothing and other combustible conditions.

Storage:

Do not store near combustible materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels.

Personal Protective Equipment

Eyes

Wear safety glasses or chemical goggles if splashing is possible.

Skin

Wear appropriate protective gloves and clothing to prevent skin exposure.

Exposure Limits

No exposure limits Exposure limits for Ruthenium Tetroxide.
Exposure limits for methylnonafluorobutylether and methylnonafluoroisobutylether each substance and for all isomers

of each have been established by the 3M company as 600 parts per million in a time weighted average(TWA).

This substance is not known to be carcinogenic.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Deep yellow
ODOR	Ozonic
BOILING POINT	Approximately 60 degrees Celsius
VAPOR PRESSURE	Approximately 170 mm Hg at 20 degrees Celsius
VAPOR DENSITY	Approximately 8.6
SOLUBILITY IN WATER	Slightly soluble in water
SPECIFIC GRAVITY	Approximately 1.5 g/mL
FREEZING POINT	Not determined
pH	Not relevant
% VOLATILE	Not determined

10. STABILITY AND REACTIVITY

Chemical Stability

Stable under normal temperature and pressures.

Incompatibility/Conditions to Avoid

Avoid strong oxidizing agents. Avoid strong reducing agents.

Hazardous Decomposition Products

May produce irritating and toxic fumes and gases.

Hazardous Polymerization

Hazardous polymerization has not been reported.

11. TOXICOLOGICAL INFORMATION

LD50 in mg/kg, CAS# 20427-56-9: not available

LD50 in CAS# 163702-07-06 and 163702-08-7, unknown

This substance is not known to be carcinogenic.

12. ECOLOGICAL INFORMATION

Ecotoxicity not available. Observe precaution from other sections. In accordance with good industrial practice, provide

exhaust ventilation for large spills or in confined spaces. Collect spilled material with an absorbent. Place in approved container.

13. DISPOSAL CONSIDERATION

Dispose of in a manner consistent with Federal, State and local regulations. As a suggested disposal procedure, incinerate in the presence of a combustible material in an industrial or commercial facility capable of handling halogenated waste. Reclaim as feasible. For information on product return, contact your distributor.

14. TRANSPORT INFORMATION

Follow all regulations in your country or region

UN CLASS / UN NUMBER : Not applicable

PRECAUTIONS : Review "Accidental Release Measures"

Review "Handling and Storage"

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall we be liable for any claims, losses, or damages of any third party or for the lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if we have been advised of the possibility of such damages.