Material Safety Data Sheet

Section 1: Chemical Product and Company Identification
Cat#: 18253
Part Name: RUTHENIUM TETROXIDE .5% STABILIZED
Supplier: Polysciences, Inc.
400 Valley Road
Warrington, PA 18976 USA
MSDS Telephone #215-343-6484 Emergency only #215-378-4526

Identified uses: Laboratory use, manufacture of substances

Section 2: Hazards Identification
Hazard Overview
Toxicological properties are not known.
GHS Classification

Signal word: Warning

Hazard and Precautionary Statements
P285 In case of inadequate ventilation wear respiratory protection.
P301A IF SWALLOWED do not induce vomiting. Do not give anything to drink. Obtain medical attention without delay.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P305B IF IN EYES, Separate eyelids with finger tips.
P340 Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P351 Rinse cautiously with water for several minutes.
P361 Remove/Take off immediately all contaminated clothing.

NFPA Rating
Hazard Ratings:
These ratings are Polysciences’ Inc. own assesments of the properties of the material using the ANSI/NFPA 704 Standard. Additional information can be found by consulting in the NFPA published ratings lists (List 325 and List 49).
If no data is listed the information is not available.
Health Flammability Reactivity
2 0 0

Section 3: Composition/ Information on Ingredients
Note: Items listed with a CASRN... number have no CAS# available.

<table>
<thead>
<tr>
<th>Item#</th>
<th>Name</th>
<th>EINECS</th>
<th>CAS#</th>
<th>% in product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ruthenium tetroxide</td>
<td>243-813-8</td>
<td>0020427569</td>
<td>0 - 5</td>
</tr>
<tr>
<td>2</td>
<td>Water</td>
<td>231-791-2</td>
<td>0007732185</td>
<td>91 - 100</td>
</tr>
</tbody>
</table>

Section 4: First Aid Measures
Flush eyes with flowing water for at least 15 minutes.
If breathing is difficult, contact emergency personnel.
If swallowed, wash out mouth with water if person is conscious.
Remove contaminated clothing.
Remove to fresh air.
Separate eyelids with finger tips.
Wash skin with deluge of water for at least 15 minutes.

Section 5: Fire Fighting Measures
Flash point, deg F.: no data Method: no data
UEL: no data LEL: no data Autoignition temperature, deg. F.: no data
Section 6: Accidental Release Measures

Any information listed below is to be considered in addition to internal guidelines for isolation of spill, containment of spill, removal of ignition sources from immediate area, and collection for disposal of spill by trained, properly protected clean up personnel.

Absorb liquids on absorbent material.
Contain spilled liquids.
Protect personnel from exposure.
Use appropriate personal protective equipment.

Section 7: Handling and Storage

Store at 4 deg. C.

Section 8: Exposure Controls/ Personal Protection

OSHA (ACGIH) Exposure Limits

<table>
<thead>
<tr>
<th>CAS# (RuO₄)</th>
<th>IDLH</th>
<th>OSHA</th>
<th>ACGIH</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
</tbody>
</table>

The use of eye protection in the form of safety glasses with side shields and the use of skin protection for hands in the form of gloves are considered minimum and non-discretionary in work places and laboratories. Any recommended personal protection equipment or environmental equipment is to be considered as additional to safety glasses and gloves.

Use process enclosures, local exhaust ventilation, or other engineering controls.

Chemical-resistant gloves should be worn whenever this material is handled. The glove material has to be impermeable and resistant to the product. Gloves should be removed and replaced immediately if there is any indication of degradation or chemical breakthrough. Rinse and remove gloves immediately after use. Wash hands with soap and water. All glove recommendations presume that the risk of exposure is through splash and not intentional immersion of the hands into the product.

Since glove permeation data does not exist for this material, no recommendation for the glove material can be given for the product. Permeation data must be obtained from the glove manufacturer to determine if the glove is suitable for the task.

Section 9: Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula: RuO₄</td>
<td></td>
</tr>
<tr>
<td>Formula Weight:</td>
<td>165.0</td>
</tr>
<tr>
<td>boiling point:</td>
<td>100 C</td>
</tr>
<tr>
<td>melting point:</td>
<td>no data</td>
</tr>
<tr>
<td>solubility:</td>
<td>complete</td>
</tr>
<tr>
<td>Appearance:</td>
<td>clear orange to gold colored solution</td>
</tr>
</tbody>
</table>

Section 10: Stability and Reactivity

Chemical Stability: stable
Conditions to Avoid: high temperature
Incompatibility with other materials: organic vapors, ether, alcohol, benzene, pyridine,
Hazardous Decomposition Products: ruthenium oxide
Hazardous Polymerization: will not occur

Section 11: Toxicological Information

Acute Data: no data
Subchronic data: no data

Section 12: Ecological Information

no data

Section 13: Disposal Considerations
The following chart lists the status of the chemical and its components in reference to 40 CFR Part 261.33. If the product is listed by code number the substance may be subject to special federal and state disposal regulations. If no codes are listed the material must be disposed in compliance with all Federal, State and Local Regulations.

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Waste Code</th>
<th>Regulated Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
<td>not listed</td>
<td>not listed</td>
</tr>
<tr>
<td>0020427569</td>
<td>not listed</td>
<td>not listed</td>
</tr>
</tbody>
</table>

**Section 14: Transportation Data**

Proper Shipping Name: NOT REGULATED
Chemical Name:
UN:
Class:
PG:

**Section 15: Regulatory Information**

This product contains a component which does not appear on the TSCA public inventory. It is manufactured or imported only in small quantities and solely for research and development.

All usage of this product must comply with 40 CFR 720.36.

This chemical substance must be used by, or directly under the supervision of, a technically qualified individual.

You must notify all persons who are engaged in experimentation, research, or analysis on the chemical substance, including the manufacture, possessing, use, transport, storage, and disposal of the substance of any known risk to health.

This product contains a component which does not appear on the TSCA public inventory. It is manufactured or imported only in small quantities and solely for research and development.

All usage of this product must comply with 40 CFR 720.36.

This chemical substance must be used by, or directly under the supervision of, a technically qualified individual.

You must notify all persons who are engaged in experimentation, research, or analysis on the chemical substance, including the manufacture, possessing, use, transport, storage, and disposal of the substance of any known risk to health.

Prop 65 - Column A identifies those items which are known to the State of California to cause cancer. Column B identified items which are known to the State of California to cause reproductive toxicity.

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>0020427569</td>
<td>no</td>
<td>no</td>
</tr>
</tbody>
</table>

State Regulatory Information: If a CAS# is listed below this material is subject to the listed state right-to-know requirements.

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
<td>not listed</td>
<td>not listed</td>
</tr>
<tr>
<td>0020427569</td>
<td>not listed</td>
<td>not listed</td>
</tr>
</tbody>
</table>

**SARA Toxic Release Chemicals (as defined in Section 313 of SARA Title III)**

This list identifies the toxic chemicals, including their de minimis concentrations for which reporting is required under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). The list is also referred to as the Toxics Release Inventory (TRI) List.

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Regulated name</th>
<th>de minimis conc. %</th>
<th>Rep. Thres.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
<td>not listed</td>
<td>not listed</td>
<td>not listed</td>
</tr>
<tr>
<td>0020427569</td>
<td>not listed</td>
<td>not listed</td>
<td>not listed</td>
</tr>
</tbody>
</table>

**SARA Extremely Hazardous Substances and TPQs**

This list includes hazardous chemicals as defined in 29 CFR 1910.1200(c); and extremely hazardous substances regulated under Section 302 of SARA Title III with their TPQs (in pounds), as listed in 40 CFR 355, Appendices A and B.

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Regulated name</th>
<th>TPQ (pounds)</th>
<th>EHS-RQ (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
<td>not listed</td>
<td>not listed</td>
<td>not listed</td>
</tr>
<tr>
<td>0020427569</td>
<td>not listed</td>
<td>not listed</td>
<td>not listed</td>
</tr>
</tbody>
</table>

**CERCLA**

The hazardous substances, and their reportable quantities (RQs) are listed in the federal regulations at 40 CFR Part 302, Table 302.4. Release of a CERCLA hazardous substance in an amount equal to or greater than its RQ, in any 24-hour period, must be reported to the National Response Center at (800) 424-8802.
POLYSCIENCES, INC. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose. POLYSCIENCES, INC. makes no representations or warranties, either expressed or implied of merchantability, fitness for particular purposes with respect to the information set forth herein or to which the information refers. Accordingly, POLYSCIENCES, INC. will not be responsible for damages resulting from the use of or reliance upon this information.

END OF MSDS