Section 1: Chemical Product and Company Identification

Cat#: 0972C
Part Name: OSMIUM TETROXIDE 4% SOLUTION (DS #119A AND #320)
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
Causes eye burns.
Causes respiratory tract irritation.
Causes skin irritation.
GHS Classification

Acute Toxicity Inhalation Category 5
Serious Eye Damage Category 1C
Skin Irritant Category 2

Signal word: Danger

Hazard and Precautionary Statements
H315 Causes skin irritation.
H318 Causes serious eye damage.
H332 Harmful if inhaled.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
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.
P301D IF SWALLOWED, induce vomiting as directed by medical personnel.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P305B IF IN EYES, Separate eyelids with finger tips.
P314 Get medical advice/attention if you feel unwell.
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 assessments of the properties of the material using the ANSI/NFPA 704 Standard.
Section 3: Composition/ Information on Ingredients

<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>Osmium tetroxide</td>
<td>244-058-7</td>
<td>0020816120</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>

Note: Items listed with a CASRN... number have no CAS# available.

Section 4: First Aid Measures

Contact medical personnel if discomfort persists.
Flush eyes with flowing water for at least 15 minutes.
If breathing is difficult, contact emergency personnel.
If swallowed, induce vomiting as directed by medical personnel.
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.: not combustible
Method: nap
UEL: no data
LEL: no data
Autoignition temperature, deg. F.: no data
Flammability Classification: no data
Flame Propagation Rate: no data
Hazardous Combustion Products: 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.
Protect personnel from exposure.
Use appropriate personal protective equipment.
Ventilate the area.

Section 7: Handling and Storage

Store at room temp

Section 8: Exposure Controls/ Personal Protection

OSHA (ACGIH) Exposure Limits

<table>
<thead>
<tr>
<th>CAS#: 0007732185</th>
<th>IDLH: NE</th>
<th>TWA</th>
<th>STEL</th>
<th>CEILING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ppm</td>
<td>mg/</td>
<td>ppm</td>
</tr>
<tr>
<td>OSHA</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>ACGIH</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
</tr>
<tr>
<td>CAS#: 0020816120</td>
<td>IDLH: 1 mg Os/m3</td>
<td>TWA ppm</td>
<td>STEL mg/m3</td>
<td>CEILING ppm</td>
</tr>
<tr>
<td>ACGIH</td>
<td>0.0002</td>
<td>0.002</td>
<td>0.0006</td>
<td>0.0006</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 chemical splash goggles and face shield.
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

Formula: OsO₄
Formula Weight: 254.2
boiling point: 1300 °C
melting point: 350 °C
appearance: clear yellow liquid
solubility: 5g/100ml
vapor pressure: 11 TORR @ 270 °C
vapor density: 1.016

Section 10: Stability and Reactivity

Chemical Stability: stable
Conditions to Avoid: no data
Incompatibility with other materials: no data
Hazardous Decomposition Products: no data
Hazardous Polymerization: will not occur

Section 11: Toxicological Information

Acute Data: lacrimation, visual disturbance, conjunctivitis, headache, potential damage to cornea, possible skin discoloration, coughing, shortness of breath,
Subchronic data: dermatitis, skin discoloration, visual disturbances, conjunctivitis, potential corneal damage, coughing, shortness of breath, bronchitis, potential kidney damage

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>0020816120</td>
<td>P087</td>
<td>Osmium tetroxide</td>
</tr>
</tbody>
</table>

Section 14: Transportation Data

Proper Shipping Name: OSMIUM TETROXIDE SOLUTION
OSMIUM TETROXIDE SOLUTION
Chemical Name

UN
UN2471
UN2471
Class
6.1
6.1
PG
I
I

Section 15: Regulatory Information

All components of this product are on the TSCA public inventory.
All components of this product are on the TSCA public inventory.

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>0020816120</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>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
</tr>
<tr>
<td>0020816120</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>0020816120</td>
<td>Osmium tetroxide</td>
<td>1.0</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>0020816120</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.

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Regulated name</th>
<th>RQ (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0007732185</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>0020816120</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
<tr>
<td>0020816120</td>
<td>Osmium oxide OsO(4), (T-4)-</td>
<td>1,000</td>
</tr>
<tr>
<td>0020816120</td>
<td>Osmium tetroxide</td>
<td>1,000</td>
</tr>
</tbody>
</table>

**Section 16: Other Information**
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