Section 1: Product and Company Identification
Product Name: Osmium Tetroxide, 4% Aqueous
Synonym: Osmium Tetroxide, Osmic Acid Solution, Osmium (VIII) Oxide
Chemical Family: Platinum Group Metal Salts
Company Name
Ted Pella, Inc., P.O. Box 492477, Redding, CA 96049-2477
Inside USA and Canada 1-800-237-3526 (Mon-Thu. 6:00AM to 4:30PM PST; Fri 6:00AM to 4:00PM PST)
Outside USA and Canada 1-530-243-2200 (Mon-Thu. 6:00AM to 4:30PM PST; Fri 6:00AM to 4:00PM PST)
CHEMTREC USA and Canada Emergency Contact Number 1-800-424-9300 24 hours a day
CHEMTREC Outside USA and Canada Emergency Contact Number +1-703-741-5970 24 hours a day

Section 2: Hazard Identification
GHS Hazard Pictograms
![GHS06](image) ![GHS05](image) ![GHS07](image)

Signal Word: DANGER

GHS Categories: Hazard Statements
GHS06 – Toxic
- Acute tox, oral Cat 5
- Acute tox inhalation Cat 3
- Specific target organ tox Cat 2
- Reproductive tox Cat 2
H303: May be harmful if swallowed
H331: Toxic if inhaled
H370: Causes damage to organs
H361: Suspected of damaging fertility or the unborn child

GHS05 – Corrosive
- Serious eye damage/irritation Cat 1

GHS07 – Harmful
- Serious eye damage/irritation Cat 1
- Skin irritation Cat 2
H318: Causes serious eye damage
H315: Causes skin irritation

Precautionary statements
P202: Do not handle until all safety precautions have been read and understood
P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
P264: Wash thoroughly after handling
P280: Wear protective gloves/protective clothing/eye protection/face protection
P308+313: IF exposed or concerned: Get medical advice/attention.
P402: Store in a dry place.
P404: Store in a closed container.
P501: Dispose of contents/container in accordance with local/national/international rules.
Other hazards
Subchronic (Target Organ Effects): Eyes and Central Nervous System are target organs.
Chronic/Carcinogenicity Effects: Laboratory tests have shown mutagenic effects. Reproductive hazard.
Conditions Aggravated By Exposure: Any respiratory condition such as asthma will be aggravated.
Conditions Aggravated By Overexposure: Potential kidney damage.

Health Effects:
HMIS Hazard Rating: Health: 4; Fire: 0; Reactivity: 1 Personal Protection: J
NFPA Hazard Rating: Health: 4; Fire: 0; Reactivity: 1 Other: TOX
(0=least, 1=Slight, 2=Moderate, 3=High, 4=Extreme)

Section 3: Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Hazardous Component(s) (chemical and common name(s)) (CAS. No)</th>
<th>%</th>
<th>OSHA PEL mg/m³</th>
<th>ACGIH TLV mg/m³</th>
<th>ACGIH TLV STEL ppm</th>
<th>NTP Carcinogen</th>
<th>IARC Carcinogen</th>
<th>OSHA regulated Carcinogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osmium Tetroxide/Osmium Oxide (20816-12-0)</td>
<td>4</td>
<td>0.002</td>
<td>0.002</td>
<td>0.006</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Water (7732-18-2)</td>
<td>96</td>
<td>NE</td>
<td>NE</td>
<td>NE</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Synonyms: Osmium Tetroxide, Osmic Acid Solution, Osmium (VIII) Oxide
Chemical Family: Platinum Group Metal Salts
Chemical Formula: OsO₄ in H₂O

Section 4: First Aid Measures
General Information: Ensure proper ventilation.
Notable Exposure Symptoms: Irritation to skin, eyes and areas of contact.
If Ingested: Rinse mouth. Seek immediate medical attention.
Clear the airway and administer artificial respiration if not breathing.
If swallowed, do NOT induce vomiting unless directed to do so by medical personnel.
If Inhaled: Remove the victim from the contaminated area while protecting yourself from exposure by wearing an appropriate respirator.
Put a similar respirator on the victim if possible.
Get medical attention immediately.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes.
Remove contact lenses if present and easy to do.
Get medical attention if irritation develops or persists.
Skin Contact: Take off immediately all contaminated clothing.
Rinse with water thoroughly.
Get medical advice if irritation develops or persists.
Additional Information: Observe for any symptoms for several hours after exposure.
Follow up with medical attention if symptoms develop.
Section 5: Fire Fighting Measures

General Information: OsO₄ is a strong oxidizer and may react explosively with many organic compounds. Emits toxic fumes under fire.

Extinguishing Method/Equipment: In case of fire, use water fog, dry chemical, CO₂, or “alcohol” foam.

Hazardous Decomposition Information: Constituents associated with burning/combustions are to be considered to be toxic. Firefighters should wear self-contained breathing apparatus and full protective gear.

DOT Class: Toxic, 6.1

Section 6: Accidental Release Measures

Personal precautions, protective equipment, and procedures
• Keep unnecessary personnel away.
• Keep people away from and upwind of spill/leak.
• Eliminate ignition sources (no smoking, flares, sparks, or flames in immediate area).
• Wear appropriate protective equipment (SCBA) and clothing during clean-up.
• Avoid breathing dust.
• Ventilate area if easy to do so and wash the spill site after clean-up is complete.
• Contact local authorities if significant spills cannot be contained.
• For personal protection, see Section 8 of this SDS.

Containment equipment and procedures
• Large spills: Contain actively spilling material if safe and easy to do so.
• Avoid generating dust.
• Collect material and dispose of.
• Small spills: Sweep and collect to waste receptacles.

Clean-up procedures
• Collect all contaminated media or other cleanup materials into a waste receptacle.
• If cleaning surface is necessary, utilize vacuum cleaner, provided adequate ventilation is available.
• Dispose of contents/container in accordance with local/national/international rules.

Section 7: Handling and Storage

Safe Handling Precautions: Do not handle until all safely precautions have been read and understood. Keep containers tightly closed. Ensure adequate ventilation. Avoid breathing dust. Avoid contact with eyes, skin and clothing. Avoid prolonged exposure. Wear appropriate personal protection equipment and wash thoroughly after handling.

Recommendations for Storage: Store in cool, dry area in a tightly closed product container at 2³ – 8³ C and away from sources of ignition or flame.

Other Precautions: 0.1 mg.m³ supplied air respirator with a full face piece, any self-contained breathing apparatus with a full face piece.
Other Precautions:

Any chemical cartridge respirator with a high efficiency particulate filter with a full face piece and cartridges providing protection against osmic acid.

Any air-purifying full face piece respirator (gas mask) with a chin-style or front- or back-mounted canister providing protection against osmium tetroxide and having a high efficiency particulate filter.

1 mg/m³ any supplied air respirator with a full face piece and operated in a pressure-demand or other positive-pressure mode.

Emergency or planned entry in unknown concentration or immediately dangerous to life or health conditions.

Any self-contained breathing apparatus with full face piece and operated in a pressure-demand or other positive-pressure mode.

Any self-contained breathing apparatus.

Escape: Any air-purifying full face piece respirator (gas mask) with a chin-style or front- or back-mounted canister providing protection against osmium tetroxide and having a high efficiency particulate filter. Any appropriate escape type self-contained breathing apparatus.

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**Section 8: Exposure Controls / Personal Protection**

**General/Engineering Controls:**

Ventilation: YES  
Local Exhaust: YES  
Mechanical: YES  
Other: Fume Hood

**Work Clothing:**

Protective work clothing which covers skin and prevents exposures.  
Lab coat/apron, flame and chemical resistant protective clothing, eye wash, safety shower, and hygiene facilities for washing.

**Eye/face Protection:**

Wear safety glasses with side shields or goggles or face shield.

**Skin Protection:**

Wear chemical resistant gloves.

**Respiratory Protection:**

0.1 mg/m³ supplied air respirator with a full face piece.

**Exposure Limits:**

<table>
<thead>
<tr>
<th></th>
<th>Osmium Tetroxide/Osmium Oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>TLV-STEI</td>
</tr>
<tr>
<td>OSHA PEL</td>
<td>8H TWA</td>
</tr>
<tr>
<td>ACGIH</td>
<td>TLV-TWA</td>
</tr>
</tbody>
</table>

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**Section 9 Physical and Chemical Properties**

**Appearance and Physical State:** Colorless to pale yellow liquid.

**Odor (threshold):** Sharp chlorine like odor.

**Chemical Type:** Mixture

**Specific Gravity (H₂O=1):** 1.04

**Vapor Pressure (mm Hg):** 63.591 mmHg

**Vapor Density (air=1):** NA

**VOC Content: (lbs/gal):** NA

**Boiling Point:** 100 °C

**Melting point:** 0 °C

**pH:** 6 – 7

**Solubility in Water:** 5 g OsO₄/100 ml

**Molecular Weight:** 254.2
Section 10: Stability and Reactivity

General:
- This product is stable and non-reactive under normal conditions of use.
- Product is not subject to hazardous polymerization.
- Nature of decomposition products not known.

Conditions to Avoid:
- Elevated temperature. (Stability)
  - Avoid open flame and ignition sources.
  - Contact with hydrochloric acid will cause formation of poisonous chlorine gas.

Incompatible Materials:
- Strong reducing agents, organic materials, hydrochloric acid, bases, chlorine gas, and finely powdered metals.

Section 11: Toxicological Information

Toxicological Acute Studies:
- Oral-LD50: 162 mg/kg (mouse)
- Intraperitoneal-LD50: 13,500 ug/kg (mouse)
- Intraperitoneal-LD50: 14,100 ug/kg (Rat)

Subchronic (target organ effects):

Reproductive effects
- Species: Rat
  - Dose: 20,336 ug/kg
  - Route of Application: Intratesticular
  - Exposure Time: (1D MALE)
  - Paternal Effect Results: Spermatogenesis (including genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct.

- Species: Mouse
  - Dose: 20,336 ug/kg
  - Route of Application: Subcutaneous
  - Exposure Time: (30D MALE)
  - Paternal Effect Results: Spermatogenesis (including genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct.

Mutagenicity (genetic effects)
- Species: Hamster
  - Dose: 200 umol/L
  - Cell Type: Embryo

Carcinogenicity
- This product does not contain any compounds listed by NTP or IARC or regulated by OSHA as a carcinogen.

Section 12: Ecological Information

General Information:
- Product not tested

Aquatic Toxicity:
- No specific data available.
  - Do not allow large quantities of product to reach water, ground water, water courses or sewer systems.

Degradation/Mobility Information:
- No specific data available.

Bioaccumulation Potential:
- No specific data available.
Section 13 Disposal Considerations

Product Disposal: Crystals or solutions may be dissolved and/or neutralized in an aqueous solution of sodium or potassium hydroxide (approximately 25%). Dispose of contents/container in accordance with local/national/international rules.

Container Disposal: Treat empty containers with extra care. Consult waste contractor.

Other Considerations: Chemical additions, processing, or otherwise altering this material may make the waste management information presented above incomplete, inaccurate, or otherwise inappropriate.

RCRA 40 CFR 261 Classification: OsO₄ is a listed EPA Hazardous Waste - P087.

Section 14: Transportation Information

US DOT Information:
Proper shipping name: Toxic liquid, inorganic, n.o.s. (Osmium tetroxide 4% in aqueous solution).
Hazard Class: 6.1
Packaging group: II
UN Number: UN3287

IATA:
Proper shipping name: Toxic liquid, inorganic, n.o.s. (Osmium tetroxide 4% in aqueous solution).
Hazard Class: 6.1
Packaging group: II
UN Number: UN3287

Section 15: Regulatory Information

United States Federal Regulations:

SARA: Section 302: No
SARA: Section 313: This product is subject to SARA Section 313 reporting requirements.
RCRA: Hazardous Waste: P-Series (P0587)
TSCA: This chemical is TSCA listed, and is also classified with FDA as an IVD.
CERCLA: RQ = 1000 lbs (454 kg).

State Regulations:
California Proposition 65: No

International Regulations:
Canada WHMIS: This product has been classified in accordance with the hazard criteria of CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes.
NDSL: No.

European Union (EU): Symbol of Danger: T
R: 23/24/25
Risk Statement: Toxic by inhalation, in contact with skin and if swallowed.
S: 7/923-36/37-45
Safety Statements: Keep container tightly closed and in well-ventilated place.
Do not breathe vapor spray.
Wear suitable protective clothing and gloves.
In case of accident or if you feel unwell, seek medical advice immediately.
(show label where possible)
Section 16: Other Information
HMIS Hazard Rating: Health: 4; Fire: 0; Reactivity: 1 Personal Protection: J
NFPA Hazard Rating: Health: 4; Fire: 0; Reactivity: 1 Other: TOX
(0=least, 1=Slight, 2=Moderate, 3=High, 4=Extreme)

Abbreviations used in this document
NE            Not established
NA            Not applicable
NIF           No Information Found
ND            No Data
ACGIH         American Conference of Governmental Industrial Hygienists
EC50          Half maximal effective concentration
EL50          Half maximal effective loading
IARC          International Agency for Research on Cancer
NOELR         No observable effect loading ratio
NTP           National Toxicology Program
GHS           Globally Harmonized System of Classification of Labeling of Chemicals
LC50          Lethal Concentration 50%
LCL0          Lowest published lethal concentration
LD50          Lethal Dose 50%
OEL           Occupational Exposure Limit
PEL           Permissible Exposure Limit
SDS           Safety Data Sheet
STEL          Short-Term Exposure Limit
TCL0          Lowest published toxic concentration
TWA           Time Weighted Average
VOC           Volatile Organic Content

Disclaimer
Ted Pella, Inc. makes no warranty of any kind regarding the information furnished herein. Users should independently determine the suitability and completeness of information from all sources. While this data is presented in good faith and believed to be accurate, it should be considered only as a supplement to other information gathered by the user. It is the User's responsibility to assure the proper use and disposal of these materials as well as the safety and health of all personnel who may work with or otherwise come in contact with these materials.

SDS Form 0013F1V4