TED PELLA, INC.
Microscopy Products for Science and Industry

Safety Data Sheet

Product No. 18459, 18463, 18465 Osmium Tetroxide, 4% Aqueous
Issue Date (06/15/2015)
Review Date (02/13/2023) Rev. 04

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

Classification of the substance or mixture.

Signal Word: **DANGER**

GHS Categories:

GHS05 - Corrosive		
GHS06 - Acute Toxicity	Oral:	Category 1
	Dermal:	Category 3
	Inhalation:	Category 2
	Skin Corrosion	Category 1A
	Eye Irritation	Category 2A
	Sensitization-Respiratory	Category 1
GHS08 - Health Hazard	Toxic to Reproduction:	Category 2

Label elements
GHS Pictograms:


GHS05


GHS06


GHS08

Hazard Statements

H300 + H330	Fatal if swallowed or inhaled.
H311	Toxic in contact with skin.
H314	Causes severe skin burns and eye damage.
H319	Causes serious eye irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H361	Suspected of damaging fertility or the unborn child.

Precautionary Statements

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.

P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P284	(In case of inadequate ventilation) wear respiratory protection.
P301 + P310	If swallowed: Immediately call a poison center/doctor.
P301 + P330 + P331	If swallowed: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
P312	Call a poison center/doctor if you feel unwell.
P320	Specific treatment is urgent (see on this label)
P361 + P364	Take off immediately all contaminated clothing and wash it before reuse.
P337 + P313	If eye irritation persists: Get medical advice/attention.
P342 + P311	If experiencing respiratory symptoms: Call a poison center/doctor.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/container in accordance with local/regional/national international regulations.

· **NFPA ratings (scale 0 - 4)**

Health = 4
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = **4**
Fire = 0
Reactivity = 0

Classification complies with OSHA Hazard Communication Standard (29 CFR 1910.1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

Section 3: Composition / Information on Ingredients

Hazardous Component(s)	CAS No.	EC No.	Index No.	w/w%
Osmium (VIII) oxide 4% Solution OsO_4 in water	20816-12-0	244-058-7	076-001-00-5	4%

Section 4: First Aid Measures

General advice: Immediately remove any clothing soiled by the product.
Remove breathing apparatus only after contaminated clothing have been completely removed.
In case of irregular breathing or respiratory arrest provide artificial respiration**.**

Inhalation: Supply fresh air or oxygen; call for physician.
In case of unconsciousness, place patient stably in side position for transport.

Skin Contact: Immediate wash with water and soap and rinse thoroughly.

Eye(s) Contact: Rinse opened eye for several minutes under running water.
If symptoms persist, consult a physician.

Ingestion: Drink copious amounts of water and provide fresh air. Immediate call for a physician.

Note to physician:
Most important symptoms and effects, both acute and delayed: No further relevant information available.

Indication of any immediate medical attention and special treatment needed: No further relevant information available.

Section 5: Fire Fighting Measures

Suitable extinguishing media: Use firefighting measures that suit the environment.

Specific hazards during firefighting: No further relevant information available.

Special protective equipment for fire fighters: Mouth respiratory protective device.

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures:

- Wear protective equipment.
- Keep unprotected persons away.

Environmental precautions:

- Do not allow to enter sewers/surface or ground water.

Methods and materials for containment and cleaning up:

- Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
- Use neutralizing agent.
- Dispose contaminated material as waste according to Section 13
- Ensure adequate ventilation.

Reference to other sections:

- Safe handling Information – Section 7
- Personal Protective Equipment – Section 8
- Disposal Information – Section 13

Protective Action Criteria for Chemicals

- **PAC-1**: 6.00E-04 ppm
- **PAC-2**: 0.0084 ppm
- **PAC-3**: 4.0 ppm

Section 7: Handling and Storage

Precautions for safe handling: Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.

Information about protection against explosions and fire:
Keep respiratory protective device available.

Conditions for safe storage (including incompatibilities):

Requirements to be met by storerooms and receptacles:	No special requirements.
Information about storage in one common storage facility:	Not required.
Other information about storage conditions:	Keep receptacle tightly sealed.
Specific end use(s):	No further relevant information available.

Section 8: Exposure Controls / Personal Protection

INGREDIENTS WITH WORKPLACE CONTROL PARAMETERS

Components	CAS No.	Value type: (Form of exposure)	Control parameter Permissible concentration
Osmium (VIII) Oxide 4% solution	20816-12-0	PEL: long-term value	0.002 mg/m^3 (as Os)
		REL: short-term value	0.006 mg/m^3, 0.0006 ppm
		REL: long-term value	0.002 mg/m^3, 0.0002 ppm
		TLV: short-term value	0.0006 ppm
		TLV: short-term value	0.0002 ppm

Engineering Measures

Personal protection equipment: Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the eyes and skin.

Respiratory protection: In case of brief exposure or low pollution, use respiratory filtering device.
In case of intensive or prolonged exposure, use respiratory protection device that is independent of circulating air.

Hand protection:

- Protective gloves
- The glove material has to be impermeable and resistant to the product, substance and preparation.
- Due to missing tests, no recommendation to the glove material can be given for the product, the preparation or the mixture.
- Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

Material of gloves:

- The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

Penetration time of glove material:

- The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

Eye protection:

- Tightly sealed goggles

Section 9 Physical and Chemical Properties

Appearance	Liquid
Color	Almost white
Odor	Sharp chlorine like
Odor threshold	Not determined
pH	6-7
Melting point/range	103.1-105.8°F / 39.5-41°C

Boiling point/range	266°F / 130°C
Flash point	Not applicable
Flammability (solid, gas)	Not applicable
Decomposition temperature	Not determined
Self-ignition	Not determined
Danger of explosion:	Product does not present an explosion hazard
Upper explosion/flammability limit	Not determined
Lower explosion/flammability limit	Not determined
Vapor pressure at 20°C (68°F)	10 hPa (7.5 mm Hg)
Density @ 20°C (68°F)	4.906 g/cm^3 (40.94057 lbs/gal)
Relative density	Not determined
Vapor density	Not determined
Evaporation rate	Not determined
Solubility in H_2O	Not miscible or difficult to mix.
Partition coefficient (n-octanol/water)	Not determined
Viscosity, dynamic	Not determined
Viscosity, kinematic	Not determined
Molecular weight	254.23 g/mol

Section 10: Stability and Reactivity

Chemical Stability

Thermal decomposition/conditions to be avoided:

- No decomposition if used according to specifications.

Possibility of hazardous reactions:

- No dangerous reactions known.

Conditions to avoid:

- No further relevant information available.

Incompatible materials:

- No further relevant information available.

Hazardous decomposition products:

- No dangerous decomposition products known.

Reactivity:

- No further relevant information available.

Section 11: Toxicological Information

Acute toxicity:

Primary irritant effect:

On the skin: Strong caustic effect on skin and mucous membrane.

On the eye: Strong caustic effect. Irritating effect.

Sensitization: Possible through inhalation.

Additional Toxicology Information:

Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

Carcinogenic categories:

IARC: No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

Section 12: Ecological Information

Toxicity:

- Aquatic Toxicity: No further relevant information available.
- Persistence and degradability: No further relevant information available.

Behavior in environmental systems:

- Bioaccumulative potential: No further relevant information available.
- Mobility in soil: No further relevant information available.

Additional Ecological Information:

Water hazard class 1 (self assessment): slightly hazardous for water
Do not allow undiluted product or large quantities to reach ground water, water course or sewage system.
Must not reach bodies of water or drainage ditch undiluted or unneutralized.

Results of PBT and vPvB assessment:

PBT Not applicable
vPvB: Not applicable

Other adverse effects: No further relevant information available.

Section 13 Disposal Considerations

Waste Treatment Methods:

Recommendations: Must not be disposed of together with household garbage.
Do not allow product to reach sewage system.

Uncleaned Product Containers:

Recommendations: Dispose in a safe manner in accordance with local, state and federal regulations.

Section 14: Transportation Information

U.S. Department of Transportation Ground (49 CFR)

Proper shipping name:	Toxic liquid, inorganic, n.o.s. (Osmium (VIII) oxide-4% solution)
Hazard class or division:	6.1-Toxic substances
Identification number:	UN 3287
Packing group:	II
Label:	6.1

International Air Transportation (ICAO/IATA)

Proper shipping name:	Toxic liquid, inorganic, n.o.s. (Osmium (VIII) oxide-4% solution)
Hazard class or division:	6.1-Toxic substances
Identification number:	UN 3287
Packing group:	II

Water Transportation (IMO/IMDG)

Proper shipping name:	TOXIC LIQUID, INORGANIC, N.O.S. (Osmium (VIII) oxide-4% solution)
Hazard class or division:	6.1-Toxic substances
Identification number:	UN 3287
Packing group:	II
Marine Pollutant:	Yes

Labels:

Special precautions for user:	Warning: Toxic substances
Hazard identification number (Kemler code)	60
EMS Number:	F-A,S-A
Stowage Category:	B
Stowage Code:	SW2 Clear of living quarters
Annex II of MARPO 73/78:	Not applicable

Transport/Additional Information:

DOT	Quantity Limitations:	5L – Passenger aircraft/rail 60L –Cargo aircraft only
	Hazardous Substance:	454kg (1,000 lbs)
IMDG	Limited Quantities:	100ml
	Excepted Quantities:	Code: E4 Maximum net quantity per inner package: 1ml Maximum net quantity per outer package: 500ml

The transport classification(s) provided herein are for information purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet (SDS). Transportation classifications may vary by mode of transportation, package size, and variations in regional or country regulations.

Section 15: Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture:

- No further relevant information available.

SARA - Superfund Amendments and Reauthorization Act:

Section 355 (extremely hazardous substances)	Substance is not listed
Section 313 (specific toxic chemical listings)	Substance is listed
TSCA - Toxic Substances Control Act:	ACTIVE
Hazardous Air Pollutants:	Substance is not listed
California Proposition 65:	Substance is not listed

Carcinogenic categories:

EPA (Environmental Protection Agency):	Substance is not listed
TLV (Threshold Limit Value):	Substance is not listed

NIOSH (National Institute for Occupation Safety and Health:
Substance is not listed

Chemical Safety Assessment: An assessment has not been performed

Section 16: Other Information

This Safety Data Sheet (SDS) is intended to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200) and is consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Full text of other abbreviations

ACGIH:	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI:	ACGIH - Biological Exposure Indices (BEI)
NIOSH REL:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

OSHA Z-2:	USA. Occupational Exposure Limits (OSHA) - Table Z-2
US WEEL:	USA. Workplace Environmental Exposure Levels (WEEL)
ACGIH / TWA:	8-hour, time-weighted average
ACGIH / STEL:	Short-term exposure limit
NIOSH REL/TWA:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL/ST:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
OSHA Z-1 / TWA:	8-hour time weighted average
OSHA Z-2/TWA:	8-hour time weighted average
OSHA Z-2/CEIL:	Acceptable ceiling concentration
OSHA Z-2/Peak:	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
US WEEL/TWA:	8-hr TWA

AICS - Australian Inventory of Chemical Substances;
AIIC - Australian Inventory of Industrial Chemicals;
ASTM - American Society for the Testing of Materials;
bw - Body weight;
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act;
CMR - Carcinogen, Mutagen or Reproductive Toxicant;
DIN - Standard of the German Institute for Standardization;
DOT - Department of Transportation;
DSL - Domestic Substances List (Canada);
ECx - Concentration associated with x% response;
EHS - Extremely Hazardous Substance;
ELx - Loading rate associated with x% response;
EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan);
ErCx - Concentration associated with x% growth rate response;
ERG - Emergency Response Guide;
GHS - Globally Harmonized System;
GLP - Good Laboratory Practice;
HMIS - Hazardous Materials Identification System;
IARC - International Agency for Research on Cancer;
IATA - International Air Transport Association;
IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk;
IC50 - Half maximal inhibitory concentration;
ICAO - International Civil Aviation Organization;
IECSC - Inventory of Existing Chemical Substances in China;
IMDG - International Maritime Dangerous Goods;
IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan);
ISO - International Organization for Standardization;
KECI - Korea Existing Chemicals Inventory;
LC50 - Lethal Concentration to 50 % of a test population;
LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose);
MARPOL - International Convention for the Prevention of Pollution from Ships;
MSHA - Mine Safety and Health Administration;
n.o.s. - Not Otherwise Specified;
NFPA - National Fire Protection Association;
NO(A)EC - No Observed (Adverse) Effect Concentration;
NO(A)EL - No Observed (Adverse) Effect Level;
NOELR - No Observable Effect Loading Rate;
NTP - National Toxicology Program;
NZIoC - New Zealand Inventory of Chemicals;
OECD - Organization for Economic Co-operation and Development;
OPPTS - Office of Chemical Safety and Pollution Prevention;
PBT - Persistent, Bioaccumulative and Toxic substance;

PICCS - Philippines Inventory of Chemicals and Chemical Substances;
(Q)SAR - (Quantitative) Structure Activity Relationship;
RCRA - Resource Conservation and Recovery Act;
REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals;
RQ - Reportable Quantity;
SADT - Self-Accelerating Decomposition Temperature;
SARA - Superfund Amendments and Reauthorization Act;
SDS -Safety Data Sheet;
TCSI - Taiwan Chemical Substance Inventory;
TSCA - Toxic Substances Control Act (United States);
UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods;
vPvB - Very Persistent and Very Bioaccumulative
