

MATERIAL SAFETY DATA SHEET

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Version 1.4

Section 1 - Product and Company Information

Product Name OSMIUM TETROXIDE, 98+%, A.C.S. REAGENT
Product Number 419494
Brand SIAL

Company Sigma-Aldrich
Address 3050 Spruce Street
SAINT LOUIS MO 63103 US

Technical Phone: 800-325-5832
Fax: 800-325-5052
Emergency Phone: 314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
OSMIUM TETROXIDE	20816-12-0	Yes

Formula OsO4
Synonyms Osmic acid * Osmium tetroxide (ACGIH:OSHA) * RCRA
waste number P087
RTECS Number: RN1140000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Oxidizing. Highly Toxic (USA) Very Toxic (EU).
Contact with combustible material may cause fire. Very toxic by
inhalation, in contact with skin and if swallowed. Causes burns.
May cause sensitization by inhalation and skin contact.
Lachrymator. Target organ(s): Eyes. Central nervous system.

HMIS RATING

HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 3

NFPA RATING

HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 3

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is
conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

CONDITIONS OF FLAMMABILITY

May accelerate combustion.

FLASH POINT

N/A

AUTOIGNITION TEMP

N/A

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.
Contact with other material may cause fire. May accelerate combustion.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING

User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep tightly closed. Keep away from combustible materials, heat, sparks, and open flame. Store in a cool dry place.

Store at 2-8°C

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand: Compatible chemical-resistant gloves.

Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Remove and wash contaminated clothing promptly. Discard contaminated shoes.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	STEL	0.0006 PPM
USA	ACGIH	TWA	0.0002 PPM
USA	MSHA Standard-air	TWA	0.002 MG/M3
USA	OSHA.	PEL	8H TWA 0.002 MG(OS)/M3
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	0.0002 PPM
		STEL	0.0006 PPM

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	0.002 mg/m3
Poland		NDSch	0.006 mg/m3
Poland		NDSP	
Remarks: {BASED ON OS} W PRZELICZENIU NA OS			

Section 9 - Physical/Chemical Properties

Appearance	Physical State: Solid	
	Odor: Unpleasant odor.	
Property	Value	At Temperature or Pressure
Molecular Weight	254.2 AMU	
pH	N/A	
BP/BP Range	130 °C	760 mmHg
MP/MP Range	39.5 - 41.0 °C	
Freezing Point	N/A	
Vapor Pressure	7 mmHg	20 °C
Vapor Density	8.8 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	4.9 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	

Evaporation Rate	N/A
Viscosity	N/A
Surface Tension	N/A
Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	N/A
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.

Materials to Avoid: Strong reducing agents, Organic materials, Finely powdered metals, Contact with hydrochloric acid will cause formation of poisonous chlorine gas.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Sublimes easily and releases a poisonous and irritating vapor.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes burns.

Skin Absorption: May be fatal if absorbed through skin.

Eye Contact: Causes burns.

Inhalation: Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. May be fatal if inhaled.

Ingestion: May be fatal if swallowed.

SENSITIZATION

Respiratory: May cause allergic respiratory reaction.

Skin: May cause allergic skin reaction.

TARGET ORGAN(S) OR SYSTEM(S)

Eyes. Central nervous system. Male reproductive system. Kidneys.

SIGNS AND SYMPTOMS OF EXPOSURE

Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Symptoms may be delayed. Exposure can cause: A greenish or blackish discoloration of the skin may result from direct contact. May cause an asthmatic-like bronchitis. Exposure may cause excessive lacrimation and a sensation of seeing halos or colored rings around lights. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

TOXICITY DATA

Intraperitoneal
Rat
14100 UG/KG
LD50

Oral
Mouse
162 mg/kg
LD50

Intraperitoneal
Mouse
13500 UG/KG
LD50

CHRONIC EXPOSURE - MUTAGEN

Species: Hamster
Dose: 200 UMOL/L
Cell Type: Embryo
Mutation test: Unscheduled DNA synthesis

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 20336 UG/KG
Route of Application: Intratesticular
Exposure Time: (1D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Species: Mouse
Dose: 20336 UG/KG
Route of Application: Subcutaneous
Exposure Time: (30D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count). Paternal Effects: Testes, epididymis, sperm duct.

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: Osmium tetroxide
UN#: 2471
Class: 6.1
Packing Group: Packing Group I
Hazard Label: Toxic substances.
PIH: Not PIH

IATA

Proper Shipping Name: Osmium tetroxide
IATA UN Number: 2471
Hazard Class: 6.1
Packing Group: I

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: T+
Indication of Danger: Very toxic.
R: 26/27/28-34
Risk Statements: Very toxic by inhalation, in contact with skin and if swallowed. Causes burns.
S: 7/9-26-45
Safety Statements: Keep container tightly closed and in well-ventilated place. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Oxidizing. Highly Toxic (USA) Very Toxic (EU).
Risk Statements: Contact with combustible material may cause fire. Very toxic by inhalation, in contact with skin and if swallowed. Causes burns. May cause sensitization by inhalation and skin contact.
Safety Statements: Keep container tightly closed and in well-ventilated place. Keep away from combustible material. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements: Lachrymator. Target organ(s): Eyes. Central nervous system.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes
DEMINIMIS: 1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our

knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.