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Manufacturer's CAGE: 1P573

Safety Data Sheet

Date Effective: October 26, 2015

SPI # 02595-BA, 02597-BA, 02598-BA, 02599-BA, 02600-BA
Osmium Tetroxide Aqueous Solution

Section 1: Identification

Chemical Name/Synonyms..... Osmium Tetroxide Aqueous Solution; Osmic acid

Chemical family..... Platinum group metal salts

Emergencies
Contacting CHEMTREC:

24 Hour Emergency Use Only #'s...
Worldwide phone: 1-(703)-527-3887
Worldwide FAX: 1-(703)-741-6090
Toll-free phone: 1-(800)-424-9300 USA only

Product or Trade Name..... SPI-Chem™ Osmium Tetroxide Aqueous Solution

Identified Use: Laboratory chemical; Fixative for Transmission Electron Microscopy

CAS #'s..... 20816-12-0; 7732-18-5

Chemical Formula..... O_4Os in H_2O

HAZARDS IDENTIFICATION

Classification of the substance:

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 1)
Acute toxicity, Dermal (Category 4)
Skin irriation (Category 2)
Serious eye damage (Category 1)
Respiratory sensitization (Category 1)

GHS Label elements, including precautionary statements:

Pictogram

Signal word: Danger

Hazard statements:

H301 Toxic if swallowed.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H330 Fatal if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary statements:

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P262 Do not get in eyes, on skin, or on clothing.
P264 Wash skin 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 Wear respiratory protection.
P301 + P310 IIF ON SKIN: Wash with plenty of soap and water..
P302 + P352 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position 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. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.
P320 Specific treatment is urgent (see supplemental first aid instructions on this label).
P330 Rinse mouth.
P332 + P313 If skin irritation occurs: Get medical advice / attention.
P362 Take off contaminated clothing and wash before reuse.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P501 Dispose of contents/ container to an approved waste disposal plant.

Hazardous Material Information System USA

Health..... 4
Fire Hazard..... 0
Reactivity..... 0
Personal Protection.....

NFPA Rating (estimated)

Health..... 4
Flammability..... 0
Reactivity..... 0

Section 2: Composition

Chemical	CAS#	Percentage
Osmium Tetroxide	20816-12-0	96 – 98 %
Water	7732-18-5	2 – 4 %

Section 3: Hazard Identification

Emergency overview:

This material is extremely harmful by inhalation, in contact with skin or eyes or if ingested (could be lethal). It is highly oxidizing, highly toxic (USA), and very toxic (EC). Contact with combustible material could cause fire.

The material if brought in contact with skin causes severe burns. May also cause sensitization by inhalation and skin contact, and when contact does occur, the effects are usually going to be irreversible. It is also a possible mutagen. Material is also considered to be a lachrymator.

Signal Word

Harmful!

Physical Health Hazards:

Harmful by inhalation, in contact with the skin or eyes and if swallowed.

Personal protection:
Wear approved protective clothing when working with this material in order to avoid any contact with material at all. Long sleeves and/or lab coat are recommended to protect against skin contact. Approved chemical goggles are recommended to protect against eye contact. And of course, all such work must be done in an approved fume hood.

Target organ(s): Eyes, central nervous system

Other comments:

The main application in the world for osmium tetroxide is in the field of electron microscopy. We recommend the use of ampoules of not larger than 1 g for routing electron microscopy or histological use. Some laboratories permit ampoules not larger than 0.25 or 0.10 g because of the hazards associated with this material.

Exposure in the electron microscope laboratory environment is rare but it does happen. While exhaustive studies have not been done what is clear is that chronic exposure to low levels of osmium tetroxide can result is vision abnormalities, and those exposed have reported seeing "halos" in their vision. Should such symptoms occur, immediately *immediately* in leave the area to fresh air and keep anyone else form entering the area with out proper approved respiratory protection. And then no matter how good or bad one feels, medical attention should be sought immediately.

Other information:

Physical state: Free flowing powder in ampoules unless heated at some point after filling above the melting point, then the material could have fused together into one larger agglomeration.

Color: Colorless to pale yellow crystals

Odor: Highly corrosive, choking

Odor threshold: No data available

Chronic Health Effects Summary:

Not known.

Conditions Aggravated by Exposure:

Not known.

Carcinogenicity:
NTP: Not known
IARC: Not known

OSHA: Not known

Explanation of carcinogenicity: None

Section 4: First Aid Measures

In case of contact, with either eyes or skin, flush either immediately with copious amounts of water for at least fifteen minutes while removing all contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Take proper precautions to ensure your own health and safety before attempting to rescue and providing first aid. For specific information refer to the Emergency Overview in Section of this MSDS.

Ingestion: Adverse health effects due to ingestion to be expected, indeed they could be lethal. Call a physician in all cases, at once, and seek other medical attention.

Section 5: Fire Fighting Measures

Osmium tetroxide is noncombustible, use extinguishing media appropriate for the surrounding fire. Special fire fighting procedures would include self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

One should use caution in the event of a fire should the sealed ampoules overhead and then explode. To prevent that from happening, continue to spray the ampoules with cold water. Should ampoules break under those conditions, the escaping vapors could come in contact with other materials and cause secondary fires.

Flammability classification:

Non-flammable

BP: 129.7°C

Vapor Pressure @ 25°C: 9.8 mm Hg

Solubilities:
5.07 % Water at 25°C
6.5 % Water at 90°C

CAS# 20816-12-0
NIOSH (RTECS) No. RN1140000

Section 6: Accidental Release Measures

Immediate response: Evacuate area at once. Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Wear disposable coveralls and discard them after use. Should spilled osmium tetroxide remain, vegetable oil is a neutralizer for the material. We recommend a liter of vegetable oil to be held for such emergency situations should there be an accidental release. However, because of the high sublimation rate of the material, this might be of limited value in such an emergency situation.

Caution: OsO_4 is a listed EPA hazardous waste, P087.

Section 7: Handling and Storage

Handling:

Wear appropriate NIOSH/MSHA approved respirator, chemical resistant gloves, safety goggles and other protective clothing. Under no circumstances should this material be used with open tipped shoes. We also recommend a safety shower be in close vicinity of the work area and this would include also a safety eye bath.

Use only in a chemical fume hood and under no circumstances, ever breathe in any of the vapors. Do not get the material in the eyes, on the skin or on clothing. Always wash thoroughly after handling.

Storage:

In sealed glass ampoule form, we recommend storage in a laboratory refrigerator. Not only does the lower temperature extend greatly the shelf life of the material but in the even there is any kind if mishap, should the ampoules be chilled rather than at room temperature, what ever damage might occur could be minimized.

For electron microscope use, typically the material is mixed as a 4% aqueous solution (or less) and a roughly 25 ml quantity of 4% solution might be getting stored in a flask with ground glass top. This top then should be wrapped tightly with Parafilm® M.

We recommend all procedures with even the 4% aqueous solution to be done under the chemical fume hood.

Section 8: Exposure Controls and Personal Protection

Always wear safety glasses with full splash protection when handling osmium tetroxide.

Section 9: Physical and Chemical Properties

Boiling point: 130° C

Melting point: 39.5 to 41° C

Vapor pressure: 52 mm Hg

Specific gravity: 4.9

Vapor density: 8.8 g/liter

Boiling Point/Range: Not applicable

pH: Not applicable

Viscosity: Not applicable

Evaporation Rate: Sublimes at room temperature

Section 10: Stability and Reactivity

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS SUBLIMES EASILY AND RELEASES A POISONOUS AND IRRITATING VAPOR

Chemical Stability: The product is stable

Conditions to Avoid: Heat

Incompatibility with: Strong reducing agents, organic materials, finely powdered metals. Contact with HCl will cause formation of poisonous chlorine gas.

Hazardous Products of Deposition: Sublimes easily and releases poisonous and highly irritating vapors.

Hazardous Polymerization: Does not occur

Section 11: Toxicological Information

Acute effects:

So far as we know, the chemical, physical and toxicological properties have not been thorough nvestigated. The material is highly destructive in an irreversible way to all tissue of the mucous membranes and upper respiratory tract, eyes and skin. Inhalation may result in spasm, convulsions, inflamation and edema of the larynx and bronchi, chemical pneuonitis and pulmonary edema.

Symptoms of exposure:

Burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Symptoms might be delayed. A "halo" effects with vision would indicate a chronic low level exposure and one for which immediately steps should be taken to remove the exposure risk. Some times this halo effect is described as color rings around lights. Exposure to skin can cause a greenish or black discoloration of the skin where exposure occurred. **May be fatal if inhaled, swallowed, or absorbed through the skin**. Allergic like reactions are also possible.

Chronic effects:

Target organs: Eyes, central nervous system, male reproductive system, kidneys

RTECS #: RN1140000
Toxicity data:

IPR-RAT LD50:14100 µg/kg
ORL-MUS LD50:162 µg/kg
IPR-MUS LD50:13500 µg/kg

Target organ data:

Sense organs and special senses (lacrimation)
Sense organs and special senses (other eye effects)
Lungs, thorax, or respiration (change in trachea or bronchi)
Paternal effects (spermatogenesis)
Paternal effects (testees epididymis, sperm duct)
Only selected registry of toxic effects of chemical substances (RTECS) data is presented here.

Section 12: Ecological Information

Exotoxicity: No information found in our select references however we would expect it to be very low for the simple reason that because of its strength as an oxidizer, it would want to be reduced that much more readily, therefore it would quickly be converted to the dioxide, a form of the metal that is reasonably innocuous.

Environmental Fate: No information found in our selected references, however we would expect it to be converted to the dioxide quite readily, which is a relative innocuous substance.

Bioaccumulation: No information found in our selected references.

Section 13: Disposal Considerations

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

Contact SPI Supplies for the possibilities for recycling. Remember this is a non-renewable resource and we should be looking at all possible ways to conserve the world's supply of this material which is not unlimited.

Section 14: Transport Information

DOT (US):
Proper Shipping Name: Toxic liquid, inorganic, n.o.s. (Osmic acid)
UN Number: 3287
Class: 6.1
Packing Group: II

IATA:
Proper Shipping Name: Toxic liquid, inorganic, n.o.s. (Osmic acid)
UN Number: 3287
Class: 6.1
Packing Group: II

IMDG:
Proper Shipping Name: TOXIC LIQID, INORGANIC, N.O.S. (Osmic acid)
UN Number: 3287
Class: 6.1
Packing Group: II
EMS-No: F-A, S-A

Section 15: Regulatory Information

TSCA: All components of this product are listed on the TSCA 8(b) inventory. If identified components of this product are listed under the TSCA 12(b) Export Notification Rule, they will be listed below.

TSCA 12(b) Component	Listed under TSCA Section
None	

SARA Title 3: Section 313 Information/Emissions Reporting (**40 CFR 372**):

Component
OsO_4

CERCLA RQ: 1000 lbs.

SARA 311/312 Hazards: Acute Health Hazard; Chronic Health Hazard

STATE RIGHT TO KNOW:
CAS# 20816-12-0, Osmium Tetroxide, is listed on the Massachusetts, New Jersey, and Pennsylvania Right-to-Know lists.

California Prop 65
This product does not contain any chemicals know to the State of California to cause cancer, birth defects, or reproductive harm.

European community information
EC INDEX NO: 076-001-00-5

Oxidizing
Very toxic

Reviews, standards and regulations

OEL=MAK
ACGIH TLV-STEL 0.0006 PPM

DTLVS* TLV/BEI,1999
ACGIH TLV-TWA 0.0002 PPM
DTLVS* TLV/BEI,1999
MSHA STANDARD-AIR:TWA
0.002 MG/M3
DTLVS* 3,192,1971
OSHA PEL (GEN INDU):8H TWA
0.002 MG(OS)/M3
CFRGBR 29,1910.1000,1994
OSHA PEL (CONSTRUC):8H TWA
0.002 MG(OS)/M3
CFRGBR 29,1926.55,1994
OSHA PEL (SHIPYARD):8H TWA
0.002 MG(OS)/M3
CFRGBR 29,1915.1000,1993
OSHA PEL (FED CONT):8H TWA
0.002 MG(OS)/M3
CFRGBR 41,50-204.50,1994

NIOSH REL TO OSMIUM TETROXIDE-AIR:10H
TWA 0.0002 PPM;STEL 0.0006 PPM
NIOSH* DHHS #92-100,1992
NOHS 1974: HZD 52370; NIS 2; TNF 195;
NOS 2; TNE 370
NOES 1983: HZD 52370; NIS 2; TNF 87;
NOS 5; TNE 1733; TFE 420
EPA GENETOX PROGRAM 1988,
POSITIVE: B SUBTILIS REC ASSAY
EPA GENETOX PROGRAM 1988,
INCONCLUSIVE: D
EPA TSCA SECTION 8(B)
CHEMICAL INVENTORY
ON EPA IRIS DATABASE

Section 16: Other Information

Disclaimer of Liability:

Caution! Do not use SPI Supplies products or materials in applications involving implantation within the body; direct or indirect contact with the blood pathway; contact with bone, tissue, tissue fluid, or blood; or prolonged contact with mucous membranes. Products offered by SPI Supplies are not designed or manufactured for use in implantation in the human body or in contact with internal body fluids or tissues. SPI Supplies will not provide to customers making devices for such applications any notice, certification, or information necessary for such medical device use required by US FDA (Food and Drug Administration) regulation or any other statute. SPI Supplies and Structure Probe, Inc. make no representation, promise, express warranty or implied warranty concerning the suitability of these materials for use in implantation in the human body or in contact with internal body tissues of fluids.

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