Osmium and its compounds

Safety Data Sheet

Division of Occupational Health and Safety
National Institutes of Health

DESCRIPTION

Osmium:	Bluish-white metal of the platinum group with an atomic number of 76, valences of 2, 3, 4, 6 and 8, and 7 stable isotopes.
Osmium tetroxide:	A dimorphic compound with both crystalline and amorphous forms; colorless; pungent, disagreeable odor.

OTHER NAMES

Osmium:	None known
Osmium tetroxide:	osmic acid anhydride, perosmic acid, perosmic oxide

USES

Osmium:	Alloys; hardener for platinum; phonograph needles; instrument pivots; laboratory catalyst.
Osmium tetroxide:	Microscopic staining; photography; catalyst in organic synthesis; oxidizing agent for converting olefins to glycols.

HAZARDOUS PROPERTIES

1. Fire

   Osmium

   a.. Nonflammable, however, heating of the metal in air will cause poisonous fumes of osmium tetroxide to be given off.

   Osmium Tetroxide

   a. Flammability unknown

   b. May form other toxic compounds when heated in the presence of fluorine or chlorine.

   c. Osmium tetroxide is a powerful oxidizing agent; accidental combinations with reducing agents should be avoided.

   d. As a catalytic agent, osmium tetroxide will cause hydrogen oxygen mixtures to explode at slightly elevated temperatures (40 - 50ºC).

2. Health

Osmium

a. Will give off poisonous fumes of osmium tetroxide when heated in air.

Osmium Tetroxide

b. Strong irritant to eyes

c. Strong irritant to mucous membranes

d. Toxicity by ingestion unknown

PRECAUTIONS

1. Fire

a. Do not heat either osmium metal or osmium tetroxide in open air.

b. Keep away from sources of heat and open flames when not in use.

2. Health

a. Will give off poisonous fumes of osmium tetroxide when heated in air.

b. Avoid breathing of vapors or skin contact with liquid.

c. Always wear protective gloves and clothing when using either the metal or the compound.

STORAGE

1. Protect containers against physical damage.
2. Storage in area which has very good ventilation.
3. Do not store liquid or metal with other chlorides, acids or other oxidizable material.

CHEMICAL DATA

		Metallic Osmium	Osmium Tetroxide
1.	Chemical formula or symbol	Os	$Os0_4$
2.	Atomic number	76	
3.	Molecular weight	190.2	254.2
4.	Vapor density (Air = 1)	--- =	---
5.	Boiling point	5500ºC (est.)	131.2ºC
6.	Melting point	3050ºC	40.6ºC
7.	Flash point	---	---
8.	Ignition temperature	---	---
9.	Specific gravity (Water=1)	22.61	4.91
10.	Solubility	hot concentrated H_2SO_4	alcohol; ether; 6.2g/100 ml water
11.	Vapor pressure	---	11 mm Hg at 25ºC

12. The Threshold Limit Value (TLV) for exposure to osmium or osmium tetroxide over an 8-hour day is 0.0002 parts per million (ppm) parts of air or 0.002 mg/m^3 of air.

EMERGENCY PROCEDURES

1. Fire: When fighting fire which may contain osmium, use self-contained breathing apparatus and protective clothing.
2. First Aid
   a. Skin Contact: wash area thoroughly with soap and water
   b. Eye contact: irrigate eyes immediately with copious amounts of water for at least 15 minutes.
   c. Inhalation or ingestion: remove worker(s) affected by vapors or liquid from further exposure; call a physician immediately.

REFERENCES

American Conference of Governmental Industrial Hygienists: Threshold Limit Values for 1975. American Conference of Governmental Industrial Hygienists, 1014 Broadway, Cincinnati, Ohio.

American Industrial Hygiene Association 1968 Hygienic Guide Series. American Industrial Hygiene Association, 14125 Prevost Street, Detroit, Michigan.

The Condensed Chemical Dictionary, Eighth Edition, Revised by Gessner G. Hawley, Van Nostrand Reinhold Company, New York, NY.

Laboratory Waste Disposal Manual, Manufacturing Chemist Association. Revised November 1972, Manufacturing Chemist Association, 1825 Connecticut Avenue, N.W., Washington, DC.

Merck Index of Chemicals and Drugs, Seventh Edition, Paul G. Stecher, Merck and Company Incorporated, Rahway, New Jersey.

*The information contained in this bulletin is based on a literature search and may not be complete.