

OSMIUM-INSTITUTE

Product Data Sheet

Crystalline bulk osmium

Safety Data Sheet

Crystalline bulk osmium

Product Data Sheet

Crystalline bulk osmium

Unless otherwise explicitly stated, the word “osmium” in this Product Data Sheet refers to the crystalline bulk form and not to airborne osmium particulates, powder and dusts.

Product Identifier

Product name: Osmium (crystalline, in bulk form). Chemical formula: Os.

Other means of identification

CAS No: 7440-04-2, Osmium.

Recommended use of the chemical and restrictions on use

Recommended or intended use: Use as a store of value and/or use as a semi-manufactured material for the manufacture of jewellery, timepieces and other luxury goods.

Contact

Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH,
Höllriegelskreuther Weg 3, 82065 Baierbrunn, Germany

Phone: +49 89 744 88 88 88, Website: www.osmium-institute.com

Disclosure of proportions of ingredients

Name	CAS No	% by weight	% purity (finess)
Osmium (crystalline)	7440-04-02	100	99.999

Refer to “Appendix A” for an excerpt from the chemical analysis.

Specific hazards arising from the chemical

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Precautions for safe handling

Osmium is brittle and should not be dropped onto hard surfaces to avoid breaking. If osmium grinds against another surface or is bent, crystals may break out of the structure. Osmium should be stored separately in a way that prevents the osmium from grinding against other items and/or surfaces. It is also recommended that osmium jewelry, in particular rings, should be removed before doing manual works such as gardening, exercising or cleaning.

Conditions for safe storage, including any incompatibilities

For small osmium pieces the likelihood of confusing the osmium with other materials is great. Therefore, osmium should always be individually packed. No additional information available.

Appearance

Bright, bluish-silvery to bluish-whitish lustre, brittle solid material (Figure 1).



Figure 1: Close-up of a crystalline bulk osmium surface.

Shapes: Bars with different geometries and dimensions: Disk, rectangular, “diamond” and “star” shapes, ring-shaped (curved), bespoke two-dimensional shapes, crystallised on three-dimensional graphite substrates.

Odour: Odourless.

Bulk modulus: 462 GPa.

Hardness: 7.0 (Mohs scale).

Melting point/freezing point: 3033 °C (3306 K).

Boiling point and boiling range: 5012 °C (5285 K).

Flammability (solid, gas): Osmium is not flammable.

Density: 22.61 g/cm³.

Solubility: Osmium is insoluble in water, acidic and/or caustic solutions.

Decomposition temperature

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Specific heat value: Molar heat capacity: 24.7 J/(mol·K)

Release of invisible flammable vapours and gases

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Size distribution

The size of osmium ranges from approx. 1×10^{-3} m to 5×10^{-2} m. The smallest size for airborne osmium particulates, powder and dusts is approx. 10^{-9} m.

Crystallinity

Osmium has a hexagonal close packed crystal structure.

Surface area

Crystalline with a clearly visible, macroscopic crystal structure.

Reactivity

Osmium can react with fluorine and chlorine only under laboratory conditions.

Osmium is resistant against non-oxidising acids in water and air.

Osmium is resistant against oxidising acids, including nitric acid, phosphoric acid, and sulfuric acid.

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Upon request, the Osmium-Institut zur Inverkehrbringung und Zertifizierung GmbH can provide results of a study from an accredited laboratory examining the oxidation behaviour of osmium as a function of temperature.

Chemical stability

Osmium is chemically inert (not chemically reactive) under standard conditions for temperature and pressure. Finely dispersed osmium slowly oxidises to osmium tetroxide: $\text{Os} + 2\text{O}_2 \rightarrow \text{OsO}_4$.

Safety information for further processing

Prior to any further processing of osmium, including but not limited to the manufacture of jewellery, timepieces and other luxury goods, it is recommended to contact the manufacturer or importer.

Do not further process the osmium without having downloaded, read and understood the applicable Safety Data Sheet and the Processing Guidelines published by Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH and without having taken additional safety measures as required by applicable legislation and standards.

The applicable Safety Data Sheet and the Processing Guidelines are available upon request from Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH and can also be downloaded at <https://www.buy-osmium.com>.

Date of preparation or review

This Product Data Sheet has been prepared by Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH.

Revision: 1.

Revision date: 18 September 2018.

Appendix A - Excerpt from the chemical analysis



GOMS
ANALYTICAL REPORT

EVANS ANALYTICAL GROUP SAS
84, chemin de la Peyrette
Tournefeuille, France 31170

Telephone (+33) 5 61 73 15 89
Fax: (+33) 5 61 73 15 87
Email info.fr@eaglebs.com
www.eaglebs.com

P.O.#

Date of Analysis: 21-nov.-2017
Customer ID: Os

Job # F0HH8412
Sample ID: F171115022 - CB

Issued on: 22/11/2017

échantillon d'Osmium

Element	Concentration [ppm wt]	Element	Concentration [ppm wt]
Li	< 0.005	Pd	< 0.01
Be	< 0.005	Ag	< 0.01
B	< 0.005	Cd	< 0.01
C	-	In	< 0.01
N	-	Sn	< 0.005
O	-	Sb	< 0.005
F	< 0.05	Te	< 0.005
Na	< 0.005	I	< 0.005
Mg	< 0.005	Cs	< 0.005
Al	< 0.005	Ba	< 0.005
Si	< 0.005	La	< 0.005
P	< 0.005	Ce	< 0.005
S	< 0.01	Pr	< 0.005
Cl	< 0.01	Nd	< 0.005
K	< 0.05	Sm	< 0.005
Ca	< 0.01	Eu	< 0.005
Sc	< 0.005	Gd	< 0.005
Ti	< 0.005	Tb	< 0.005
V	< 0.005	Dy	< 0.005
Cr	< 0.005	Ho	< 0.005
Mn	< 0.005	Er	< 0.005
Fe	< 0.005	Tm	< 0.005
Co	< 0.005	Yb	< 0.005
Ni	< 0.005	Lu	< 0.005
Cu	< 0.005	Hf	< 0.005
Zn	< 0.01	Ta	< 5
Ga	< 0.01	W	< 0.05
Ge	< 0.01	Re	< 0.05
As	< 0.01	Os	Matrix
Se	< 0.01	Ir	< 0.1
Br	< 0.01	Pt	< 0.1
Rb	< 0.005	Au	< 0.5
Sr	< 0.005	Hg	< 0.1
Y	< 0.005	Tl	< 0.5
Zr	< 0.005	Pb	< 0.5
Nb	< 0.005	Bi	< 0.01
Mo	< 0.005	Th	< 0.001
Ru	0.45	U	< 0.001
Rh	< 0.005		

H, C, N, O recommended by Interstitial Gas Analysis (Internally equipped)

C.BAZILLE (Analyst)

ISO 9001:2008 registered

Page 1 of 1

Approved by: _____

The measurement uncertainties are available upon request. The tests results in the report relate only to the test sample submitted to analysis.
This report shall not be reproduced except in full without written approval of Evans Analytical Group SAS.
Les incertitudes de mesure sont disponibles sur demande. Les résultats présentés sur ce rapport ne valent que pour l'échantillon soumis à essai.
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Safety Data Sheet

Crystalline bulk osmium

This Safety Data Sheet is valid internationally and has been prepared according to the requirements of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS).

Section 1 - Identification: Product identifier and chemical identity

Unless otherwise explicitly stated, the word "osmium" in this Safety Data Sheet refers to the crystalline bulk form and not to airborne osmium particulates, powder and dusts.

Product Identifier

Product name: Osmium (crystalline, in bulk form). Chemical formula: Os.

Other means of identification: CAS No: 7440-04-2, Osmium.

Recommended use of the chemical and restrictions on use

Recommended or intended use: Use as a store of value and/or use as a semi-manufactured material for the manufacture of jewellery, timepieces and other luxury goods.

Do not modify the osmium (for example heating, cutting, grinding, sanding) without having downloaded, read and understood the applicable Product Data Sheet and the Processing Guidelines published by Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH and without having taken additional safety measures as required by applicable legislation and standards. The applicable Product Data Sheet and the Processing Guidelines are available from the importer upon request and can also be downloaded at <https://www.buynosmium.com/shop/australia>.

Details of manufacturer or importer

Details: Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH, Höllriegelskreuther Weg 3, 82065 Baierbrunn, Germany

Phone: +49 89 744 88 88 88

Website: www.osmium-institute.com

Emergency phone number

Emergency phone number: +49 (89) 7 44 88 88 88 (available 24 hours every day from anywhere).

Section 2 – Hazard(s) identification

Classification of the hazardous chemical

This Safety Data Sheet only covers osmium in crystalline, bulk form. Accordingly, airborne osmium particulates, dust or powder are not covered in this Safety Data Sheet. Osmium in crystalline, bulk form is not considered a hazardous chemical. No additional information available.

Label elements, including precautionary statements

No information available.

Section 3 - Composition and information on ingredients

Disclosure of ingredient names

Osmium (crystalline, in bulk form).

Use of generic names

Osmium.

Disclosure of proportions of ingredients

Name	CAS No	% by weight	% purity (finesness)
Osmium (crystalline)	7440-04-02	100	99.999

Section 4 - First-aid measures

Description of necessary first aid measures

Ingestion (swallowing) Choking hazard. If choking person is conscious:

1. Immediately call triple zero (000) for emergency medical services.
2. Bend the person well forward and give five back blows with the heel of your hand between their shoulder blades – checking if the blockage has been removed after each blow.
3. If unsuccessful, give five chest thrusts by placing one hand in the middle of their back for support and the heel of the other hand on the lower part of their breastbone – checking if the blockage has been removed after each thrust.

The technique for adults and children is different from that required for babies:

- Adult or child – Ask the person to lean over with their hands on their knees or sit in a chair leaning forward. The amount of force used on a child is less than that used on an adult.
- Baby – Place the baby on your lap or forearm, with their head lower than their body. Ensure that you have them in a firm hold. The amount of force is less than that used on a child.

If the person becomes unconscious:

1. Immediately call triple zero (000) for emergency medical services.
2. Remove any visible obstruction from the mouth.
3. Commence cardiopulmonary resuscitation (CPR).

Skin contact

Health effects, including allergic reactions, are not known.

Eye contact

Health effects, including allergic reactions, are not known.

Inhalation

Crystalline bulk osmium cannot be inhaled.

Symptoms caused by exposure

Ingestion (swallowing) A person with a partly blocked airway can still breathe, speak or cough. Symptoms include:

- Panicked and distressed behaviour.
- Inability to talk in complete sentences or at full volume.
- Frantic coughing.
- Unusual breathing sounds, such as wheezing or whistling.
- Clutching at the throat.
- Watery eyes.
- Red face.

If the person's airway is completely blocked and they cannot breathe, speak or cough at all, they will show some or all of the above symptoms including vigorous attempts to breathe, then turning pale and then blue due to lack of oxygen (cyanosis), before collapsing into unconsciousness.

Skin contact

Health effects, including allergic reactions, are not known for osmium.

Eye contact

Health effects, including allergic reactions, are not known for osmium.

Inhalation

Not applicable – Crystalline bulk osmium cannot be inhaled.

Medical attention and special treatment

Medical attention as per Section "Description of necessary first aid measures".

Section 5 - Fire-fighting measures**Suitable extinguishing equipment**

Use a dry powder fire extinguisher.

Specific hazards arising from the chemical

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Special protective equipment and precautions for firefighters

Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus. Wear full chemical protective clothing.

Section 6 - Accidental release measures**Personal precautions, protective equipment and emergency procedures**

No information available.

Environmental precautions

Temperature must not exceed 400 °C (673 K) to avoid the formation of osmium tetroxide.

Methods and materials for containment and cleaning up

Use warm water for cleaning.

Section 7 - Handling and storage, including how the chemical may be safely used**Precautions for safe handling**

Osmium is brittle and should not be dropped onto hard surfaces to avoid breaking. If osmium grinds against another surface or is bent, crystals may break out of the structure.

No additional information available.

Conditions for safe storage, including any incompatibilities

For small osmium pieces the likelihood of confusing the osmium with other materials is great. Therefore, osmium must always be individually packed.

No additional information available.

Section 8 - Exposure controls and personal protection**Exposure control measures**

No information available.

Biological monitoring: No information available.

Control Banding: No information available.

Engineering controls: No information available.

Individual protection measures, for example personal protective equipment (PPE): No information available.

Section 9 - Physical and chemical properties

Appearance

Bright, bluish-silvery to bluish-whitish lustre, brittle solid material.

Shapes: Bars with different geometries and dimensions: Disk, rectangular, “diamond” and “star” shapes, ring-shaped (curved), bespoke two-dimensional shapes, crystallised on threedimensional graphite substrates.

Odour: Odourless.

Odour threshold: No information available.

pH: No information available.

Bulk modulus: 462 GPa.

Hardness: 7.0 (Mohs scale).

Melting point/freezing point: 3033 °C (3306 K).

Flash point: No information available.

Evaporation rate: No information available.

Flammability (solid, gas): Osmium is not flammable.

Upper/lower flammability or explosive limits: No information available.

Vapour pressure: No information available.

Vapour density: No information available.

Relative density: No information available.

Density: 22.61 g/cm³.

Solubility: Osmium is insoluble in water, acidic and/or caustic solutions.

Partition coefficient: n-octanol/water: No applicable.

Auto-ignition temperature: Not applicable.

Decomposition temperature

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Viscosity: Not applicable.

Specific heat value: Molar heat capacity: 24.7 J/(mol·K)

Saturated vapour concentration: No information available.

Release of invisible flammable vapours and gases

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Particle size: Refer to Section "Size distribution".

Size distribution

The size of osmium ranges from approx. 1×10^{-3} m to 5×10^{-2} m.

The smallest size for airborne osmium particulates, powder and dusts is approx. 10^{-9} m.

Shape and aspect ratio: No information available.

Crystallinity: Osmium has a hexagonal close packed crystal structure.

Dustiness: Not applicable.

Surface area: Crystalline with a clearly visible, macroscopic crystal structure.

Degree of aggregation or agglomeration, and dispersibility

No information available.

Redox potential: No information available.

Biodurability or biopersistence: No information available.

Surface coating or chemistry

Osmium is chemically inert (not chemically reactive) under standard conditions for temperature and pressure.

Other: Osmium has a strong shielding effect against gamma radiation.

Section 10 - Stability and reactivity

Reactivity

Osmium can react with fluorine and chlorine only under laboratory conditions. Osmium is resistant against non-oxidising acids in water and air. Osmium is resistant against oxidising acids, including nitric acid, phosphoric acid, and sulfuric acid. Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K). Upon request, the Osmium-Institut zur Inverkehrbringung und Zertifizierung GmbH can provide results of a study from an accredited laboratory examining the oxidation behaviour of osmium as a function of temperature.

Chemical stability

Osmium is chemically inert (not chemically reactive) under standard conditions for temperature and pressure.

Finely dispersed osmium slowly oxidises to osmium tetroxide: $\text{Os} + 2\text{O}_2 \rightarrow \text{OsO}_4$.

Possibility of hazardous reactions If osmium is processed by means of e.g. grinding, melting or wire cutting, hazardous levels of airborne osmium particulates, powder, and/or osmium tetroxide (OsO_4) may be generated.

Airborne osmium particulates, powder and dusts are a flammable solid.

Conditions to avoid

Avoid temperatures exceeding 400 °C (673 K).

Avoid modifications of the osmium which result in the formation of airborne osmium particulates, powder and dusts.

Incompatible materials: No information available.

Hazardous decomposition products

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K).

Section 11 - Toxicological information

Information on possible routes of exposure

No information available.

Early onset symptoms related to exposure

Osmium is not known to cause skin corrosion/irritation or skin sensitisation.

No additional information available.

Delayed health effects from exposure: No information available.

Exposure levels and health effects

No information available.

Interactive effects: No information available.

When specific chemical data is not available

No information available.

Mixtures of chemicals: No information available.

Other information

No additional information available.

Section 12 - Ecological information

Ecotoxicity: No information available.

Persistence and degradability: No information available.

Bioaccumulative potential: No information available.

Mobility in soil: No information available.

Other adverse effects: No information available.

Section 13 - Disposal considerations

Disposal methods

Contact the importer.

Osmium should not be exposed to temperatures above 400 °C (673 K).

Section 14 - Transport information

UN number: No additional information available.

Proper Shipping Name or Technical Name: Osmium (crystalline, in bulk form).

Transport hazard class: No additional information available.

Packing Group: No additional information available.

Environmental hazards for transport purposes

No additional information available.

Special precautions for user: No additional information available.

Additional information: No additional information available.

Hazchem or Emergency Action Code: No additional information available.

Section 15 - Regulatory information

Safety, health and environmental regulations

No information available.

Section 16 - Any other relevant information

Safety information for further processing

Prior to any further processing of osmium, including but not limited to the manufacture of jewellery, timepieces and other luxury goods, it is recommended to contact the manufacturer or importer.

Do not further process the osmium without having downloaded, read and understood the applicable Product Data Sheet and the Processing Guidelines published by Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH and without having taken additional safety measures as required by applicable legislation and standards.

The applicable Product Data Sheet and the Processing Guidelines are available from the importer upon request and can also be downloaded at <https://www.buyosmium.com/shop/australia>.

Osmium tetroxide

Osmium may form osmium tetroxide if the temperature exceeds 400 °C (673 K). In addition, airborne osmium particulates, powder and dusts may slowly form osmium tetroxide at temperatures below 400 °C (673 K), including at room temperature.

Osmium tetroxide has a pungent, chlorine-like odour.

Osmium tetroxide (primary chemical name), Osmium tetraoxide, Osmium oxide, Osmic acid, Osmium VIII oxide.

Chemical formula: OsO_4

CAS No: 20816-12-0

EC No: 244-058-7

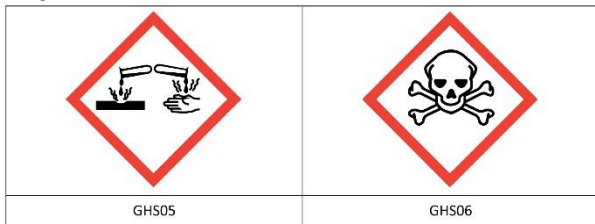
RTECS: RN1140000

TSCA 8(b) inventory: Osmium oxide (OsO_4), (T-4)-

Osmium – THE sunshine Element

The following classification is according to the Hazardous Chemical Information System (HCIS) which draws on data published by the European Union (EC) No 1272/2008 (CLP Regulation, Annex VI, Table 3.1, Index no 076-001-00-5).

Pictogram:



Signal word: **Danger**

Hazard category:

1. Acute toxicity – Inhalation – category 2
2. Acute toxicity – Dermal – category 1
3. Acute toxicity – Oral – category 2
4. Skin corrosion – Skin corrosion/irritation – category 1B

Hazard statements:

1. H330 (Fatal if inhaled)
2. H310 (Fatal in contact with skin)
3. H300 (Fatal if swallowed)
4. H314 (Causes severe skin burns and eye damage)

Precautionary statements:

Prevention: P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response:

P301+P330+P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P302+P350: IF ON SKIN: Gently wash with plenty of soap and water. 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. Continue rinsing.
P309+P311: IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.

Airborne osmium particulates, powder and dusts

Airborne osmium particulates, powder and dusts are a flammable solid.

Airborne osmium particulates, powder and dusts may cause lung irritation with hyperemia and pulmonary edema as well as skin and eye damage. Remove person to fresh air and keep comfortable for breathing. Immediately seek medical advice.

Airborne osmium particulates, powder and dusts may slowly form osmium tetroxide at temperatures below 400 °C (673 K), including at room temperature. Refer to Section "Osmium tetroxide" above.

Date of preparation or review

This Safety Data Sheet has been published by Osmium-Institute Australia to Introduce and Certify Osmium Pty Ltd.

Revision: 0.

Revision date: 17 July 2018.

Key abbreviations or acronyms used Os:

Osmium (crystalline, in bulk form).

Osmium-Institut zur Inverkehrbringung und Zertifizierung von Osmium GmbH
Höllriegelskreuther Weg 3
82065 Baierbrunn

Am Mösl 41
82418 Murnau am Staffelsee
Germany

Hotline: +49 89 744 88 88 88
info@osmium-institute.com