# 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 semimanufactured 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 (fineness) |
|---|---|---|---|
| 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

Crystalline 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 x $10^{-3}$ m to 5 x $10^{-2}$ 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 Inverkehbringung 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: $Os + 2O_2 \rightarrow OsO_4$.

## 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: 0.

Revision date: 17 July 2018.

## Appendix A - Excerpt from the chemical analysis

EAG LABORATORIES

GDMS
ANALYTICAL REPORT

EVANS ANALYTICAL GROUP SAS
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Tournefeuille, France 31170

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*P.O.#*

*Date of Analysis:* 21-nov.-2017 *Job #* F0HH8412
*Customer ID:* Os *Sample ID:* F171115022 - CB
**échantillon d'Osmium** ***Issued on: 22/11/2017***

| 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

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Approved by: _____