



Osmium

MELTING POINT: 3,127°C

BOILING POINT: 5,303°C

DENSITY: 22.590 g/cm³

MOST COMMON IONS: OsCl₆³⁻, OsCl₆²⁻

The element osmium was discovered in 1804 by English chemist Smithson Tennant (1761-1815) in the black residue that remained after crude platinum was dissolved in aqua regia. The average abundance in Earth's crust is very low, about 0.005 grams (0.00018 ounces) per metric ton, and only four osmium-containing minerals, all extremely rare, are known: erlichmanite, OsS₂; omeiite, (Os,Ru)As₂; and osarsite and anduoite, (Os,Ru)AsS. Osmium also occurs in natural **alloys** with iridium and/or ruthenium (*e.g.*, iridosmium). Osmium is obtained as a by-product of refining nickel and the more common platinum group **metals**. Worldwide production is very small, approximately 500 kilograms (1,100 pounds) per year (versus 2,500,000 kilograms, or 5,500,000 pounds, per year for gold). Despite its rarity, osmium is only 30 percent more expensive than gold because it has few commercial uses. Osmium metal is lustrous, bluish-white, hard, and brittle; it melts at 3,127°C (5,661°F) and boils at 5,303°C (9,577°F). It is the densest element known: Its density is 22.59 grams (0.797 ounces) per cubic centimeter (twice that of lead). Osmium is combined with other platinum group elements to yield extremely hard alloys, which find limited use as electrical contacts, wear-resistant instrument pivots and bearings, and tips for high-priced ink pens. Osmium forms compounds in all of its **oxidation** states, from +8 to -2. Its chemistry closely resembles that of ruthenium. The most important compound is osmium tetroxide, OsO₄, a pale yellow solid used as a stain in microscopy, in fingerprint detection, and as a **catalyst** in the production of some pharmaceuticals. Osmium tetroxide has an unpleasant chlorinelike odor, which prompted Tennant to name the element using the Greek word *osme*, "a smell."

alloy: mixture of two or more elements, at least one of which is a metal

metal: element or other substance the solid phase of which is characterized by high thermal and electrical conductivities

oxidation: process that involves the loss of electrons (or the addition of an oxygen atom)

catalyst: substance that aids in a reaction while retaining its own chemical identity

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Bibliography

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Internet Resources

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