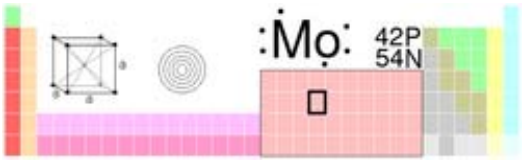
Molybdenum



Molybdenum (pronounced /məˈlɪbdənəm/, from the Greek meaning "lead-like"), is a Group 6 chemical element with the symbol Mo and atomic number 42. It has the sixth-highest melting point of any element, and for this reason it is often used in high-strength steel alloys. Molybdenum is found in trace amounts in plants and animals, although excess molybdenum can be toxic in some animals. Molybdenum was discovered in 1778 by Carl Wilhelm Scheele and first isolated in 1781 by Peter Jacob Hjelm.

Characteristics

Molybdenum is a transition metal with an electronegativity of 1.8 on the Pauling scale and an atomic mass of 95.9 g/mole.It does not react with oxygen or water at room temperature. At elevated temperatures, molybdenum trioxide is formed in the reaction $2Mo + 3O2 \rightarrow 2MoO3$.

In its pure metal form, molybdenum is silvery white with a Mohs hardness of 5.5, though it is somewhat more ductile than tungsten. It has a melting point of 2623°C, and only tantalum, osmium, rhenium, and tungsten have higher melting points.Molybdenum burns only at temperatures above 600°C. It also has the lowest heating expansion of any commercially used metal.

Applications

The ability of molybdenum to withstand extreme temperatures without significantly expanding or softening makes it useful in applications that involve intense heat, including the manufacture of aircraft parts, electrical contacts, industrial motors, and filaments.Molybdenum is also used in alloys for its high corrosion resistance and weldability.Most high-strength steel alloys are .25% to 8% molybdenum.Despite being used in such small portions, more than 43 million kg of molybdenum is used as an alloying agent each year in stainless steels, tool steels, cast irons, and high-temperature superalloys.

Because of its lower density and more stable price, molybdenum is implemented in the place of tungsten. Molybdenum can be implemented both as an alloying agent and as a flame-resistant coating for other metals. Although its melting point is 2623 °C, molybdenum rapidly oxidizes at temperatures above 760 °C, making it better-suited for use in vacuum environments.

Molybdenum 99 is used as a parent radioisotope to the radioisotope Technetium 99, which is used in many medical procedures

Molybdenum disulfide (MoS2) is used as a lubricant and an agent. It forms strong films on metallic surfaces, and is highly resistant to both extreme temperatures and high pressure, and for this reason, it is a common additive to engine motor oil; in case of a catastrophic failure, the thin layer of molybdenum prevents metal-on-metal contact. Lead molybdate co-precipitated with lead chromate and lead sulfate is a bright-orange pigment used with ceramics and plastics.Molybdenum trioxide (MoO3) is used as an adhesive between enamels and metals. Molybdenum powder is used as a fertilizer for some plants, such as cauliflower.

Also used in NO, NO2, NOx analyzers in power plants for pollution controls. At 350 °C the element acts as a catalyst for NO2/NOx to form only NO molecules for consistent readings by infrared light.