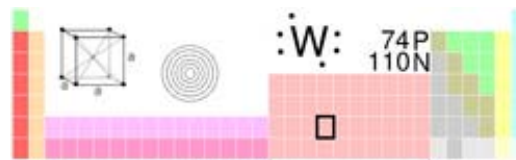


Tungsten

Tungsten (pronounced /ˈtʌŋstən/), also known as wolfram (/ˈwʊlfrəm/), is a chemical element that has the symbol W and atomic number 74.



Characteristics

A steel-gray metal, tungsten is found in several ores, including wolframite and scheelite. It is remarkable for its robust physical properties, especially the fact that it has the highest melting point of all the non-alloyed metals and the second highest of all the elements after carbon. Tungsten is often brittle and hard to work in its raw state; however, if pure, it can be cut with a hacksaw. The pure form is used mainly in electrical applications, but its many compounds and alloys are used in many applications, most notably in light bulb filaments, X-ray tubes (as both the filament and target), and superalloys. Tungsten is also the only metal from the third transition series that is known to occur in biomolecules.

Applications

Because of its ability to produce hardness at high temperatures and its high melting point (the second highest of any known element), elemental tungsten is used in many high-temperature applications. These include light bulb, cathode-ray tube, and vacuum tube filaments, as well as heating elements and nozzles on rocket engines. The high melting point also makes tungsten suitable for aerospace and high temperature uses which include electrical, heating, and welding applications, notably in the gas tungsten arc welding process (also called TIG welding).

Due to its conductive properties, as well as its relative chemical inertia, tungsten is also used in electrodes, and in the emitter tips of field emission electron-beam instruments, such as focused ion beam (FIB) and electron microscopes. In electronics, tungsten is used as an interconnect material in integrated circuits, between the silicon dioxide dielectric material and the transistors. Additionally, it is used in the manufacture of metallic films, which replace the wiring used in conventional electronics with a coat of tungsten (or molybdenum) on silicon.[14]

Tungsten chemical compounds are used in catalysts, inorganic pigments (e.g. tungsten oxides), and also as high-temperature lubricants (tungsten disulfide). Tungsten carbide (WC) is used to make wear-resistant abrasives and cutters and knives for drills, circular saws, milling and turning tools used by the metalworking, woodworking, mining, petroleum and construction industries. Tungsten oxides are used in ceramic glazes and calcium/magnesium tungstates are used widely in fluorescent lighting. Crystal tungstates are used as scintillation detectors in nuclear physics and nuclear medicine. Other salts that contain tungsten are used in the chemical and tanning industries.