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Tungsten

Tungsten, symbol W (from the earlier name, wolfram), metallic element that has the highest melting point of any metal. Tungsten is one of the [transition elements](#) of the periodic table (see [Periodic Law](#)). The atomic number of tungsten is 74.

Some credit the Swedish chemist [Carl Wilhelm Scheele](#) with the discovery of tungsten in 1781, while others name the Spanish D'Elhuyar brothers Juan José and Fausto as its discoverers, in 1783 .

Pure tungsten is silver-white in color and is ductile; the more easily obtained impure form is steel-gray and is hard and brittle.

Tungsten is insoluble in hot and cold water and in alcohol, slightly soluble in ammonia and nitric acid, and soluble in hot, concentrated potassium hydroxide. Tungsten melts at about 3410° C (6170° F), boils at about 5660° C (10,220° F), and has a specific gravity of 19.5. The atomic weight of tungsten is 183.85.

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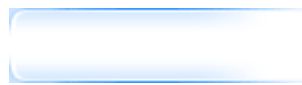
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Tungsten ranks 57th in abundance among the elements in the crust of the earth. It is never found free in nature, but occurs in combination with other metals, notably in the minerals [scheelite](#) and [wolframite](#), which are the important tungsten ores. Mines in South Korea, Portugal, Austria, and Australia produce more than half of the world's supply of these ores.

To separate the element from its ore, the ore is first fused with sodium carbonate to yield sodium tungstate, Na_2WO_4 . The soluble sodium tungstate is then extracted with hot water and treated with hydrochloric acid to yield tungstic acid, H_2WO_4 . The latter compound is washed and dried to produce the oxide WO_3 , which is reduced by hydrogen in an electric furnace. The resulting fine powder is reheated in molds in an atmosphere of hydrogen and pressed into bars, which are hammered and rolled at high temperature to compact them and make them ductile.

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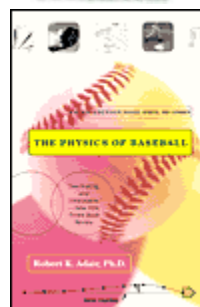


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The principal uses of tungsten are as filaments in incandescent lamps, as [wires](#) in electric furnaces, and in the production of hard, tenacious [alloys](#) of steel. It is used also in the manufacture of spark plugs, electrical contact points, and cutting tools, and as a target in X-ray tubes.

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