

Vanadium

Vanadium is a [chemical element](#) with the [symbol](#) **V** and [atomic number](#) 23. It is a hard, silvery-grey, [malleable transition metal](#). The elemental metal is rarely found in nature, but once isolated artificially, the formation of an [oxide](#) layer ([passivation](#)) somewhat stabilizes the free metal against further [oxidation](#).

[Andrés Manuel del Río](#) discovered compounds of vanadium in 1801 in [Mexico](#) by analyzing a new [lead](#)-bearing mineral he called "brown lead". Though he initially presumed its qualities were due to the presence of a new element, he was later erroneously convinced that the element was just [chromium](#). Then in 1830, [Nils Gabriel Sefström](#) generated [chlorides](#) of vanadium, thus proving there was a new element, and named it "vanadium" after the Scandinavian goddess of beauty and fertility, Vanadís (Freyja). The name was based on the wide range of colors found in vanadium compounds. Del Rio's lead mineral was ultimately named [vanadinite](#) for its vanadium content. In 1867 [Henry Enfield Roscoe](#) obtained the pure element.

Vanadium occurs naturally in about 65 [minerals](#) and in [fossil fuel](#) deposits. It is produced in [China](#) and [Russia](#) from steel smelter [slag](#). Other countries produce it either from magnetite directly, flue dust of heavy oil, or as a byproduct of [uranium](#) mining. It is mainly used to produce specialty [steel alloys](#) such as [high-speed tool steels](#), and some [aluminium alloys](#). The most important industrial vanadium compound, [vanadium pentoxide](#), is used as a catalyst for the production of [sulfuric acid](#). The [vanadium redox battery](#) for energy storage may be an important application in the future.

Large amounts of vanadium [ions](#) are found in a few organisms, possibly as a [toxin](#). The oxide and some other salts of vanadium have moderate toxicity. Particularly in the ocean, vanadium is used by some life forms as an active center of [enzymes](#), such as the [vanadium bromoperoxidase](#) of some ocean [algae](#).