

*** Name Origin:**

Greek: titanos (Titans).

*** Sources:**

Usually occurs in the minerals ilmenite (FeTiO_3) or rutile (TiO_2). Also in Titaniferous magnetite, titanite (CaTiSiO_5), and iron ores.

*** Uses:**

Since it is strong and resists acids it is used in many alloys. Titanium dioxide (TiO_2), a white pigment that covers surfaces very well, is used in paint, rubber, paper and many other materials. Also used in heat exchangers, airplane motors, bone pins and other things requiring light weight metals or metals that resist corrosion or high temperatures. Titanium oxide is used extensively in paints.

*** Additional Notes:**

Discovered by Gregor in 1791; named by Klaproth in 1795. Impure titanium was prepared by Nilson and Pettersson in 1887; however, the pure metal (99.9%) was not made until 1910 by Hunter by heating TiCl_4 with sodium in a steel bomb. Titanium is present in meteorites and in the sun. Rocks obtained during the Apollo 17 lunar mission showed presence of 12.1% TiO_2 . Analyses of rocks obtained during earlier Apollo missions show lower percentages. Titanium oxide bands are prominent in the spectra of M-type stars. The element is the ninth most abundant in the crust of the earth. Titanium is almost always present in igneous rocks and in the sediments derived from them. It occurs in the minerals rutile, ilmenite, and sphene, and is present in titanates and in many iron ores. Deposits of ilmenite and rutile are found in Florida, California, Tennessee, New York, and elsewhere. Titanium is present in the ash of coal, in plants, and in the human body. The metal was a laboratory curiosity until Kroll, in 1946, showed that titanium could be produced commercially by reducing titanium tetrachloride with magnesium. This method is largely used for producing the metal today. The metal can be purified by decomposing the iodide. Titanium, when pure, is a lustrous, white metal. It has a low density, good strength, is easily fabricated, and has excellent corrosion resistance. It is ductile only when it is free of oxygen. The metal burns in air and is the only element that burns in nitrogen. Titanium is resistant to dilute sulfuric and hydrochloric acid, most organic acids, moist chlorine gas, and chloride solutions. Natural titanium consists of five isotopes with atomic masses from 46 to 50. All are stable. Fifteen other unstable isotopes are known. The metal is dimorphic. The hexagonal a form changes to the cubic b form very slowly at about 880°C . The metal combines with oxygen at red heat, and with chlorine at 550°C . Titanium is important as an alloying agent with aluminum, molybdenum, manganese, iron, and other metals. Alloys of titanium are principally used for aircraft and missiles where lightweight strength and ability to withstand extremes of temperature are important. Titanium is as strong as steel, but 45% lighter. It is 60% heavier than aluminum, but twice as strong. Titanium has potential use in desalination plants for converting sea water into fresh water. The metal has excellent resistance to sea water and is used for propeller shafts, rigging, and other parts of ships exposed to salt water. A titanium anode coated with platinum has been used to provide cathodic protection from corrosion by salt water. Titanium metal is

considered to be physiologically inert; however, titanium powder may be a carcinogenic hazard. When pure, titanium dioxide is relatively clear and has an extremely high index of refraction with an optical dispersion higher than diamond. It is produced artificially for use as a gemstone, but it is relatively soft. Star sapphires and rubies exhibit their asterism as a result of the presence of TiO_2 . Titanium dioxide is extensively used for both house paint and artist's paint, as it is permanent and has good covering power. Titanium oxide pigment accounts for the largest use of the element. Titanium paint is an excellent reflector of infrared, and is extensively used in solar observatories where heat causes poor seeing conditions. Titanium tetrachloride is used to iridize glass. This compound fumes strongly in air and has been used to produce smoke screens. It is the ninth most abundant element in the earth's crust and is also found in meteorites and in the sun. It is found in the ash of coal, in plants and even in the human body. It occurs in the minerals rutile, ilmenite and sphene. As a compound, it is found as Titanium dioxide TiO_2 in star sapphires and rubies (it is TiO_2 that gives them their asterism). It is also found as titanium chloride (TiCl_4).