



DIANE FOSTER

# TITANIUM

Element Symbol: **Ti**

Atomic Number: **22**

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International Year of  
**CHEMISTRY**  
**2011**



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Occasionally described as the “space age metal” and was originally named as “Gregorite”, after its British discoverer, William Gregor.

In 1791, William Gregor, an amateur Geologist and pastor in Cornwall United Kingdom found black sand by a stream in the nearby parish of Manaccan and noticed the sand was attracted by a magnet. On analysis it was found that the sand contained iron oxide and an unidentified white metallic oxide which did not match the properties of any known element. He reported his discovery to the Royal Geological Society of Cornwall and in the German Science journal Crell's Annalen.

In 1795 a German Chemist by the name of Martin Heinrich Klaproth independently rediscovered it in the ore rutile ( $\text{TiO}_2$ ) He found that it contained a new element and named it for the “Titans” of Greek mythology. In 1887 impure Titanium was prepared by Nilson & Petterson. In 1910 pure metallic Titanium (99.9%) was first prepared by Matthew Hunter at Rensselaer Polytechnic Institut, who heated  $\text{TiCl}_4$  together with sodium in a steel bomb at 700-800 °C.

In the 1950s and 1960s the Soviet Union established the use of titanium in military and submarine applications. The American Department of Defense recognized the importance of the metal and supported early efforts of commercialization.

Titanium is a low density, strong, lustrous, corrosion resistant metal with silver color. It is the ninth most abundant element on the planet. It is found in almost all living things, rocks, water bodies and soils. It occurs in nature only in chemical combinations, the most common of which are oxygen and iron.

The major source of Titanium is black “beach sand” commonly seen in our beaches. Beach sands are a mixture of compounds, one of which can be rutile. Australia has the world's biggest deposits of these titanium ores. The metal is extracted from its primary mineral ores using the Kroll process or Hunter process. Upon isolation and purification it becomes the brilliant white pigment titanium dioxide, used in paint, paper making and plastics.

Titanium can be alloyed with aluminum, iron, vanadium, molybdenum to produce strong lightweight alloys for aerospace like jet engines, missiles and spacecraft. The most broadly used titanium alloy, Ti-6Al-4V, is present in forty-five percent of industrial applications. Ti-6Al-4V has developed into the standard alloy against which other alloys are compared in the course of selecting a titanium alloy for a particular application.

Titanium metal is used in automobile industry or motorcycle racing, where weight reduction is important whilst maintaining great strength and rigidity. These properties result in titanium being used in eyeglass frames and numerous sports equipment.

Titanium is used in surgical implements and implants since it is non toxic and is not rejected by the body. Examples are hip balls and sockets that can stay in place for up to 20 years.

*Provided by the element sponsor sponsor Katherine Hizu*

## ARTISTS DESCRIPTION

I was reminded of some beautiful ear-rings I had many years ago, extremely lightweight and shimmering with all the colours of the rainbow. It is a hard transition metal, used in strong, light, corrosive resistant alloys. It is a common element in the earth's crust and is sourced from ilmenite and rutile. Titanium dioxide is manufactured for use as a white pigment in paper and paint. (memories of the tioxide factory at Blythe Heads near Burnie and its drastic effects on the environment). Because of its properties it is also used widely in prosthetics, dentistry, aircraft engines, fireworks and much more.

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