TINA CURTIS

NIOBIUM

Element Symbol: Nb
Atomic Number: 41

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The discovery of niobium was so nice they found it twice!!

Charles Hatchett a chemist working at the British Museum discovered a new element in a sample of mineral called columbite in 1801. He called it columbium. The mineral columbite was originally found in New England, USA and was named in honour of Christopher Columbus. William Hyde Wollaston the discoverer of palladium and rhodium later in 1809 said (essentially) 'oh no you didn't' and claimed columbium was the same as tantalum to which it is very similar. Since he had a bit of clout or credibility he was believed. It wasn't until 1846 that the German chemist Heinrich Rose said there was another element found along with tantalum in various ores. He decided to call it niobium. The name niobum comes from Greek mythology where Niobe was the daughter of Tantalus. The mess was finally cleared up in 1864/5 when it was proved columbium was niobium. Both names were used for many years. The Americas stuck with Columbium while Europe called it Niobium. In 1949 it was finally decided that niobium would be the official name as the Greek mythological names were seen as more appropriate.

Niobium is mostly found in ores with iron, manganese and tantalum as columbite or tantalite. In early December 2008 Talison Minerals suspended mining at the world's largest tantalum operations at Wodgina, WA, because of the fall in demand for tantalum metal. Other sources are ores rich in zirconum e.g. the Dubbo Zirconia Project (DZP) in New South Wales is one of the world's most advanced developments for zirconium, niobium, yttrium and rare earths. Most niobium (90%) is used for making high grade steel where just a little, often less than 0.1%, goes a long way. It forms a microalloy which changes the grain and crystallization improving toughness strength, shaping and welding properties of stainless steels. This finds many uses in structural components for cars and pipeline steels.
Niobium is also used to make some superalloys with high temperature strength and creep resistance vital for jet engines and other turbines such as gas compressors in natural gas production where corrosion resistance is needed from the acid gases H_2S and CO_2.

Other more exotic uses included the thruster nozzles on the Apollo lunar modules which were an alloy of niobium-halfnium-titanium (89% Nb 10% Hf 1% Ti) along with many other alloys used for aerospace applications. Superconducting magnet alloys of niobium-germanium (Nb_3Ge), niobium-tin (Nb_3Sn) or niobium-titanium used for magnetic resonance imaging (MRI) and other nuclear magnetic resonance (NMR) and even particle accelerators such as the Large Hadron Collider (LHC).

Niobium has also found use in free electron lasers for medical and weapons systems and thermal and radioastronomy detectors. Lithium niobate is a ferroelectric material and is used in mobile phones as tuneable capacitors. Niobium is also added to optical glass giving it a high refractive index allowing corrective lenses to be thinner. Medical devices such as pacemakers etc. make use of the hypoallergenic nature of some niobium and some niobium alloys. Porous layers can be used to allow ossointegration. Jewellers have also made use of the hypoallergenic properties and with some creative anodising to produce a variety of colours through diffraction of light via control of the oxide layer thickness.

Provided by the element sponsor Stephen Boonstoppel

ARTISTS DESCRIPTION

The naming of the element Niobium is related to its neighbour below it on the periodic table, Tantalum. Tantalum was named after Tantalus, a Greek god, because isolating the pure metal tantalised chemists. When a similar new element was 'discovered' by a German chemist in 1846, he named it Niobium after Niobe, the daughter of Tantalus. In Greek mythology she is portrayed weeping. In America they had an element already with similar properties which they called Columbium. In 1864 it was proved Columbium and Niobium were in fact the same. For nearly 90 years both names were used, Columbium in America and Niobium in Europe, but in 1949 it was finally decided that Niobium would be the official name. The colours chosen for the print are the sorts of blues and purples that jewellers get when they anodise Niobium, creating hypoallergenic jewellery with distinctive iridescent hues.

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