



Paint contains titanium dioxide

Unlike most other metals you are probably familiar with, such as iron or copper, titanium is a relatively 'modern metal', in that it was not produced commercially until the 1940s. However, in a relatively short time, titanium has come to be used for many different and important purposes.

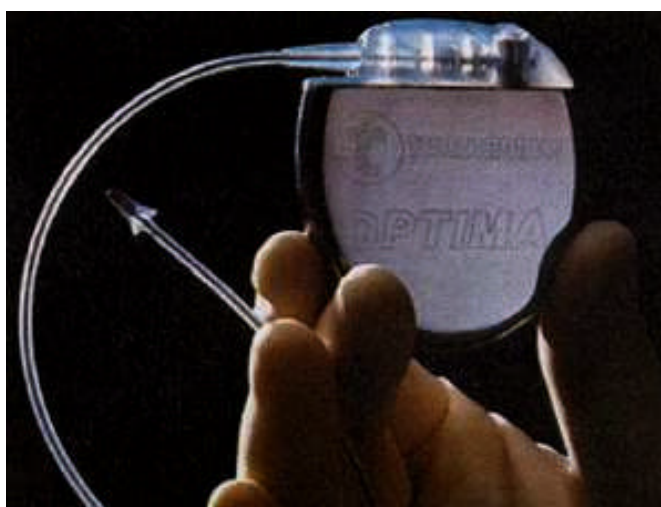
Unless you have a heart pacemaker, fly in a fast plane like the Concorde, or play a sport that uses titanium-based equipment, your most likely contact is not with titanium metal but with titanium dioxide - in paints, paper or sunscreen, or when you've eaten any food with colouring, like Smarties!

PROPERTIES

- Titanium is lightweight, strong and corrosion-resistant.
- Titanium is a silver-white metal.
- Pure titanium is quite soft but titanium alloys are extremely strong (even stronger than steel and aluminium).
- Titanium has a very high melting point (1660°C).
- Titanium is non-toxic.
- Titanium was named in 1795 by a German chemist, after the Titans of Greek mythology who were very strong. Its symbol is Ti.
- Titanium dioxide is one of the whitest, brightest substances known. It is non-toxic. It also provides protection from UV rays.

USES

USE	DESCRIPTION
Titanium metal	Titanium's light weight, combined with great strength, rust resistance and very high melting point make it ideal for use in aircraft engines, spacecraft, missiles, cars, sports equipment (such as racing yacht parts, golf clubs, tennis racquets and bike frames), wrist watches, underwater craft, and general industrial equipment. Its non-toxicity also makes it useful for surgical implants such as pacemakers, artificial joints and bone pins. Titanium is also used to manufacture chlorine.
Titanium dioxide	As this is such a white pigment, and its reflective properties add richness/brightness to colours, and it provides UV protection , titanium dioxide is used in paints (replacing the use of lead), lacquers, paper, plastics, ink, rubber, textiles, cosmetics, sunscreens, leather, food colouring, and ceramics. It is also used as a coating on welding rods.
Titanium tetrachloride	This compound fumes in moist air, making a dense white smoke, so is used for smokescreens and skywriting.



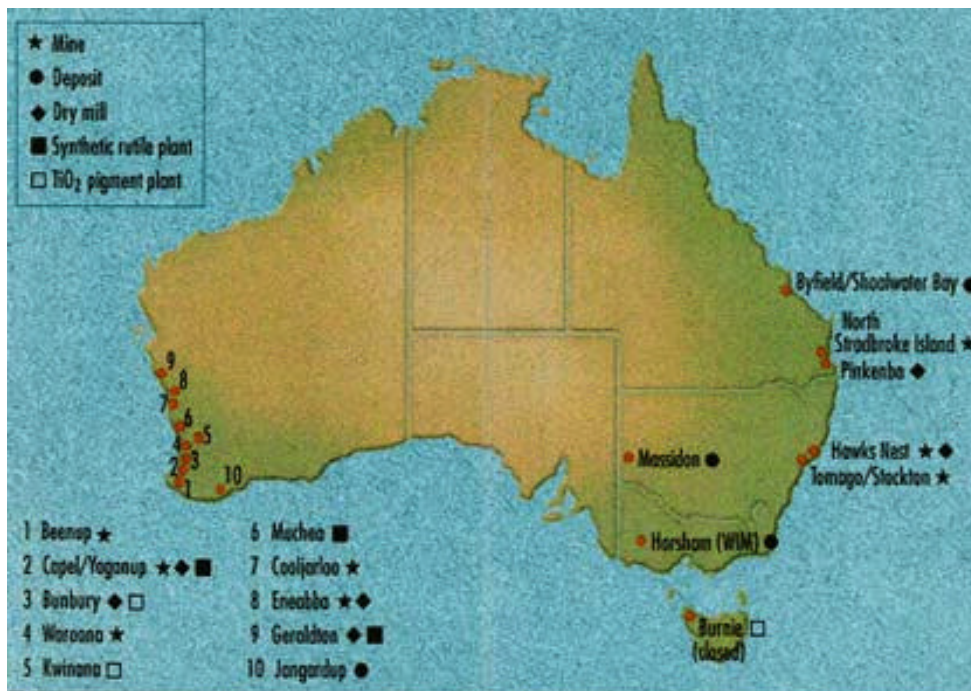
Heart Pacemaker

SOURCE

Titanium metal and titanium dioxide are obtained from ores (such as rutile and ilmenite) described as 'mineral sands', usually found in beaches and dunes on the east and west coasts of Australia. Many of our beaches are unavailable for mining, however Australia is still a leader in the production of titanium, mining about half of the world's titanium needs.

Although mineral sand deposits were noticed back in 1870, sands were first mined in Australia as late as the 1930s at Byron Bay on the north coast of New South Wales. Today, Western Australia is the largest producer. To mine for these minerals, sands are dredged through a large suction pipe, and the heavy minerals are separated out from the lighter sand particles. As the dredge moves slowly forward, the clean sand tailings are pumped back to fill the mined area again.

The mined minerals are sent to mills to be separated from one another using electrical and magnetic techniques. To obtain pure, white titanium dioxide, the minerals are reacted with chlorine then burned in oxygen. Producing pure titanium metal is only done overseas, where mineral sands are reacted with other chemicals and then heated.



Location of Main Titanium Mineral Mining Operations

AMAZING FACTS

- Military aircraft, such as the Lockheed Blackbird, contain 85% titanium and are able to fly at three times the speed of sound!
- Titanium has been used to reinforce the ancient Parthenon in Greece, and the deck beams of the salvaged remains of the warship the *Mary Rose*, which sank with 700 men on board in 1545.
- If humans continue to explore space, then titanium is likely to be needed in increasing amounts for the rocket engines, pressure vessels and structural parts of space vehicles.
- If you want to know when you're eating titanium dioxide, look out for food colouring number 171 on the packet.

FOR FURTHER INFORMATION

- Fact Sheet: Mineral Sands, Minerals Council of Australia and Australian Geological Survey Organization, 1999
- Mineral Sands, Minerals of Western Australia Series #7, The Chamber of Minerals and Energy of WA Inc.
- www.agso.gov.au/education/factsheet/