Titanium Metal (Ti) / Sponge / Titanium Powder

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Description

Present in meteorites and in the sun, titanium is the ninth most abundant element in the earth's crust. It is found in almost all igneous rocks, in the ash of coal, in plants, and in the human body, Pure titanium is a silvery-white, lustrous metal with low density and good strength.

In powder form, it is dark gray, titanium is as strong as steel with only 45% of its weight, so when combined with other metals, it greatly improves the strength and the ability to withstand extremes of temperature.

Titanium sponge is a porous, brittle form of titanium, a highly ductile metal which has a high strength-to-weight ratio. Titanium has low thermal and electrical conductivity and is one of the most corrosion-resistant structural metals.

Sponge is an intermediate product used to produce titanium ingot, which in turn is used to make slab, billet, bar, plate, sheet, and other titanium mill products.

Chemical Name: Titanium

Chemical Formula: Ti

Synonyms

titanium sponge, Ti, titanium powder, Ti-6Al-4V powder, titanium metal, spherical titanium powder, titanium plate, CAS#7440-32-6, titanium wire, titanium rod, titanium granules, titanium slug, titanium foil, titanium sputtering target, titanium gauze, titanium tablets,

Chemical Properties

93%, 99.7%, 99%, 99+%, 99.99%, 99.995%, and 99.999%, Ti-6Al-4V

Physical Properties

a) Slug, target, granules, sponge, tablets, powder, foil, and wire

b) Spherical, irregular

Typical Applications

a) Constituent in pyrotechnic fuses and combustible compositions, photographic/ignition pastes, glass to metal or ceramic to metal joining material, gas turbine engines, intermetallic compositions, ship structures, pumps. deep-sea submersibles, condensers, airframes, water-jet propulsion systems, weapons, systems, flue gas desulphurization, steam turbines, fan blades, piping systems, compressor discs, heat exchangers, wing structures, vessels, tanks, agitators, eyeglass frames, medical implants, nuclear waste storage, valves, springs, connecting rods, jewelry and sports equipment.

b) Because of its high strength-to-weight ratio, titanium and its alloys are widely used in both aerospace and non-aerospace applications.

1) Aerospace applications include: use in gas turbine engines for both military and commercial aircraft (where use of titanium results in reduced engine weight while maintaining strength), airframes, and in various applications in missiles and space vehicles. In most aircraft engines, titanium-based alloy parts account for 20-30 percent of engine weight.

2) Due to their high tensile strength to density ratio, high corrosion resistance, and ability to withstand moderately high temperatures without creeping, titanium alloys are used in aircraft, armor plating, naval ships, spacecraft, and missiles. For these applications titanium alloyed with aluminium, vanadium, and other elements is used for a variety of components including critical structural parts, fire walls, landing gear, exhaust ducts (helicopters), and hydraulic systems. In fact, about two thirds of all titanium metal produced is used in aircraft engines and frames.

3) The SR-71 "Blackbird" was one of the first aircraft to make extensive use of titanium within its structure, paving the way for its use in modern military and commercial aircraft. An estimated 59 metric tons (130,000 pounds) are used in the Boeing 777, 45 in the Boeing 747, 18 in the Boeing 737, 32 in the Airbus A340, 18 in the Airbus A330, and 12 in the Airbus A320. The Airbus A380 may use 146 metric tons, including about 26 tons in the engines. In engine applications, titanium is used for rotors, compressor blades, hydraulic system components, and nacelles. The titanium 6AL-4V alloy accounts for almost 50% of all alloys used in aircraft applications.

c) Non-aerospace applications include: use in specialty chemical, pulp and paper, oil and gas, marine, medical, and consumer goods industries.

d) Titanium Alloy Powder Medical Applications:

i) Titanium and its alloys are used extensively for coating the surface of implantable medical devices to accelerate bone growth and the healing process.

ii) Titanium and its alloys have become very popular materials because of their low density, high corrosion resistance and excellent mechanical properties (Randall and Animesh, 1997; Liu et al., 2005). Today also the usefulness of titanium for medical implants, for exclusive sporting gears and also for jewelry is recognized. Titanium parts are still expensive not only because of high raw materials prices but also because of difficulty forming, machining and welding. This is why the near net shape forming of titanium is very advantageous. Metal Injection Molding (MIM) as a near net shape process for high production number of small intricate parts is a desirable alternative (Rack and Qazi, 2005).

iii) In the MIM process, the binder is a key component, which provides the powder with the flowability and formability necessary for molding even though it is temporary (Scott Weil et al., 2006). The binder systems that commonly used for injection molding technique were based on thermoplastic materials (Krauss et al., 2007; Witari et al., 2004). In this study, the palm oil derivative which is palm stearin has been formulated and evaluated as a possible alternative binder system. The reason for using palm stearin as a binder system is due to its contents that can be advantages during debinding process. It is important that the removal of binder be performed gradually to maintain the shape of the debound part. At different heating temperature, the binder melts leaving different impurities at different melting point. The remaining impurities help forming capillary holes for the removal of the rest of the binder material. Therefore, the selection of palm stearin as a possible alternative binder system fulfills the important criteria of a binder system in PIM process as its components exhibit various melting points.

Packaging

Drums

Specifications

Atomic Number	22
Molecular Weight (g/mol.)	47.90
Apparent Density (g/cm3)	4.507
Magnetic Ordering	paramagnetic
Specific Heat @25°C (cal/g-°C)	.1386
Melting Point (°C)	1668
Boiling Point (°C)	3260
Thermal Conductivity (cal/s-cm°C)	9.41
Mohs Hardness	6.0
Poisson Ratio	0.32
Crystallography	hexagonal structure

Classification

Titanium Metal (Ti) / Sponge / Powder TSCA (SARA Title III) Status: Listed. For further information please call the E.P.A. at 202.554.1404

Titanium Metal (Ti) / Sponge / Powder Chemical Abstract Service Number: CAS# 7440-32-6

Titanium Metal (Ti) / Sponge / Powder UN Number: 1352 (hydrated powder) / 2546 (powder) / 1871 (hydrided powder) / 2878 (sponge)

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