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Titanium atomic number

Avaleht Selle saidi Kommentaarid AbiInfo Viited Window Version Näita tabel: Nimi Atomic Number Atomic Mass Electron Konfiguratsiooni number Neutrons Sulamistemperatuur Keemistemperatuur Kuupäev Discovery Crystal struktuur Element Grupid: leelismetallid Leelismetallid Seelismetallid Siirdemetallid Muud metallid Metalloids Mitte-Metallid Halogeengaasid Haruldased muldmetallid Keemiline element aatomarvuga 22 See artikkel on umbes keemiline element. Teiste kasutusviiside kohta vaata titaanium (täpsustus). Chemical element with atomic number 22Titanium, 22TiTitaaniumPronunciation/tɪˈteɪniəm, taɪ-/[1] (ti-TAY-nee-əm, ty-)Appearancesilvery grey-white metallicStandard atomic weight Ar, std(Ti)47.867(1)[2]Titanium in the periodic table Hydrogen Helium Lithium Beryllium Boron Carbon Nitrogen Oxygen Fluorine Neon Sodium Magnesium Aluminium Silicon Phosphorus Sulfur Chlorine Argon Potassium Calcium Scandium Titanium Vanadium Chromium Manganese Iron Cobalt Nickel Copper Zinc Gallium Germanium Arsenic Selenium Bromine Krypton Rubidium Strontium Yttrium Zirconium Niobium Molybdenum Technetium Ruthenium Rhodium Palladium Silver Cadmium Indium Tin Antimony Tellurium Iodine Xenon Caesium Barium Lanthanum Cerium Praseodymium Neodymium Promethium Samarium Europium Gadolinium Terbium Dysprosium Holmium Erbium Thulium Ytterbium Lutetium Hafnium Tantalum Tungsten Rhenium Osmium Iridium Platinum Gold Mercury (element) Thallium Lead Bismuth Polonium Astatine Radon Francium Radium Actinium Thorium Protactinium Uranium Neptunium Plutonium Americium Curium Berkelium Californium Einsteinium Fermium Mendelevium Nobelium Lawrencium Rutherfordium Dubnium Seaborgium Bohrium Hassium Meitnerium Darmstadtium Roentgenium Copernicium Nihonium Flerovium Moscovium Livermorium Tennessine Oganesson −↑Ti↓Zr scandium ← titanium → vanadium Atomic number (Z)22Groupgroup 4Perioderiod 4 Blockd-block Elemendi kategooria Üleminek metallElektronkonfiguratsioon[Ar] 3d2 4s2Elektronid kesta kohta2, 8, 10, 2Füüsikalised omadusedFaas STPsolidMeltingi punktis1941 K (1668 °C, 3034 °F) Keetmispunkt3560 K (3287 °C, 5949 °F) Tihedus (peaaegu r.t.) 4.506 g/cm3, kui vedelik (m.p.) 4.11 g/cm3 Termotuumasünteesi15 kJ/mol Aurustumise kuumus425 kJ/mol Molaarne soojusvõimsus25.060 J/(mol·K) AururõhkP (Pa) 1 10 100 1 k 10 k 100 k T (K) 1982 2171 (2403) 2692 3064 3558 Atomic propertiesOksüdatsiooni olekud−2, −1, 0,[3] +1, +2, +3, +4[4] (amfoteerilisele oksiid)ElektronegativityPauling skaala: 1.54 Ionization energies1st: 658.8 kJ/mol 2nd: 1309,8 kJ/mol 3rd: 2652,5 kJ/mol (rohkem) Aatomiraadius: 147 pm Kovalentne raadius160±8pm Titaani spektrijoonedMuud omadusedLoomulik occurrenceprimordialCrystal struktuur kuusnurkne sulatatud 5090 m/s (r.t.) Heat expansion8,6 μm/(m·K) (at 25 °C) Thermal conductivity21,9 W/(m·K) Electrical resistance420 nΩ·m (at 20 °C) Magnetic magnetic susceptibility +153.2 00·10−6 cm3/mol (293 K)[5] Young module116 GPa shear module44 GPa Lahtisemodulus110 GPa Poisson ratio0,32 Mohs hardness6.0 Vickers hardness830-3420 MPa Brinell hardness716-2 770 MPa CAS number7440-32-6 HistoryDiscoveryWilliam Gregor (1791)First isolationJöns Jakob Berzelius (1825)Appointed Martin Heinrich Klaproth (1795)Half-life(t1/2) degradation mode of the isotope abundance Product 44Ti syn 6 3 y ε 44Sc γ – 46Ti 8.25% stable 47Ti 7.44% stable 48Ti 73.72% stable 49Ti 5.41% stable 50Ti 5.18% stable Category: Titaniumviewtalkedit | references Titanium is a chemical element with the symbol Ti and atomic number 22. It is a glossy transition from metal to silver color, low density, and high strength. Titanium is resistant to corrosion in seawater, aqua regia and chlorine. In 1791, Dane was discovered in Cornwall, Great Britain, by William Gregor and named after the titans of Greek mythology by Martin Heinrich Klaproth. The element is present in several deposits, mainly rutile and expression thread, which are widely distributed in the earth's crust and lithosphere; it is found in almost all living beings, as well as bodies of water, rocks and soil. [6] Kroll[7] and Hunter processes extract it from its main mineral ores. The most common compound, titanium dioxide, is a popular photocatalyst and is used in the manufacture of white pigments. [8] Other compounds include titaniumantetrachloride (TiCl4), component of smoke covers and catalysts; titanium trichloride (TiCl3) used as a catalyst for the production of polypropylene. [6] Titanium may be aluminum, vanadium and molybdenum, among other things, produce strong, light alloys in space (jet engines, rockets and spacecraft), military, industrial processes (chemicals and petrochemicals, de-ing plants, cellulose, and paper), automotive, agriculture (agriculture), medical prostheses, orthopaedic implants, dental and end-ofdontic instruments and files, dental implants, sports goods, jewelry, mobile phones and other applications. The two most useful properties of the metal are corrosion resistance and strength-density ratio, which is the highest of the metallic element. [9] In an unalloyed condition, titanium is as strong as some steels, but less dense. [10] For this element, there are two allotropic forms[11] and five naturally occurring isotopes, 46Ti to 50Ti, with 48Ti being the richest (73.8%). physical characteristics. Features Physical properties Such as metal, titanium is recognized for its high strength to weight ratio. [11] It is a strong low-density metal that is quite plastic (especially in an oxygen-free environment) [6] in a shiny and metallic-white color. [13] Relatively high melting point (above 1,650 °C or 3000 °F) makes it useful as fire-resistant metal. It is paramagnetic and has quite low electrical and thermal conductivity compared to other metals. Titanium sikkaan is superconductive when cooled below a critical temperature of 0.49 K.[14][15] Commercially pure (99.2% pure) titanium classes have a super tensile strength of about 434 MPa (63000 psi), which is equivalent to that of conventional, low-quality steel alloys but less dense. Titanium is 60% denser than aluminium, but more than twice as strong[10] as the most commonly used aluminium alloy 6061-T6. Certain titanium alloys (e.g. Beta C) achieve tensile strengths above 1400 MPa (200,000 psi). [16] However, titanium loses its strength when heated at a temperature above 430 °C [17]. it is not magnetic and bad conductivity. Mechanical treatment requires precautions, as the material can shine when not using sharp tools and correct cooling methods. Like steel structures, those made of titanium have a fatigue limit that ensures the longevity of some applications. [13] Metal is the dimorphic separation of hexagonal α forms, which becomes a body-centre β d cubic metre (grid) β at 882 °F [17 α]. [17] Chemical properties Titanium pourbaix diagram in pure water, perchloric acid or sodium hydroxide[18] Like aluminium and magnesium, titanium metal and its alloys oxidize immediately after exposure to air. Titanium reacts easily with oxygen at 1200 °C in air and at 610 °C in pure oxygen, forming titanium dioxide. [11] However, it is slow to react with water and air at ambient temperature because it forms a passive oxide coating that protects the bulk metal from further oxidation. [6] For the first forms, this protective layer is only 1 to 2 nm thick, but continues to grow slowly; thickness of 25 nm over a period of four years. [19] Atmospheric lability provides an excellent corrosion resistance of titanium, which is almost equivalent to platinum. Titanium is capable of withstanding the onslaught of diluted sulphuric acid and hydrochloric acid, chloride solutions and most organic acids. [7] However, titanium is corroded by concentrated acids. [20] As its negative redox shows, titanium is a thermodynamically highly reactive metal that burns in a normal atmosphere at lower temperatures melting point. Melting is only possible in an inerlter atmosphere or vacuum. At 550 °C (1,022 °F), it is connected to chlorine. [7] It also reacts with other halogens and absorbs hydrogen. [8] Titanium is one of the few elements that burns in pure nitrogen gas, reacting at 800 °C (1470 °F) to form a titanium nitride that causes elandisid. [21] Since titanium sublimation pumps are oxygen, nitrogen and some other gases due to their high reactivity, titanium filaments are used. Such pumps cheaply and reliably produce very low pressure ultra-high vacuum systems. The presence of titanium is the ninth most abundant element in the Earth's crust (0.63% by weight)[22] and the seventh most abundant metal. It is found as oxides in most rock, derived sediments, living creatures and natural water bodies. [6] [7] 784 of the 801 tardstone stones analyzed by the United States Geological Survey. It accounts for between 0.5% and 1.5% of soil. [22] The commonly used minerals containing titanium are anatase, brookite, expression thread, perovskite, rutile and titanium (sphene). [19] Akaogite is a very rare mineral consisting of titanium dioxide. These minerals are only economically important for rutile and ilmenite, but even they are difficult to find in high concentrations. In 2011, some 6.0 and 0.7 million tonnes respectively were extracted. [23] Western Australia, Canada, China, India, Mozambique, New Zealand, Norway, Sierra Leone, South Africa and Ukraine have significant titanium-bearing expressions of the thread deposits. In 2011, approximately 186,000 tonnes of titanium metal sponge were produced, mainly in China (60,000 t), Japan (56,000 t), Russia (40,000 tonnes), the United States (32,000 t) and Kazakhstan (20,700 t). Titan's total reserves are estimated to exceed 600 million tonnes. [23] 2011. 8.6 Mozambique 516 7.7 China 500 7.5 Vietnam 490 7.3 Ukraine 357 5.3 World 6700 100 Concentration of titanium is about 4 picomolar in the ocean. At 100 °C, the concentration of titanium in water at pH 7 is estimated to be less than 10 to 7 M. There is no evidence of biological role, although rare organisms are known to collect high concentrations of titanium. [24] Titanium is contained in meteorites and has been detected in the Sun and in type M stars[7] (the coolest type) with a surface temperature of 3200 °C (5790 °F). [25] Stones brought from the Moon during the Apollo 17 mission, rocks from the moon are 12.1% TiO2. [7] This also found in coal ash, plants and even in the human body. Native titanium (pure metallic) is very rare. [26] Isotopes Main article: The naturally occurring titanium titanium of titanium isotopes consists of five stable isotopes: 46Ti, 47Ti, 48Ti, 49Ti and 50Ti, with 48Ti being the most abundant (73.8% natural abundance). At least 21 radioisotopes have been characterised, the most stable of which are 44Ti with a half-life of 63 years; 45Ti, 184.8 minutes; 51St, 5.76 minutes; and 52T, 1.7 minutes. All other radioactive isotopes have a half-life of less than 33 seconds, with a majority of less than half a second. [12] Titanium isotopes with an atomic mass of between 39.002 u (39Ti) and 63.999 u (64Ti). [27] The main degradation mode of isotope as 46T is positron emission (except 44Ti, which passes through the electron grip) leading to the isotopes of the scandium, and the first mode of the isotope, which is heavier than 50 Ti, is a beta emission leading to the isotope of the ancient adium. [12] Titanium becomes radioactive when bombarded with deuteroni, mainly by eleating positrons and heavy gamma rays. [7] Compounds See also: Categories of Titanium compounds and Titanium minerals. The TiN-coated drill nozzle +4 in the oxidation state is dominated by titanium chemistry[28], but compounds +3 in the oxidation state are also common. Titanium usually adopts the geometry of the octahedral coordination in its complexes, but tetrahedral TiCl4 is a notable exception. Because titanium (IV) compounds have a high covalent bond in the gas. Unlike most other transition metals, simple aquo Ti(IV) complexes are unknown. Oxides, sulfides and alkoxides The most important oxide is TiO2, which exists in three important polymorphs; anatase, brookite and rutile. All of these are white diamagnetic solids, although mineral samples may appear dark (see rutile). They adopt polymeric structures where Ti is surrounded by six oxide ligands connecting other Ti centres. The term titanate usually refers to titanium compounds indicated by barium titanium (BaTiO3). With the structure of perovskite, this material has piezoelectric properties and is used as a given in the interversion of sound and electricity. [11] Many minerals are titanates, e.g. ilmenite (FeTiO3). Star sapphires and rubies get their asterism (star-forming brilliance) in the presence of titanium dioxide additives. [19] Titanium reduced oxides (suboxide) are known, mainly reduced titanium dioxide stoichiometry, which is obtained by atmospheric plasma spraying. Ti3O5, described as Ti(IV)-Ti(III), is a purple semiconductor produced by the reduction of TiO2 with hydrogen at high temperatures[30] and used industrially when surfaces are to evaporate with titanium dioxide: it evaporates as a pure TiO, while TiO2 evaporates with variable Index. [31] Ti2O3, the corundum structure, and TiO, is also known, although often non-snochiometric. [32] Titanium (IV) alkyxidees, made with alcohols, are dyed compounds that turn into dioxide when reacting with water. They are industrially beneficial through the solid TiO2 sol-gel process. Titanium sopropoxide is used in chemical synthesis in chiral by sharp epoxidation. Titanium forms a variety of sulphiids, but only TiS2 has attracted significant interest. It takes a layered structure and was used as a cathode for the development of lithium batteries. Because Ti(IV) is a hard cation, titanium sulphides are unstable and tend to hydrolyze oxide by release from hydrogen sulphide. Nitrides and carbides Titanium nitride (TiN) belongs to the genus refractory transitional metal nitrides and have characteristics similar to both covalent compounds, including; thermal stability, extreme hardness, thermal/electrical conductivity and high melting temperature. [33] The TiN hardness is equivalent to sapphire and carborundum (9.0 on the Mohs scale)[34] and is often used to cut cutting instruments such as drill pieces. [35] It is also used as a decorative finish for gold paint and as a barrier in the manufacture of semiconductors. [36] Titanium carbide, which is also very difficult, can be found in cutting tools and coatings. [37] Titanium (III) compounds are characteristic violet, as illustrated by the aqueous solution of titanium trichloride. Halides Titanium endchloride (titanium(IV) chloride, TiCl4[38]) is a colourless volatile liquid (commercial samples are yellowish) which hydrolysis in the air with the emission of spectacular white clouds. Through the Kroll process, TiCl4 is used to convert titanium ores from titanium to metal. Titanium tetrachloride is also used for titanium dioxide, e.g. in white paint. [39] It is widely used in organic chemistry as Lewisic acid, for example in the condensation of Mukaiyama aldol. [40] In the Van Arkel process, titanium nitrate (TiI4) is produced in the production of high purity titanium metal. Titanium(III) and titanium(II) also form stable chlorides. A notable example is titanium(III) chloride (TiCl3), which is used as a catalyst for the production of polyolefins (see Catalyst for Ziegler-Natta) and organic chemistry reducer. Organo organochlorine Due to the important role of organotitaan chemistry as a catalyst for polymerization, Ti-C bonds have been intensively studied. The most common organotitanium complex is titanium dioxide chloride ((C5H5)2TiCl2). Related compounds include tebbe reagent and Petasis reagent. Titanium forms carbonyl complexes, e.g. ((C5H5)2Ti(CO)2[41] Anticancer studies After the success of platinum-based chemotherapy complexes were the first non-platinum compounds to be tested for cancer treatment. Titanium compounds have the advantage of their high efficacy and low toxicity. In biological environments, hydrolysis leads to safe and inert titanium dioxide. Despite these benefits, the first candidate compounds were not able to obtain clinical trials. As a result of further development, potentially effective, selective and stable titanium-based drugs were created. [42] Their mechanism of action is not yet well understood. The history of Martin Heinrich Klaproth named the titans of Greek Mythology titan Titan discovered in 1791 by clergyman and amateur geologist William Gregor to add a mineral to Cornwall, United Kingdom. Gregor recognized the existence of a new element in the appearance[8] when he found black sand in the creek and noticed that the sand was flattered by the magnet. [43] In its analysis of sand, it identified the presence of two metal oxides: iron oxide (explanation of magnet extraction) and 45.25% of white metal oxide, which it could not identify. [22] Realising that the unidentified oxide contained metal that did not correspond to any known elements, Gregor reported his findings to the Royal Society of Geology in Cornwall and Crell's Annalen in the German scientific journal Crell's Annalen. [44] [45] At the same time Franz-Joseph Müller von Reichenstein produced a similar substance but could not detect it. In 1795, the Prussian chemist Martin Heinrich Klaproth independently rediscovered the oxide in Hungary (now Bojnický, Slovakia). [43] Klaproth found that it contained a new element and called it Greek mythology for the Titans. [25] After hearing about Gregor's earlier discovery, he received a sample of manackinide and confirmed that it contained titanium. The processes currently known to extract titanium from their various ores are laborious and costly; it is not possible to reduce ore by heating carbon (such as iron melting) because titanium combines carbon to produce titanium carbide. [43] Pure metallic titanium (99.9%) was first prepared in 1910 [7] Titanium metal was used outside the laboratory before 1932. Eight years later, he refined the process with magnesium and even sodium, which became known as the Kroll process. [48] Although studies continue on more efficient and cheaper processes (e.g. FFC Cambridge, Armstrong), the Kroll process is still used for commercial production. [7] [8] Titanium sponge made from the Kroll process was made of very high purity titanium in small quantities, when Anton Eduard van Arkel and Jan Hendrik de Boer discovered in 1925[49] in 1950, the number of people who had been born in The Hague in 1950 was 100 000. The Soviet Union pioneered the use of titanium in military and submarines[47] (Alpha class and Mike class) [50] as part of cold war-related programmes. [51] Since the early 1950s, titanium has become widely used in military aviation, especially in high-performance aircraft, starting with aircraft such as the F-100 Super Sabre and Lockheed A-12 and SR-71. While acknowledging the strategic importance of Titan[52], the US Department of Defense supported early commercialization efforts. [53] Throughout the Cold War, titanium was considered strategic material by the US government, and as of 2006, titanium sponge metal was produced in seven countries: China, Japan, Russia, Kazakhstan, the US, Ukraine and India. (in order of production). [56] In 2006, the U.S. Department of Defense's Advanced Research Projects Agency (DARPA) awarded $5.7 million to a two-company consortium to develop a new process for the manufacture of titanium metal powder. Under heat and pressure, the powder can be used to create strong, light objects, from armoured slabs to components of the aerospace, transport and chemical industries. [58] Production and manufacture Main products: Kroll process and Hunter process See also: van Arkel-de Boer process and FFC Cambridge process Titanium (mineral concentrate) Basic titanium products: plate, pipe, rods and powder Titanium metal processing takes place in four main stages:[59] titanium ore reduction sponge, porous form; melting of sponge or sponge plus main alloy for painful formation; initial preparation when the fabric is transformed into general mill products such as raw fabric, lever, plate, sheet, strip and tube; secondary preparation of finished products. Since it is not possible to produce titanium dioxide easily[13], ticl4 is obtained by reducing ticl4 with magnesium metal in the Kroll process. The complexity of this batch production in the Kroll process explains the relatively high market value of titanium[60], although the Kroll process is cheaper than the Hunter process. [47] For the production of TiCl4 required by the Kroll process, dioxide is reduced carbonicly in the presence of chlorine. In the process, chlorine gas is transferred to a red hot mixture on a rut or a to reduce carbon content. After extensive cleaning by fractionation, TiCl4 800 °C (1,470 °F) is reduced by melting magnesium in the argon atmosphere. Titanium metal can be further cleaned with the van Arkel-de Boer process, which involves thermal decomposition of titanium thodine. 2 FeTiO3 + 7 Cl2 + 6 C → 2 TiCl4 + 2 FeCl3 + 6 CO (900 °C) TiCl4 + 2 Mg → 2 MgCl2 + Ti (1100 °C) Recently developed batch production method FFC Cambridge process[61] reduces titanium dioxide in electrochemically melted calcium chloride to produce titanium metal either as a powder or as a sponge. [62] When mixed oxide powder is used, the product is alloy. Ordinary titanium alloys are made by reduction. For example, cuprotitanium (with copper oil rut), ferrocarbon titanium (a seed reduced in an electric oven with coke) and manganotine (rut with manganese or manganese oxides) are reduced. [63] About fifty classes of titanium alloys are designed and currently in use, although only a few dozen are readily available commercially. [64] ASTM International recognises 31 classes of titanium metal and alloys, of which classes one to four are commercially pure (non-alloy). These four range as a function of oxygen content in tensile strength, with 1.19] The remaining classes are alloys, each designed for specific characteristics related to suppleness, strength, hardness, electrical durability, crawl resistance, specific corrosion resistance and combinations thereof. In addition to the ASTM specifications, titanium alloys are also produced to meet space and military specifications (SAE-AMS, MIL-T), ISO standards and country-specific specifications, as well as end-user specifications for aerospace, military, medical and industrial applications. Titanium powder is made using a flow production process called the Armstrong process[67], which is similar to the batch production Hunter process. Add the titaniumantetrachloride gas flow to the line of melted sodium metal; (sodium chloride salt and titanium particles) filtered extra sodium. The titanium is then separated by washing salt water. Both sodium and chlorine are recycled to produce and process more titanium tetrachloride. [68] The welding of titanium must be carried out in the inert atmosphere of argon or helium to protect it from contamination by atmospheric gases (oxygen, nitrogen and hydrogen). [17] Contamination causes a variety of conditions, such as ebrittlement, which reduce the integrity of assembly welds and cause joint failure. A commercially clean flat product (sheet, plate) can be easily formed, but treatment must take into account the prone to metal springback. This is particularly true for certain high strength alloys. [69] [70] Titanium cannot be soldering without pre-plated it metal that is soldering. [71] Metal can be finished with the same equipment and processes as stainless steel. [17] Applications 2. Titanium is often added to aluminium (grain size for refining), vanadium, copper (hard), iron, manganese, molybdenum and other metals. [72] Titanium milling products (leaves, plates, bars, wire, forging, castings) find application in industrial, aerospace, recreational and emerging markets. Powdered titanium is used in pyrotechnics as a source of brightly burning particles. Pigments, additives and coatings Titanium dioxide is the most commonly used titanium compound About 95% of all titanium ore is intended for refining titanium dioxide (TiO2), an intensely white permanent pigment used in paints, paper, toothpaste and plastics. [23] It is also used in cement, precious stones, paper optic opaque[73] and graphite composite anglings and golf clubs as a strengthening substance. The TiO2 pigment is chemically inert, tolerates fading in sunlight and is highly opaque: it gives a clean and bright white colour to the brown or grey chemicals that make up most of household plastics. In nature, this compound is found in the anatase, stream and insecumite of minerals. [6] Titanium dioxide is a good colour in difficult temperatures and marine environments. [8] Pure titanium dioxide refractive index is very high and optical dispersion is greater than the diamond. [7] In addition to very important pigment, titanium dioxide is also used in sunscreen products. [13] Aviation and marine area Since titanium alloys have a high tensile strength to the density ratio[11], high corrosion resistance[7], fatigue resistance, high crack resistance[74] and the ability to withstand moderately high temperatures without sneaking up, they are used in aircraft, armoured plat, naval vessels, spacecraft and rockets. [7] [8] These applications include titanium with alloyed aluminium, zirconium, nickel[75], vanadium and other elements producing a wide range of components, including critical structural parts, fire walls, tels, exhaust channels (helicopters) and hydraulic systems. In fact, about two-thirds of all titanium produced is used in metal aircraft engines and frames. [76] Titanium 6AL-4V alloy accounts for almost 50% of all alloys used in aircraft applications. [77] The Lockheed A-12 and its development of the SR-71 Blackbird were the first two aircraft frames where titanium was used, paving the way for much wider use of modern military and commercial An estimated 59 tons (130,000 pounds) are used in the Boeing 777, 45 in the Boeing 747, 18 Boeing 737, 32 Airbus A340, 18 Airbus A330 and 12 Airbus A320. The Airbus A380 can use 77 tons, including about 11 tons of engines. The aeroengine applications are used for titanium rotors, compressor blades, hydroelectric components and nacelles. Jet engines used the early Orenda Iroquois in the 1950s. [7] was used as heater-coolers for salt water aquariums, fishing line and leader, and divers' knives. Titanium is used in the corps and components of scientific and military surveillance equipment used in the ocean. The former Soviet Union developed techniques for forging submarines with titanium alloy hulls[80] for forging titanium in large vacuum tubes. Titan is used in the Juno spacecraft vault walls to protect on-board electronics. [81] High purity industrial (99,999%) Titanium tube welded with visible crystals of titanium and process equipment (heat exchangers, tanks, process vessels, valves) are mainly used in the chemical and petrochemical industries for corrosion resistance. Specific alloys are used in oil and gas wells and nickel hydrometallurgy with their high strength (e.g. titanium-C alloy), corrosion resistance or both. The pulp and paper industry uses titanium in process equipment that come into contact with corrosive substances such as sodium hypochlorite or wet chlorine gas (bleaching). [82] Other applications include ultrasonic welding, wave-watering[83] and spraying targets. [84] Colourless liquid TiO2 is an important colourless liquid TiO2 titanium tracchloride (TiCl4) and is also used for the production of the Ziegler-Natta catalyst. Titanium tetrachloride is also used to iridize glass and because it fumes heavily in humid air, it is used to make smoke screens. [13] Titanium metal of consumer and architectural titanium sealing stamps is used in the automotive industry, especially in car and motorcycling competitions, where low weight and high strength and stiffness are critical. [85] Metal is generally too expensive for the general consumer market, although some late corvettes are made of titanium exhaust[86] and the Corvette Z06's LT4 supercharged engine uses lightweight solid titanium inlet valves to ensure greater strength and heat resistance. [87] Titanium is used in many sporting goods: tennis rackets, golf clubs, lacrosse stick shafts; cricket, hockey, lacrosse and football helmet grills and bicycle frames and components. Although it is not a mainstream material for bicycle production, titanium bicycles have been used by racing teams and adventure Titanium alloys are used in spectacle frames, which are quite expensive but very durable, long lasting, light weight, and do not cause skin allergies. Many backpackers use titanium equipment, including cookware, eating utensils, lanterns, and tent piles. Although titanium products are slightly more expensive than traditional steel or aluminium alternatives, they can be significantly lighter without damaging strength. Titanium horseshoes are preferred by steel farriers because they are lighter and more durable. The titanium façade of the Frank Gehry Guggenheim Museum, Bilbao Titan, has been used in architecture from time to time. 42.5 m (139 ft) Monument Yuri Gagarin, first man to travel in space (55°42′29.7N 37°34′57.2E / 55.708250°N 37.582556°E / 55.708250; 37.582556), as well as the 110 m (360 ft) Monument conquerors of Space on top of the Cosmonaut Museum in Moscow, is made of titanium metal with an attractive color and connection to rockets. [90] [91] The Guggenheim Museum Bilbao and cerritos Millennium Library were the first buildings in Europe and North America that were lashed with titanium panels. [76] The titanium coat was used at the Frederic C. Hamilton Building in Denver, Colorado. [92] Due to the good strength and light weight of titanium compared to other metals (steel, stainless steel and aluminium) and recent advances in metal working techniques, its use has become increasingly widespread in the production of firearms. The primary uses are pistol frames and revolver cylinders. For the same reasons, it is used in the body of laptops (e.g. on the Apple PowerBook line). [93] Some of the light and corrosion-resistant tools for market lightness, such as shovels and flashlights, are made of titanium or titanium alloys. Jewelry ratio tension and color anodized titanium. (Cateb, 2010). Due to its durability, titanium has become more popular in designer jewelry (especially titanium rings). Its inertia makes it a good choice for allergy sufferers or those who wear jewelry in environments such as swimming pools. Titanium is also alloyed gold to produce alloy, which can be marketed as 24-carat gold, because 1% alloyed Ti is not enough to require a smaller mark. The resulting alloy is about the hardness of 14-karat gold and is more durable than pure 24-karat gold. [94] Titanium's durability, light weight and dent and corrosion resistance make it useful in clock cases. Some artists work with titanium to produce sculptures, decorative objects and furniture. Titanium can be anodized to change the thickness of the surface oxide layer, causing optical interference from the fringe and a variety of bright colors. [96] With this colour and chemical inertia, titanium is a popular metal for body piercing. [97] Titan has special purpose non-circulation coins and medals. In 1999, Gibraltar released the world's first titanium coin to mark the millennium. [98] Gold Coast Titans, Australian rugby league team, award medal for pure titanium their player of the year. [99] Medical Main article: Titanium biofitability because titanium is biocompatible (non-toxic and does not push the body), it has many medical uses, including surgical devices and implants such as hip balls and sockets (joint replacement) and dental implants, which can remain in place for up to 20 years. [43] Titanium is often alloyed in about 4% aluminium or 6% Al and 4% vanadium. [100] Medical screws and plate used to repair wrist fracture, the scale is centimeters. Titan has an in-ability to integrate osseo, allowing the use of dental implants that can last more than 30 years. This feature is also useful for orthopaedic implant applications. [43] They benefit from the lower elasticity module of titanium (Young module) to better match the bone that such devices are designed to repair. As a result, skeletal loads are more evenly divided between bone and implant, leading to a lower incidence of bone decomposition due to stress shielding and periprosthetic fractures that occur at the limits of orthopedic implants. However, the stiffness of the titanium alloys is still more than twice as large as the bone, so the adjacent bone carries a significantly lower load and can deteriorate. [101] [102] Since titanium is ferromagnetic, patients with titanium implants can be safely examined by magnetic resonance imaging (convenient for long-term implants). Preparations for titanium implantation of the body involves subjecting it to a high-temperature plasma arc that removes surface atoms, exposing fresh titanium that is instantly oxidized. Titanium is used for surgical instruments, wheelchairs, crutches and other products used in imaging-guided surgery, for which high strength and low weight are recommended. Titanium dioxide nanoparticles are widely used in electronics and in the supply of medicines and cosmetics. [103] Storage of nuclear waste due to corrosion resistance containers has been studied for the long-term storage of nuclear waste. Volume containers of more than 100,000 years are considered possible with production conditions that minimise the effects of materials. [104] A titanium drip shield could also be installed in containers of other types to increase their longevity. [105] Bioremediation The fungus Marasmius oreades and Hypnoma cannotheids may be biomuttitan in titanium-contaminated soils. [106] Precautions Nettle contains up to 80 parts per million iad. Titanium is not toxic even in high doses and plays no natural role in the human body. [25] Estimated amount of 0.8 milligrams of titanium every day, but most pass without being absorbed into the tissues. [25] However, this is sometimes bio-accumulating in tissues containing silica. One study shows a possible link between titanium and yellow nail syndrome. [107] An unknown plant mechanism may be used as titanium to stimulate carbohydrate production and promote growth. This may explain why most plants contain about 1 part of a million (ppm) titanium, the herbs are about 2 ppm, and the ponytail and nettle contain up to 80 ppm. [25] In the form of powder or metal chips, the titanium metal poses a significant fire risk and the risk of explosion when heated in the air. [108] Water and carbon dioxide are not effective in extinguishing the titanium fire; Instead, class D dry powder substances should be used. [8] When producing or handling chlorine, titanium should not be exposed to dry chlorine gas as this may cause a titanium chlorine fire. [109] Even wet chlorine poses a fire risk when extreme weather conditions cause unexpected drying. Titanium may ignite when a fresh, non-oxidised surface comes into contact with liquid oxygen. [110] Fresh metal may come into contact if the oxidised surface is hit or scratched with a hard object or if the mechanical strain causes. This restricts its use in liquid oxygen systems, such as the aviation industry. Since titanium tubes impurities can cause fires in contact with oxygen, titanium is prohibited by gaseous oxygen breathing systems. Steel tubes are used in high pressure systems (3000 p.s.) and in aluminium tubes for low pressure systems. Vt ka riikide loetelu titaani tootmise poolt Titanium Titaan Aafrika Titaansulamist Titaankate Titaan-Titanium Metals Corporation Titaanring Titaanring Titanium sublimation pump VSMPO-AVISMA Titaan tsirkoongeotheretry PortalsAccess seotud teemadelKeemia portaal Viited

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