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MECHANICAL ACTIVATING AS METHOD OF PLANNIONG OF SPONGY TITANIUM TO HYDROGENIZING

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There are brought comparative results over for process of hydrogenising of spongy titanium ordinary mark of TS-100 and the same titan, but activated. Application of the mechanical activating of titanium before hydrogenising allowed shortening duration of this process on 25-30 % and promoting the coefficient of the use of equipment.
Keywords: spongy titanium, mechanical activating, hydrogenising of titanium, hydrogenation titanium

The decline of cost of titanium and its alloys still remains an actual task the decision of which will allow considerably to extend area of their application.

Question of creation of titanic alloys β- and pseudo β-classes alloys of series of «low–cost» can be decided by realization of two constituents: the uses as β-stabilizer of more cheap as compared to a molybdenum alloying elements (for example, iron or chrome) and application of energy-saving processes by deformation and thermal treatment.

Recycling of wastes of titanium and titanic alloys [4] plugs in itself such economic aspects, as forming of metalstock titanium factors of income, added cost and prime price. Technological constituents of recycling are the use of bad quality spongy titanium of mark of TS-So, lump wastes, shaving, sheet slipping and depreciation scrap in a charge at smelting of bars and in the productions of other products (phosphate of titanium, titanic powders, hydride of titanium, SVS-products, niccelide of titanium).

The methods of powder-like metallurgy allow considerably to reduce the cost of titanic products. Application of hydride of titanium by comparison to traditional powder of titanium spongy with additions of alloying elements allows to improve a synthesis, chemical homogeneity, homogeneity of microstructure, provide an enhanceable relative density, high mechanical properties of products at the decline of their cost [5,6].

The process of hydrogenising of titanium can be used as the intermediate stage in the making of fine metallic powder, and also for the making of commodity hydride of titanium.

Lately appeared work on research of influence of the mechanical actiyating of feedstock on its subsequent hydrogenising [11,12].

The task of the real research is to set efficiency of influence of the mechanical activating of spongy titan on the technological indexes of his hydrogenising

Hydrogenising was executed on the experienced-industrial aggragetus with a retort by a diameter a 600 mm on technology, applied at the Zaporozhe metallurgical experienced plant of Institute titanium

Mechanical activating of spongy titanium, executed by growing of feedstock (TS-100 by factions - 30.+10 mm) shallow in a rotor crusher. The shredded metal was dispersed on a sieve and faction a +2 -5 mm was sent to hydrogenising. Depending on the quantity of passage-ways through a crusher насыпная mass of metal changed within the limits a 1.018-1-991 g/sm^3.

Hydrogenising of spongy titanium of faction -12 +2 and -30 +10 mm flows practically identically. In an initial period there is stormy absorption of hydrogen by material with the sharp getting up of temperature in a reactor. Under reaching a temperature more than 600 °C a reaction is slowed and pressure in aggregates' rises to 0.13 MPa.

Duration of hydrogenising of spongy titanium of faction is -12 +2 mm and -30 +10 mm is 22 and more than 24 hours accordingly (without the account of time, expended on preparatory operations, in particular warming up cooling of vehicle). Thus the half of necessary for hydrogenising hydrogen is taken in at first two o'clock after the beginning of co-operating of hydrogen with titanium.

Character of hydrogenation for mechanical activating spongy titanium is analogous to fulfilled on first stage of researches, notably – availability violent reaction in initial period of process with rise obtaining in aggregates. After obtaining beginning reverse reaction (~ 600 °C) rate of absorption hydrogen declines.

What more frequent the particle of material is exposed to influence of pressure (quantity of passage-ways through a crusher), at more high temperature the reaction of co-operation of titanium that with hydrogen begins. Explanation of this fact consists in that the change of concentration of point defects under the action of pressure is determined by that, a grate broadens at formation of defect or compresses. It is necessary from here, that with the increase of pressure, other things being equal, the concentration of ionic vacancies must diminish, and interstitial ions to increase. This is condition different character of influence of pressure on the processes of diffusion in a solid body, including. on твердофазные chemical reactions in which diffusion through the layer of твердофазного product is limiting [14].

Duration of hydrogenising of the mechanically activated material of different degree of treatment makes 16-18 hours (without the account of time on preparatory operations), that substantially below than duration of hydrogenising of large-sized material (22 and more than 24 hours).

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