

A NOVEL PROCESS FOR LEACHING VANADIUM FROM THE VANADIUM SLAG

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Abstract. In China, the comprehensive utilization of vanadium and titanium resource is an important scientific and technological issue. Meanwhile, energy conservation and environmental protection is much more serious than ever before. In the traditional process for vanadium extraction, the roasting process is the key step for oxidize V (III) and V(IV) to V (V) of the vanadium slag by presence of NaCl or CaO, but it results in serious environmental pollution and energy consumption. For elimination the roasting process in vanadium extraction and utilize the spent acid in titanium dioxide production, this paper reports a novel technology for vanadium extraction: leaching the vanadium slag with the spent acid for titanium from titanium dioxide production.

Key words: Vanadium; Titanium; Energy Conservation, Environmental Protection, Resource Utilization

Energy conservation and environmental protection is the two important issues in the world, especially in the industry areas. Metallurgical industry plays an important role on both national daily life and defense construction. The non-ferrous metallurgy industry is one of the major energy-hungry industries in China and it is eager to promote energy saving in key industries. With large poisonous or greenhouse gases discharged, there is also numerous energy consumption wasted on the traditional backward technology. It is necessary for non-ferrous metal industries to improve efficiency and sustainable development to achieve strengthen energy conservation and comprehensive utilization of resources .

Though the roasting and leaching process for vanadium extraction is widely used in the world wide, there was many technical aspects need to be improved [1-2]. At the roasting stage for vanadium extraction, the traditional process uses NaCl or CaO as additive, inevitably caused air pollution and energy waste [3-4]. As the spent acid from titanium dioxide production was generated by sulfate process, it contains large amount H_2SO_4 , Fe^{2+} , Mg^{2+} , Al^{3+} and Mn^{2+} ion, which could not be indiscriminate discharge [5]. And Only in China, there are about 6 million tons spent acid discharged per year in the titanium dioxide industry [6].

To solve the energy and environmental problems during the vanadium extraction, our term propose a novel technology: leaching the vanadium slag with the spent acid for titanium from titanium dioxide production [7]. In the new process shown in Fig. 1, the spent acid is used as leach agent and the vanadium slag is used as raw material. By the pressure acid leaching process, the vanadium is extracted into leaching solution. Obviously, the traditional two stage roasting and leaching process is changed into one leaching process in our process. After the whole process, it could achieve targets: the leaching rate of vanadium is above 98%, 80t spent acid is consumed per year with one ton vanadium production. Compared with the traditional process for vanadium extraction, the new technology can reduce the harmful gases or greenhouse gases 450m^3 , 30% energy consumption, and 150,000 RMB every per ton vanadium production.

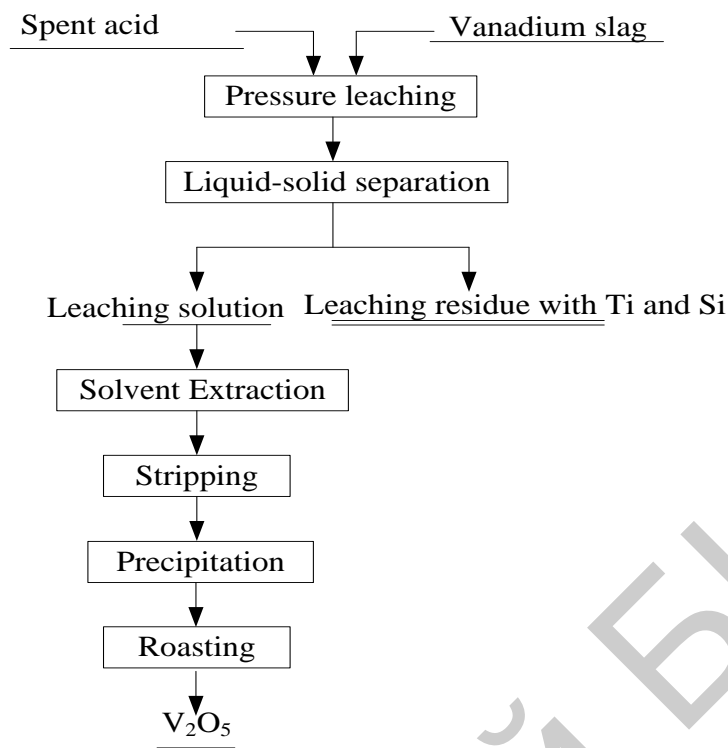


Fig. 1 Flow sheet of novel technology for vanadium extraction

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