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Preparation of Tio_2-Enriched Material from Ti-Bearing Slag by Acid Roasting

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Extended Abstract

EVRAZ Highveld Steel and Vanadium has about 45 million tons of slags which assays at 31% TiO_2. This slag can become a raw material for extracting titanium instead of it being a waste product and causing environmental pollution (Zhang et al, 2014). Several mineral processing and metallurgical processes have been proposed for treating Ti-bearing slags such as middle grade rutile making, titanium pigment making by H_2SO_4 method and Si-Al-Ti alloy by smelting (Zhong et al, 2014, Sui et al, 2013, Lasheen, 2008). Due to the solid solution of titanium and other elements in the slag and complex interfacial combinations, the application of these processes may results in poor recovery and high cost as previously shown. (Liu et al, 2007).

An attempt to upgrade the titanium content from the slags was investigated. Combined pyrometallurgy and hydrometallurgy processes were applied based on the reactivity of Mg, Si, Ca and Fe with selected solvents. Acid roasting with phosphoric acid was used with the objective of modifying the structure of the sample in order to form water soluble compounds of Mg, Fe and Ca after roasting at 1000^{O}C. The calcine was then leached in sulphuric acid in order to remove the formed Mg, Ca and Fe compounds. The residue was then leached in sodium hydroxide in order to remove the silicates. It was observed that an upgrading of TiO_2 to 48.3% by weight was realized when leaching with 1% H_2SO_4 while the XRD results revealed the presence of titanium in the form of rutile (TiO_2) ,Ilmenite [Fe (Ti O_3)] and Karrooite (Mg Ti_2 O_5) as major phases. TiO_2 grade was further increased to 61% after leaching in the residue in sodium hydroxide.

Keywords: Ti bearing slag, roasting, leaching, phosphoric acid.

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