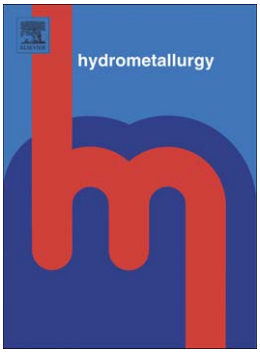

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Gallium and Vanadium Extraction from Red Mud of Turkish Alumina Refinery Plant: Hydrogarnet Process

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Abstract

In this paper the treatment of red mud by autoclave leaching for its conversion into ferrous hydrogarnet product and extraction of valuable components (i.e. Na_2O, Al_2O_3, Ga and V_2O_5) was investigated. Leaching of red mud using high modulus alkaline solution (Na_2O 240 g/L; $\alpha_к$=30) in the presence of lime at 240-260°C was found to allow the recovery of the contained values (98.5% Na_2O, 65.3% Al_2O_3, 55.5% Ga and 65.8% V_2O_5) and the fixing silica in the form of hydrogarnet mud ($3CaO.Fe_2O_3.2SiO_2.2H_2O$) with alow alkali content (0.35% Na_2O). An effective treatment scheme for the leach solution based on precipitation and two-stage carbonization processes was developed and demonstrated. This allowed the generation of alkaline solutions suitable for recycling back to leaching stage and recovery of a concentrate (30% Al_2O_3) that is rich in Ga (0.32%) and V_2O_5(3.7%).The chemical and phase composition of the solid products obtained from each stage of processing were determined by XRF and XRD analyses. This study has demonstrated that Bayer-hydrogarnet process can be suitably exploited for processing of red mud.

Keywords: Red mud; Hydrogarnet process; Hydrated tricalcium aluminate; Aluminium-carbonaceous sediment

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