

EXTRACTION OF POTASH FROM K-FELDSPAR MINERAL BY ACID AND MOLTEN SALT LEACHING PROCESSES

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ABSTRACT

Potassium is one of the three essential nutrients for the plant growth. It will be supplied in the form of fertilizer with other nutrients such as N, P and K. Feldspars and glauconite minerals are the prominent sources of potash, which contains a good amount of potassium with other associated elements. Feldspar exists in different phases such as microcline, albite and anorthosilicate. The feldspar has an average chemical composition of 62% SiO₂, 26% Al₂O₃, 8% K₂O, 3% Na₂O and 1% CaO as the main constituents. In order to extract potassium, chemical leachants such as HCl, H₂SO₄ and HNO₃ were tried with different concentrations. The recovery of potash is found to be 35% in the case of H₂SO₄ medium. In hydrothermal process, maximum recovery of potash is attained as 71% in H₂SO₄ medium by repeated cycles of leaching. Molten salt extraction was performed at 850°C using MgCl₂ and CaCl₂ as molten leaching media. The duration of digestion was about 8 hours. After the digestion in the molten melt, the K and Na were leached out by treating with water and acid independently. The product was isolated from the molten melt and analyzed for its concentration using Atomic Absorption Spectroscopy (AAS), X-ray Diffraction technique (XRD), Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS). In the water medium, more than 90% of potash can be recovered as water soluble K using CaCl₂ as the flux. In the case of acid medium, same concentration of potash can be extracted along with the dissolution of Ca as CaCl₂. While in the case of MgCl₂ as the flux, it is noticed that only 35% of K can be recovered. The results indicate that maximum recovery of potash is achieved when the feldspar to flux ratio (Feldspar: CaCl₂) is 1:8 to 1:10. The results of the above investigation have been presented in this paper.

KEYWORDS: Feldspar, Potash Leaching, X- Ray Diffraction, Hydrometallurgical Route, Molten Salt