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Separation of Molybdenum, Vanadium and Nickel by Liquid-Liquid Extraction

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Abstract: Elements in the ash of asphaltites that is used in thermal central for power generation units are Mo, V, U, Ti and Ni. The main goal of this study was to separate molybdenum, vanadium and nickel from the aqueous solution. The quantities of the above elements in solution were in the range of 50-80 ppm. The separate these elements from solution, the liquid-liquid extraction method was applied to samples. Alamine 336 was used as extractant. During the reduction-oxidation processes, single and multiple extraction methods were applied to the solution in combination. The quantities of molybdenum, vanadium and nickel in the solution were determined by a Shimadzu AA-670 model Atomic Absorbion Spectrometer. 100 % of the molybdenum was isolated from the solution, and during the fourth and fifth stages of extraction, approximately 100 % of the vanadium was isolated from the solution. In this extraction process 12.5 % of the Alamine 336 in kerosene was used. However, this extractant is not suitable for the isolation of nickel, so nickel was recovered by precipitation as NiS in 96 % yield. Although in the literature vanadium can be extracted in V⁵⁺ state with Alamine 336, in our studies it was obtained also in V⁴⁺ state.

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