Accepted Manuscript

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PII: S0304-386X(17)30516-9

DOI: doi:10.1016/j.hydromet.2018.05.024

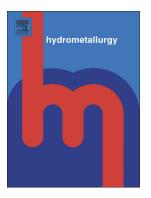
Reference: HYDROM 4830

To appear in: *Hydrometallurgy*

Received date: 22 June 2017 Revised date: 22 May 2018 Accepted date: 27 May 2018

Please cite this article as: Ariuntuya Battsengel, Altansukh Batnasan, Ariunbolor Narankhuu, Kazutoshi Haga, Yasushi Watanabe, Atsushi Shibayama, Recovery of light and heavy rare earth elements from apatite ore using sulphuric acid leaching, solvent extraction and precipitation. Hydrom (2017), doi:10.1016/j.hydromet.2018.05.024

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Recovery of Light and Heavy Rare Earth Elements from Apatite Ore Using Sulphuric Acid Leaching, Solvent Extraction and Precipitation

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ABSTRACT

Apatite is one of the important host minerals of the rare earth elements (REEs). Separation of REEs from apatite has not been studied extensively compared with other main minerals such as monazite, bastnasite and xenotime. Therefore, it is essential to develop an effective method for recovery of REEs from apatite-based ores.

This paper presents the results of laboratory studies for the recovery of rare earth elements from an apatite ore sample by using sulfuric acid leaching, solvent extraction, and precipitation processes. Results showed that the most effective dissolutions of light REEs (> 85%) and heavy REEs (>89%) from the apatite ore sample were achieved with a dilute sulfuric acid solution (1 M H_2SO_4) at a temperature of 20 0C in an hour. The heavy REEs present in the pregnant leach solution were almost entirely extracted using 1.2 M di-(2-ethylhexyl) phosphoric acid (D2EHPA) as a cation exchanger, while the most light REEs remained in the raffinate. The heavy REEs loaded into the organic phase was stripped completely by 3 M H_2SO_4 solution. REEs in raffinate and strip solutions were precipitated as RE oxalates with the addition of 0.08 M oxalic acid.

Keywords: rare earth elements, fluorapatite, leaching, solvent extraction, precipitation

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