

NANOFILTRATION MEMBRANE AND LIQUID EXTRACTION FOR RARE EARTH SEPARATION FROM PHOSPHATE ORE WASTE OF DJEBEL ONK ALGERIA

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Key Words: Rare earth elements, phosphate ore, waste, secondary resources, membrane.

Rare earth elements are considered as raw substances for several high technological material, they are extracted and furnished by a limited number of country, while the need for these critical elements continue to grow strongly to incite exploration of a new resources. In this purposes, we propose in our work, an alternative way to achieve rare earth production from a secondary supply provided by an industrial waste processing of phosphate ore. A fine powder are obtained by physical treatment having size of particles under 100 μ m which were rejected since its contains a low amount of P₂O₅ inferior to 25%. Acidic leaching process have been conducted to dissolve and extract rare earth from calcium and phosphate species, then liquid extraction were achieved by organophosphoric ligand (TOPO, TBP, D2EHP). Final purification has been obtained by nanofiltration procedure using synthetic polymeric membrane containing polyethersulfone as support and a thin layer of polyamide as a separation media.

Selectivity factors in the range 100–5600 were obtained between HREEs and LREEs (*Figure 1*), thus highlighting the excellent ability of D2EHPA to separate these two categories of REEs. The selectivity between HREEs and MREEs was lower but still interesting with values in the range 9 – 71, i.e. much better than with TOPO. A real separation was obtained between MREEs and LREEs, with separation factors around 10 (reaching up to ~ 100 for Eu / Ce and Gd / Ce with 0.6 M D2EHPA).

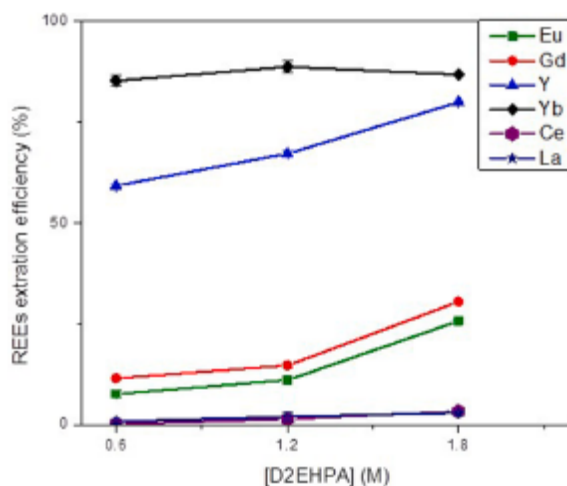


Figure 2 – REEs extraction efficiency as a function of D2EHPA concentration