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PERTRACTION OF NEODYMIUM BY A DEDICATED SOLVENT

By

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ABSTRACT

The process called pertraction or non-dispersive solvent extraction (NDSX) is a technique which allows the metals recovery from leach solutions. It is a liquid-liquid extractor in which the interfacial area is delimited by a porous membrane separating two immiscible phases, the aqueous phase containing the species to be extracted and the organic phase forming the extractant. In the case of the figure bellow, organic phase passing through the shell side of the module wets the hydrophobic membrane. A non-wetting aqueous phase is passed through the lumen side of the membrane.

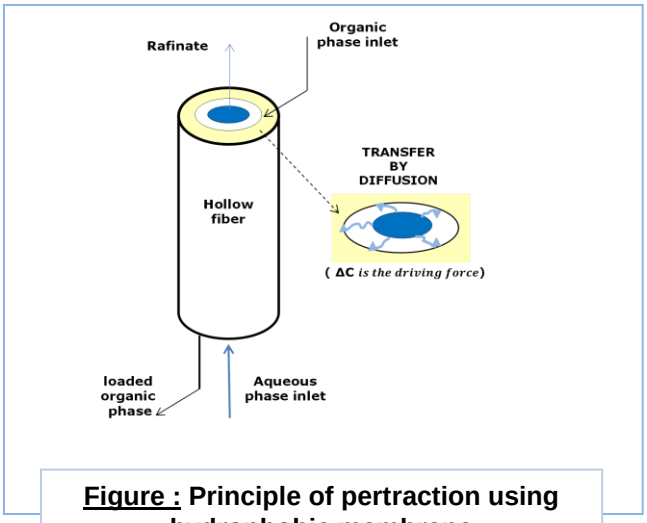

Figure : Principle of pertraction using hydrophobic membrane

It is worth noticing that the aqueous-organic (aqueous-membrane) interface is essentially immobilized at the pore mouth of the hydrophobic membrane support through which the solute mass transfer takes place. It has several advantages over conventional solvent extraction method such as dispersion-free operation, very high contact surface area per unit extractor volume (provided by hollow fiber geometry), emulsion formation is avoided and nonrequirement of density difference of the phases.

In the present contribution, the macroporous and hydrophobic hollow fiber made of polypropylene is used for the extraction of Nd^{3+} in HNO_3 solution in the presence of sodium nitrate $NaNO_3$. The studied extractant is used as pure (e.g without diluent) and has been chosen for his relative low solubility in water, his high selectivity for rare earths elements (REE), and his low viscosity. In view of possible application to actual feeds, Nd^{3+} recovery from varying feed conditions was investigated such as HNO_3, and Nd^{3+} concentrations. In order to predict scale up of the process, the extraction on a fiber with a cylindrical geometry is modeled taking account transfer kinetics at the interphase. For a model need, Taylor Dispersion Analysis (TDA) coupled to UV-Vis detection is used for determine the diffusion coefficient of Nd^{3+} in aqueous phase and in organic phase.