

Menthol-based eutectic solvent for indium and thallium partition from hydrochloric acid media

M.F. Volia,^{1,2} E.E. Tereshatov,¹ and C.M. Folden III^{1,3}

¹*Cyclotron Institute, Texas A&M University, College Station, Texas 77843,*

²*Department of Nuclear Engineering, Texas A&M University, College Station, Texas 77843,*

³*Department of Chemistry, Texas A&M University, College Station, Texas 77843*

Eutectic mixtures have been considered as an alternative green solvent due to their similar characteristics with ionic liquids [1, 2]. Some of these solvents were reported to be hydrophobic [3, 4] and were able to extract metal ions from aqueous media through a liquid-liquid extraction process [5]. This report is to highlight the ability of a hydrophobic eutectic mixture composed of DL-menthol and lauric acid (ES-MLA) to extract In(III), Tl(I, III) from hydrochloric acid media. The most promising results were obtained for Tl(III). Addition of HDEHP into ES-MLA was able to significantly improve the extraction yields of In(III) and Tl(I), particularly at low acidity, but had a minor effect on Tl(III) extraction. The metal extraction decreases in the order Tl(III) > Tl(I) > In(III) for the entire HCl range in the case of pure ES-MLA and above 1 M HCl for the HDEHP + ES-MLA systems (Fig. 1). A mathematical model to explain the metal extraction has been developed. The effect of HDEHP diluents (the eutectic mixture ES-MLA or kerosene) on In(III) and Tl(III) extraction was also studied. It was found that the kerosene-containing system was able to improve In(III) extraction at low acidity by two orders of magnitude while Tl(III) behavior in this acidity region was not affected. However, at high acid concentrations the eutectic-based system shows an increase in D-values. A paper on these results is in the late stages of preparation.

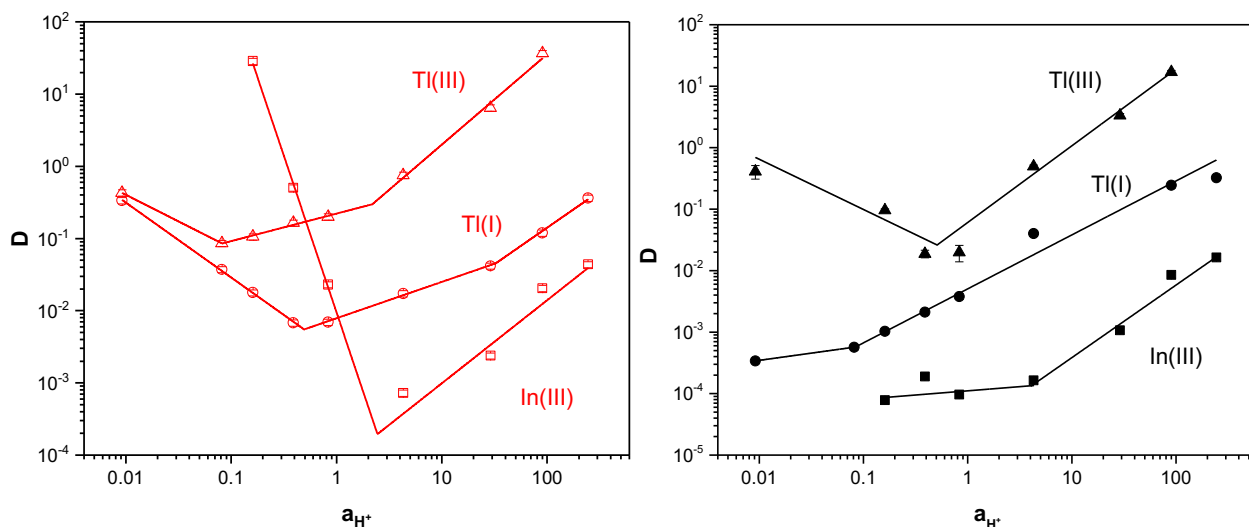


Fig. 1. The results of In(III) and Tl(I, III) extraction into ES-MLA (2:1 molar ratio) in the presence (left) and absence (right) of HDEHP. The lines are drawn to guide the eye.

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