**Aqueous Biphasic System (ABS): A green methodology for ultra-trace scale rhenium separation**

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The task of present day research is to search for the greener and cleaner alternatives. Separation and speciation of elements in trace/ultra-trace scale is possible by using greener systems like aqueous biphasic system (ABS). ABS consists of two aqueous solutions in contact, where both the phases are mutually immiscible to each other above their critical solubility concentrations. During the last decade, aqueous biphasic extraction is being extensively cultured as a green and potential liquid-liquid extraction technique which stands on ‘mutual incompatibility’ of certain polymer-polymer /salt-salt or polymer-salt systems. In recent years, metal ion separation by PEG based ABS are getting ample attention for their aqueous nature, nontoxic, non-flammable, and inexpensive bulk materials.

In the present work an extensive investigation on PEG based ABS mediated separation methodologies were carried out to separate ultra-trace scale 183Re in no-carrier added form produced by charged particle activation on bulk tantalum target. The partitioning of metal ions in various ABS were found to be greatly influenced by the chosen salt-rich phases, specially on their anions as they dominate kosmotropic/ chaotropic nature of the salt rich phase. The influence of various factors like temperature, thermodynamic parameters and polymer molecular weight were also investigated. Among the various biocompatible and biodegradable systems studied, we were able to separate ultra-trace scale rhenium quantitatively with high separation factors in order of 107 at the optimum condition with sodium malonate-PEG 4000 ABS. These PEG based ABSs provided economical, rapid extraction kinetics, low energy consumption and relative reliability in scale up.

The thrust area: Bio-organic and Green Chemistry

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