



Extraction of Pb(II) from water samples by ionic liquid-modified silica sorbents

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ABSTRACT

Removal of toxic heavy metals from water matrices is an important challenge in water pollution. In this study, a solid-phase extraction method based on physical adsorption is reported for the removal of Pb(II). Two modified silica sorbents were developed by direct immobilization of 1-butyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide (C4) and 1-hexyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide (C6), respectively, on silica surface. Surface modification and characterization of adsorbents were confirmed by FTIR and SEM. Both the sorbents showed enhanced sorption capacity for Pb(II), however, sorbent loaded with 1-butyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide showed relatively increased removal efficiency when compared to silica loaded with 1-hexyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide. Batch studies were performed to optimize different variables that influence adsorption process i.e. effect of sorbent dosage, pH, time of contact, sorbate concentration, and temperature. Langmuir, Freundlich, and Temkin isotherms were applied to study adsorption phenomenon.

Keywords: Adsorption; Ionic liquids; Silica; ICP-OES; Wastewater; Lead removal

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