

Abstract

Research Title : THE DEVELOPMENT OF ADSORBENT FOR THE EXTRACTION
OF HEAVY METAL FROM WASTEWATER IN DUSIT DISTRICT,
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This work is aimed at evaluating the optimum condition for the synthesis of silica to be used as an effective sorbent for the removal of metals from wastewater in Dusit district. Effect of silica precursors was studied which showed the good ordered arrangement of mesopore and the narrow pore size distribution of the silica when the silica precursor was TEOS or calcined silica. The synthesis facility, morphology and the Cu(II) extraction capacity of different materials were compared. The results indicated that the silica prepared from 0.18 CTAB/TEOS mole ratio was the most effective sorbent. Other factors influencing the Cu(II) extractability of this sorbent investigated by SPE column method revealed the crucial role of an extraction flow rate. The maximum capacity of this sorbent obtained by the Langmuir equation was found to be 0.1647 mol/kg. The profound study on the parameters affected the extraction properties of the nanometer porous silica towards other metal ions was also performed. The attainment of sorbent capacities for the extraction of these ions was achieved, provided that pH of metal solution was greater than 3 and the metal solution contained NaNO₃ salt. The extraction of metal from mixture solution of Fe(III), Mn(II) and Zn(II) demonstrated the excellent capacity and the high selectivity of such silica to the extraction of Fe(III) ions. The Langmuir plot gave maximum Fe(III) extraction capacity of the sorbent equal to 0.1573 mol/kg. The reusability of this silica was also established without any decrease in its performance. The study of kinetic extraction revealed the rapidity of the metal

extraction process of the sorbent. The application of the silica for the removal of various metals from different wastewater samples in Dusit district was also achieved with satisfactory results.