

عنوان مقاله:

Application of response surface methodology in electrochemical removal of heavy metals (Cd^{2+} , Ni^{2+} , Cr^{3+} , Hg^{2+}) from two industrial sludge samples

محل انتشار:

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خلاصه مقاله:

Electrokinetic phenomena were utilized to remove heavy metal ions (Cd^{2+} , Ni^{2+} , Cr^{3+} , Hg^{2+}) from two sludge samples in the laboratory scale. The first sample was an oily sludge and the second one was a white mercury rich pasty sample obtained from filter press drain settler unit of Abadan refinery. The efficiency of the electrochemical technique in simultaneously removal of several metal ions was investigated by artificially contaminating of the refinery sample with Cd^{2+} , Ni^{2+} and Cr^{3+} nitrate salts. The experiments were performed in a 20 liter membrane electroreactor equipped by two plane graphite electrodes with surface area of 0.03 m². The electrolyte in the electrode chambers was circulated at the constant flow rate of 0.5 l/min and their pH was controlled by surcharging of 0.2 M sulfuric acid solution. The response surface methodology (RSM) was applied to determine the optimum operational parameters such as the current density, time and pH. Based on the experimental results and RSM analysis, the optimum parameters for the oily sludge / refinery sample were 5/15 mA/cm² current density, 14/21 days time and 1.5/1 pH values respectively. The removal efficiency at the optimum condition for oily sludge was better than the refinery sample because of the significance of electrosmotic effect in the oily sludge system. The results revealed that the utilized process is an effective approach for removing heavy metal contaminations even in severe conditions and systems containing complex formulation and several metals.

کلمات کلیدی:

Electrokinetic, Heavy Metal Removal, Sludge, RSM Methodology

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