AN ELECTROCHEMICAL STUDY OF HEAVY METALS EFFLUENT TREATMENT

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ABSTRAK

Satu tinjauan majalah dan literatur paten mengenai cara rawatan air buangan dari elektrosaduran, terutamanya teknik yang terlibat dengan cara elektro-pengumpalan atau pemendakan bersama bagi logam hidroksida yang tak larut telah dijalankan. Satu cara elektrolisis untuk penyingkiran ion kuprum, kromium dan nikel, dengan pemendakan bersama oleh pembawa ferik hidroksida dan aluminium hidroksida yang dijanakan secara elektrokimia, telah diuji pada suhu ambien dengan menggunakan elektrod keluli dan aluminium dalam simulasi larutan buangan yang mengandungi 500, 100, 50 mg/L kuprum, kromium, nikel pada pelbagai ketumpatan arus pada julat merangkumi 2 ke 20 mA/cm^2. Kehadiran NaCl dalam julat 0.01 mol/L hingga 0.1 mol/L boleh memperbaiki kesan penyingkiran logam berat. Ferum oksida hidrus magnetik yang mana ia boleh mendak dengan pantas dan mudah dipisahkan dari larutan dengan menggunakan magnet telah dibentuk semasa elektrolisis dilanjutkan dan dengan pengacauan magnetik. Ion kromium menggalakkan pembentukan oksida hidrus magnetik ini. Penyelidikan keupayaan dinamik tentang kelakuan elektrod ketika elektrolisis telah dijalankan bagi kedua-dua jenis logam elektrod yang digunakan.

Abstract

A survey of journal and patent literature on methods of treatment of electroplating waste solutions, in particular those involving electrocoagulation or co-precipitation of insoluble metal hydroxides, was carried out. An electrolytic method for removal of copper, chromium and nickel ions, by co-precipitating with electrochemically generated carrier ferric hydroxide and aluminium hydroxide, was tested at ambient temperature with the use of steel and aluminium electrodes in simulated waste solutions containing 500, 100 and 50 mg/L copper, chromium and nickel at various current densities ranging from 2 to 20mA/cm^2. The presence of NaCl in the range of 0.01 mol/L to 0.10 mol/L could improve the heavy metal removal efficiency. Magnetic iron hydrous oxide, which could settle faster and was easier to separate from the solution by using magnets, was formed during prolonged electrolysis with magnetic stirring. Chromium ion enhanced the formation of this magnetic hydrous oxide. Potentiodynamic studies on electrode behaviour during electrolysis in the simulated effluent solutions have also been carried out for both types of electrode materials used.

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