**ELECTROCHEMICAL TREATMENT OF ELECTROPLATING WASTEWATERS**

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*Abstract*

*A pilot plant study of the treatment of electroplating wastewaters using elctroreduction with iron electrode plates, electrocoagulation/ozonation using aluminium electrode set followed by ozonation was presented. The initial effluent was highly enriched in heavy metals and elevated levels of organic contaminants. The concentrations of Cr6+, Fe, Ni, Cu, Zn, Pb, TOC, and COD exceeded the upper permissible limits of 63, 220.2, 1.1, 7, 131.3, 1.7, 12.3 and 11.4 times, respectively. The heavy metal removal was forced either by the coagulation/flocculation using Fe2+, Fe3+, and Al3+ ions released into the treated solution by electrochemical corrosion of the sacrificial iron and aluminium electrodes, precipitation of the metal hydroxides as well as co-precipitation with iron and aluminium hydroxides. The principle mechanisms of the organic matter destruction were oxidation by ozone and the indirect oxidation with chlorine/hypochlorite formed by the anodic oxidation of chloride already present in the wastewater. Following the combined treatment, the removal efficiencies of the parameters Cr6+, Fe, Ni, Cu, Zn, Pb, TOC, and COD were 99.94%, 100.00%, 95.86%, 98.66%, 99.97%, 96.81%, 93.24%, 93.43%, and 77.78%, respectively. All the parameters in the final effluent were in agreement with regulated values.*

*Key words:* *ozonation, electrochemical treatment, wastewater, electroplating, heavy metals, TOC, COD, iron anodes, aluminum anodes*

**ELEKTROKEMIJSKA OBRADA GALVANSKIH OTPADNIH VODA**

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*Izvod*

*U radu je prikazano pročišćavanje galvanskih otpadnih voda na pilot postrojenju korištenjem elektroredukcije sa željezovim setom elektroda, elektrokoagulacije/ozonacije pomoću aluminijevih elektroda te ozonacije. Ulazni efluent je bio visoko opterećen teškim metalima i s povišenim razinama organskih onečišćivala. Koncentracije Cr6+, Fe, Ni, Cu, Zn, Pb, TOC, i COD premašivale su maksimalno dopuštene koncentracije 63, 220.2, 1.1, 7, 131.3, 1.7, 12.3 odnosno 11.4 puta. Uklanjanje teških metala postignuto je koagulacijom/flokulacijom pomoću Fe2+, Fe3+, i Al3+ iona oslobođenih u tretiranu otopinu elektrokemijskom korozijom žrtvujućih elektroda od željeza i aluminija, zatim taloženjem/precipitacijom metalnih hidroksida kao i ko-precipitacijom s Fe- i Al-hidroksidima. Glavni mehanizmi razaranja organske tvari su bili oksidacija ozonom i oksidacija klorom/hipokloritom nastalim indirektnom anodnom oksidacijom klorida prisutnih u otpadnoj vodi. Primjenom kombiniranog sustava pročišćavanja, efikasnost uklanjanja parametara Cr6+, Fe, Ni, Cu, Zn, Pb, UOU, i KPK su iznosile 99.94%, 100.00%, 95.86%, 98.66%, 99.97%, 96.81%, 93.24%, 93.43%, odnosno 77.78%. Svi ovi parametri mjereni u konačnom efluentu bili su u skladu sa zakonski propisanim vrijednostima*

*Ključne riječi:* *ozonacija, elektrokemijska obrada, otpadne vode, galvanizacija, teški metali, UOU, KPK, željezove anode, aluminijeve anode*