

Electrochemical oxidation in pigment wastewater treatment using a Ti/IrO₂ tube-type electrode

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ABSTRACT

The objectives of this study are to investigate characteristics of electrochemical oxidation of wastewater depending on electrode materials and to analyze the influence of the chloride ion as an electrolyte on electrochemical oxidation of pigment wastewater using a Ti/IrO₂ tube-type electrode. The Ti/IrO₂ electrode was adopted as the most proper material in the comparative analysis under COD removal efficiency and current efficiency. The current efficiency for each electrode material was decreased in the order of Ti/IrO₂ 16.5%, Ti/Pt 14.0%, and graphite 3.4%. Two kinds of electrolytes of NaCl and Na₂SO₄ revealed different levels of electrochemical oxidation under the same conductivity conditions. Specific energy consumption was reduced by adding a chloride ion in the electrochemical oxidation treatment. The chlorite ion (ClO₂⁻) and free chlorine were produced in the Ti/IrO₂ tube-type electrochemical oxidation systems. The production amount of chlorite ion was larger than double that of free chlorine production. The indirect oxidation process by the intermediate product was concluded to be the major principle for COD removal.

Keywords: Chloride ion; Electrochemical oxidation; Electrolyte; Pigment wastewater; Ti/IrO₂; Tube-type electrode

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