

Management of wastewater from ink production and metal plating industries in an Egyptian industrial city

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ABSTRACT

This study focuses on selecting an appropriate treatment technology for wastewater discharged from two metal plating and one ink production factories. All located in an Egyptian industrial city. The study aims to form a useful guideline and reference for application by operating units in similar types of industry. Metal industry in the city was responsible for the highest quantity of wastewater discharge per day (2096 m³/d). Ink production was characterized by higher organic load than other industries (COD: 30,500 mg/l, TSS: 7490 mg/l, oil and grease: 409 mg/l, Cu: 22 mg/l). The metal plating factories under investigation produce 30 and 5 m³/d, besides they are close-by so it was found economically feasible to combine the effluent from the two factories in one treatment unit. Analysis of the mixed samples of the metal plating factories indicated that the wastewater was acidic and contaminated with heavy metals. The concentration of zinc, chromium and nickel was 25.8, 4.0 and 2.5 mg/l, respectively. Chemical treatment of the metal plating wastewater involved the use of an excess dosage of 96 mg/l of ferrous sulphate to reduce chromium hexavalent to chromium trivalent, followed by addition of 330 mg/l of CaO at pH 9 to precipitate chromic hydroxide and the other metals. The produced effluent quality was in compliance with the permissible limits set by the national environmental laws and regulations. Laboratory experiments proved that ink wastewater treatment using Fenton oxidation process is a promising and attractive treatment method that produces an effluent complying with the national environmental laws, however its high cost is a major limitation for its application. The viable alternative investigated in this study is the application of pollution control measures at source due to the economic competitiveness.

Keywords: Fenton; Prevention; Ink; Metal; Wastewater

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