Cairo University

ELECTROCOAGULATION TECHNIQUE IN SURFACE WATER TREATMENT USING ALUMINUM AND IRON ELECTRODES

By

Saad Abdelhalim Bakry Abdelsalam

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
In
Civil Engineering – Public Works

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Electrocoagulation Technique in Surface Water Treatment Using Aluminum and Iron Electrodes.

Key Words:
Electrocoagulation; Surface water; TOC; Aluminum; Iron.

Summary:

In this thesis, treatment of surface water by electrocoagulation technique using aluminum and iron electrodes has been studied. Experiments were carried out by using natural surface water that was collected at the intake of the new Quhafah drinking water treatment plant (Fayoum, Egypt). Surface water was treated at room temperature with a variable applied current density which varied from 3 to 5 mA/cm^2, at different reaction time (20, 40, and 60 minutes) and with variable initial pH (4, 5.5, and natural water pH). Furthermore, the electrical energy consumption (EEC) for each electrode has been calculated. From the results, it was observed that aluminum had better performance in removal of TOC, TDS and conductivity than iron. Also, it seemed that both materials are almost equally effective in removal of turbidity. Where, in case of aluminum electrodes, the maximum removal efficiency of TOC, turbidity, TDS and conductivity was 73.58%, 99.10%, 83.85% and 83.87% respectively. Whereas, in case of iron electrodes, the maximum removal efficiency of TOC, turbidity, TDS and conductivity was 64.78%, 98.25%, 78.01% and 78.04% respectively. Also, the results showed that the EEC was lower in case of iron electrodes than in case of aluminum electrodes, where the maximum EEC was 33.99 KWh/m^3 for iron electrodes and it was 46.80 KWh/m^3 for aluminum electrodes.

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