شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

بعض الوثائق الأصلية تالفة

شبكة المعلومات الجامعية

بالرسالة صفحات لم ترد بالأصل

NICKEL AND CHROMIUM REMOVAL FROM WASTEWATER BY THE APPLICATION OF ELECTROCOAGULATION USING COPPER AND ZINC ELECTRODES UNDER VARIOUS OPERATING CONDITIONS

By

Omar Ahmed Shaker Khalil

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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Approved by the
Examining Committee

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Title of Thesis:

Nickel and Chromium Removal from Wastewater by the Application of Electrocoagulation Using Copper and Zinc Electrodes under Various Operating Conditions

Key Words:
Electrocoagulation; Nickel; Chromium; Copper; Zinc.

Summary:

In this thesis, nickel and chromium removal from wastewater by the application of electrocoagulation using copper and zinc electrodes has been studied. Experiments were conducted by using synthetic water and real wastewater. It was treated at room temperature with various operating conditions. Starting from optimum pH, CD, electrode spacing and salt type at (1, 5, 10, 15, 30, 45, 60, 90) minutes during reaction time. In addition to measuring pH for synthetic and real wastewater, measuring EEC for real wastewater, comparing EC and CC and comparing batch and continuous operation modes. For the results, it was observed that copper is better than zinc in nickel removal and zinc is better than copper in chromium removal as maximum nickel removal reached 99.96% in case of copper and chromium removal reached 99.95% in case of zinc for synthetic and real wastewater. While in real combined wastewater, zinc is better than copper in nickel removal and copper is better than zinc in chromium removal as maximum nickel removal reached 99.81% in case of zinc and chromium removal reached 91.68% in case of copper. It was also observed that EC is better than chemical coagulation and the batch mode is almost the same as continuous mode. It was also noticed that COD decreased in real wastewater after application of EC.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.
I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Omar Ahmed Shaker Khalil Date: / / 2020

Signature:

Dedication

This thesis is dedicated to:-

My mother Naglaa for her kindness and devotion and for her endless support and love.

My beloved father Ahmed who always cares for me and gives me the valuable advice that I need.

My brother Abdallah and my grandfather Mohamed who always push me forward.

My Uncle Ehab for his support and encouragement.

Acknowledgments

There is no doubt that the completion of this work would not be possible without the grace of Allah, then the help, support and motivation of many important people.

First, I would like to thank my thesis main advisor **Prof. Dr. Minerva Edward Matta**. The door to her office was always open whenever I ran into a trouble spot or had a question about my research or writing. She consistently allowed this thesis to be my own work, but steered me in the right direction whenever she thought I needed it. I am gratefully indebted to her and thankful for her valuable comments on this thesis.

I would like to express my sincere gratitude to **Dr. Safwat Mahmoud Safwat** for his help, support and inspiring discussions. I would also like to acknowledge him as the second reader of this thesis. I would like to thank him as he was involved in my experimental work for this thesis. Without his participation and advice, the thesis could not have been successfully conducted.

Finally, I must express my very profound gratitude to my parents and my brother for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. I would like to express my thanks to everyone who participated directly or indirectly in this work. Thank you.

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