CU (II) AND NICKEL (II) REMOVAL FROM CONTAMINATED WATER BY ELECTROLYSIS METHOD USING GRAPHITE ELECTRODE

MUHAMMAD AZRIL BIN HASHIM

Final Year Project Report Submitted in
Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science (Hons.) Applied Chemistry
In the Faculty of Applied Sciences
University Teknologi MARA

MAY 2009

This Final Year Project Report entitled "**Copper (II) and Nickel (II) Removal From Contaminated Water by Electrolysis Method Using Graphite Electrode**" was submitted by Muhammad Azril Bin Hashim, in partial fulfilment of the requirements for the Degree of Bachelor of Sciences (Hons.) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by

Prof Madya Bohamuddin Ariffin
Supervisor
B.Sc (Hons.) Applied Chemistry
Faculty of Applied Sciences

Encik Shaharuddin
Co-Supervisor
QESH INTEGRATED
Selangor

Cik Sabrina Yahaya
Project Coordinator
B.Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Dr.Yusairie Mohd
Head of Programme
B.Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor

Date: 10 JUNE 2009

ACKNOWLEDGEMENT

First of all I would like to take this opportunity to express my sincere gratitude and appreciation to my project supervisor, Prof Madya Borhanuddin Ariffin and my co-supervisor, En. Shaharuddin from Qesh Integrated Consultancy for his supervision, guidance, constructive comments, continuous support and suggestion throughout this study.

I would also acknowledge Nur Syuhada', Ruwaidah and Siti Juriah for their advice and their willingness to share their bright thoughts with me, which were very fruitful for shaping up my ideas and research. Thanks to Nurul Huda and Norida for theoretical calculations, it was great to collaborate with you both.

Where would I be without my family? My parents deserve special mention for their inseparable support and prayers. My Father, Hashim Razali, in the first place is the person who put the fundament my learning character, showing me the joy of intellectual pursuit ever since I was a child. My Mother, Azizah Ramli, is the one who sincerely raised me with her caring and gently love. NurHasliza, Hasrul Zamir, and Azrin, thanks for being supportive and caring siblings.

Finally, I would like to thank everybody who was important to the successful realization of thesis, as well as expressing my apology that I could not mention personally one by one.

TABLE OF CONTENTS

ABSTRACT

CU (II) AND NICKEL (II) REMOVAL FROM CONTAMINATED WATER BY ELECTROLYSIS METHOD USING GRAPHITE ELECTRODE

Electrolysis effluent treatment is based on the anodic dissolution of metals, which form their hydroxides, and the pollutants are removed by sorption, coagulation, and other processes occurring in the space between the electrodes. The performance of electrolysis with carbon anode, in the treatment of metals ions (Cu^{2+} and Ni^{2+}) containing contaminated water, has been investigated. Several working parameters, such as pH, current density, and time taken for the reaction were studied in attempt to achieve a higher removal capacity. Result obtained with contaminated water revealed that effective removal capacities of studied metals could be achieved when the pH was kept at 6 for metal Copper and 4 and 8 for metal Nickel. In addition, the increase of current density enhanced the treatment effiency for both metal. The process was successfully applied to the treatment of an contaminated water where an effective reduction of Ni^{2+} concentration under legal limits was obtained, except for metal Cu^{2+}, whereby the another types of methods can be carried out such as exchange resins or jar test. The method was found to be highly efficient and cheap compared to conventional existing techniques.