

**MODIFICATION OF GRAPHENE OXIDE WITH
EGGSHELL ADSORBENT VIA IMPREGNATION
METHOD FOR FLUORIDE REMOVAL IN
WASTEWATER**

MOHAMAD IKMAL BIN MOHAMAD AZMIR

**BACHELOR OF CHEMICAL ENGINEERING
(ENVIRONMENT) WITH HONOURS**

UNIVERSITI TEKNOLOGI MARA

2017

AUTHOR'S DECLARATION

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own, unless otherwise indicated or acknowledge as reference work.

I, hereby acknowledge that I have been supplied with the Academic Rules and Regulations, Universiti Teknologi MARA, regulating the conduct of my study and research.

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Date : 10/7/17

Mohamad Ikmal b Mohamad Azmir

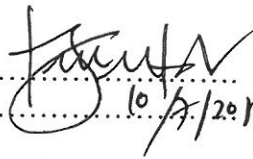
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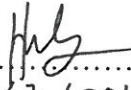
DR. NORHUSNA MOHAMAD NOR
Pensyarah Kanan
Fakulti Kejuruteraan Kimia
UiTM Pulau Pinang

Main Supervisor

Dr. Norhusna bt Mohamad Nor
Faculty of Chemical Engineering
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

Signed:

Date :



NURULHUDA AMRI
Pensyarah
Fakulti Kejuruteraan Kimia
UiTM Pulau Pinang

Co-Supervisor

Pn. Nurhuda bt Amri
Faculty of Chemical Engineering
Universiti Teknologi MARA
Cawangan Pulau Pinang
13500 Permatang Pauh
Pulau Pinang

ACKNOWLEDGEMENT

First and above all, I praise to God, the Almighty for providing me this opportunity and granting me the capability to proceed this research successfully. This thesis appears in its current form due to the assistance and guidance of several people.

I would therefore like to offer my sincere thanks to all of them. My gratitude and thanks go to my supervisor Dr. Norhusna bt Mohamad Nor, and co-supervisor, Pn.Nurulhuda bt Amri for their warm encouragement, thoughtful guidance, critical comments and correction of the thesis. I also would like to thank to the staffs of the Faculty of Chemical Engineering for providing help with my project whether directly and indirectly. Special thanks to my colleagues and friends for helping me with this project.

Lastly, I warmly thanks and appreciate my parents for their material and spiritual support in all aspects of my life. This piece of victory is dedicated to both of them.

ABSTRACT

The high concentration of fluoride can cause bad effects towards human being. Hence, adsorption is essential to develop a fast, selective, economic and eco-friendly method for fluoride removal in wastewater. The initiation of graphene-based material as an adsorbent has paid more attention as a favourable adsorbent due to its inexpensive cost, high adsorption capacity and very promising adsorbent for different genre of pollutants. Therefore, the effect of parameter during GO/Eggshell (GO/ES) synthesis by using impregnation method towards fluoride removal in the wastewater have been investigated. Firstly, the adsorption capacity and removal percentage were increase as the GO/ES ratio (5:1, 1:1, 1:5) were introduced, respectively. Next, as the synthesis temperature increased (30 °C, 45 °C, 60 °C), the adsorption capacity and removal percentages also increase. Also, the trend was also increase when the synthesis time were introduced (30 min, 60 min, 90 min). The FTIR spectrum proved that GO were successfully formed and ES had been dispersed over GO surface. FTIR results confirmed the synthesis of natural calcium by the formation of chemical bonding between ES and GO. Also, The FTIR spectrum indicated that the absorption process actively took place at functional group of hydroxyl (O-H) and carboxyl (C-O). Therefore, modified GO/ES adsorbent have proven to be a good adsorbent for fluoride removal and can be developed to achieve higher removal percentage.