

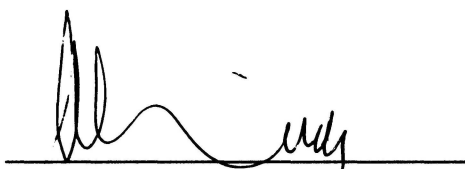
**THE EFFECT OF RATIO MII/MIII IN
REMOVAL OF REACTIVE ORANGE 16 DYE
USING $\text{MgAl}(\text{NO}_3)_3$ LAYERED DOUBLE
HYDROTALCITE (LDH)**

HUMAINIE BT DIN

**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 Science
Universiti Teknologi MARA**

MAY 2009

This Final Year Project Report entitled “**The Effect of Ratio MII/MIII Removal of Reactive Orange 16 Dye using MgAlNO_3 Layered Double Hydrotalcite (LDH)**” was submitted by Humainie bt Din, in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by



Puan Siti Mariam Sumari
Supervisor
B.Sc. (Hons.) Environmental Technology
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor



Miss Sabarina M. Yahya
Project Coordinator
B.Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
40450 Shah Alam
Selangor



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

Date: 25 MAY 2009

ACKNOWLEDGEMENTS

Bismillahirrahmanirrahim, in the name of Allah, the most Gracious and the most Merciful. First and foremost, I would like to express my sincere gratitude to Allah for his abundant generosity guidance and strength during the process of completing this thesis.

I would also like to extend my very special thanks to my supervisor, Pn Siti Mariam Sumari for her guidance, supports, and motivation through the completion of this project paper. Lot of thanks is also extended to all Chemistry laboratory staffs especially En Adnan and En.Khairul for their willingness to assist me in completing this project paper.

Last but not least, I would like to express my grateful appreciation to my family and my friends for being very supportive during the completion of this project paper. May Allah S.W.T bless all your kindness.

TABLE OF CONTENTS

	PAGE
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv-v
LIST OF TABLES	vi
LIST OF FIGURES	vii
LIST OF ABBREVIATIONS	viii-ix
ABSTRACT	ix
ABSTRAK	ix

CHAPTER 1: INTRODUCTION

1.1 Background and problems statement	1-2
1.2 Significant of study	3
1.3 Objective of study	3

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction	4
2.2 Layered Double Hydroxides (LDHs)	5
2.2.1 Structure of Layered Double Hydroxides	6-7
2.2.2 Adsorption of oxyanions on LDHs	8
2.3 Reactive Dye	9
2.3.1 Reactive Orange 16 (RO16)	10
2.4 Application of Layer Double Hydroxide	11
2.5 Impact of dye solution to environments	12

CHAPTER 3: METHODOLOGY

3.1 Materials	13
3.1.1 Chemicals/Reagent	13
3.1.2 Apparatus and Instruments	13
3.2 Method	14
3.2.1 Preparation of MgAlNO ₃ Layered Double Hydrotalcite	14
3.2.2 Preparation of dye aqueous solution	15
3.2.3 Batch Adsorption experiment	15
3.2.4 Effect of contact time on dye removal	16
3.3 Data analysis removal of dye	16
3.3.1 Percentage Removal (% Uptake)	16
3.3.2 Adsorption capacity	17

ABSTRACT

THE EFFECT OF RATIO MII/MIII IN REMOVAL OF REACTIVE ORANGE 16 DYE USING $\text{MgAl}(\text{NO}_3)_2$ LAYERED DOUBLE HYDROTALCITE (LDH)

Layered double hydroxides (LDH) are lamellar mixed hydroxides containing positively charged main layers and undergoing anion exchange chemistry. In this study, Mg-Al- NO_3 LDH was synthesized with final $\text{Mg}^{2+}/\text{Al}^{3+}$ ratio of 2 and 3 by coprecipitation method. The adsorption of Reactive Orange 16 from aqueous solution was carried out using LDH as low-cost adsorbent. The adsorption behavior of Reactive Orange 16 dyes on LDH was investigated using a batch technique colour measurement was carried out using UV-Vis spectrometric. The adsorption processes were studied which includes contact time for adsorbent dosage (0.01 g) and different concentration. The dye adsorption equilibrium was attained with 420 min of contact time for ratio 2 and 3. Percentage of adsorption increased with increased in contact time. The adsorption capacity data were also fitted to Langmuir and Freundlich equation as well. Adsorption experiments confirmed that LDH was effective in removing of Reactive Orange 16 from aqueous solution.