REMOVAL OF CADMIUM IONS FROM AQUEOUS SOLUTION BY USING REGULAR $MgAlCO_3$ HYDROTALCITE

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TABLE OF CONTENTS

		Page
ACKNOWLEDGEMENTS		iii
TABLE OF CONTENTS		iv
LIST OF FIGURE		vi
LIST OF ABBREVIATIONS		vii
ABSTRACT		viii
ABSTRAK		ix
CHAPTER 1 INTRODUCTION		
1.1	Background	1
1.2	Problem statement	3
1.3	Significance of study	3
1.4	Objective	4
CHAPTER 2 LITERATURE REVIEW		
2.1	Introduction	5
2.2	Hydrotalcite	5
2.3	Cadmium	8
2.4	Adsorption	9
	2.4.1 Physical adsorption	10
	2.4.2 Chemical adsorption	10
2.5	Impact of cadmium to the environment	11
2.6	Adsorption of heavy metal using hydrotalcite	12
2.7	Adsorption of cadmium by another adsorbent	15
	2.7.1 Fly ash	15
	2.7.2 Zeolite	15
	2.7.3 Chitosan	16
	2.7.4 Activated carbon	17
2.8	Comparison between regular hydrotalcite and calcined hydrotalcite in adsorption of heavy metal	18
2.9	Optimization studies on removal of heavy metal	18
	2.9.1 Effect of contact time	19
	2.9.2 Effect of initial concentration	19
	2.9.3 Effect of adsorbent dosage	20
CHAPTER 3 METHODOLOGY		
3.1	Chemicals	21
3.2	Apparatus	21
3.3	Instruments	22
3.4	Methods	22

ABSTRACT

REMOVAL OF CADMIUM IONS FROM AQUEOUS SOLUTION BY USING REGULAR $MgAlCO_3$ HYDROTALCITE

Hydrotalcite ($MgAlCO_3$) was found to have ability to exchange anionic species and absorb the cationic species that obtain to remove heavy metal from aqueous system. In this study, $Mg/AlCO_3$ was synthesized by co-precipitation method. Characterization of hydrotalcite by using X-Ray Diffractogram (XRD) showed the presence of sharp peaks which signifying high crystallinity. The presence of sharp peak with d-spacing of 7.95 Å and interlayer spacing of 3.93 Å determined as general features of hydrotalcite. The hydrotalcite composition was investigated by using Fourier Transform Infra Red which showed the presence of broad peak at 3468.39 cm^{-1} constitutes to hydroxyl group. The peaks at 1382.15 cm^{-1} and 618.47 cm^{-1} attribute to carbonate bands and hydrotalcite lattice vibrations (Mg-O-Mg) respectively. The effect of adsorption process was studied by different parameters including contact time, initial concentration and adsorbent dosage. The contact time required 3 hours to obtain the maximum absorption of cadmium was 70.74 %. The percentage of adsorption increased with increasing contact time. For initial concentration, the highest percentage removal was at 60 ppm (67.05 %). The percentage of adsorption decreased with increasing initial concentration. The percentage of adsorption increased with increasing in adsorbent dose.

CHAPTER 1

INTRODUCTION

1.1 Background

The problems of the ecosystem are increasing with the development of new technology. One of the main problems is heavy metal pollution. Toxic metal compounds coming to the earth's surface and reach the seas, lakes and ponds. The toxic metal compounds leaching from the soil which can contaminate underground water in trace amounts. The heavy metals are necessary for the growth of plants (Uzun and Guzel, 2000) such as zinc which is a micronutrient for plants but at the higher concentrations, it can be poisonous for the plants and microorganisms especially to aquatic life (Boua, 2000). The marine animals can absorb the heavy metals in wastewater and directly enter the human food chains posing a serious health risk to consumers (Meena *et al.*, 2005).

There are many of industries including minerals processing, production of pigments and dyes, metal plating and production of accumulators and batteries that produce wastes contaminated with significant amounts of heavy metals. Copper, nickel, zinc, cadmium, lead and chromium are example of the heavy metals that commonly used in these industries (Townsend, 2001). The atomic number of cadmium is 48 and it has about 112.411 g/mol of relative atomic mass (Hill and Petrucci, 2000). Cadmium is one of the heavy metals which are