

UNIVERSITI TEKNOLOGI MARA

**SURFACTANT MODIFICATION OF
DURIAN PEELS FOR REMOVAL
REMAZOL BRILLIANT ORANGE 3R
(RBO3R) DYE FROM AQUEOUS
SOLUTIONS: A COLUMN STUDIES**

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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

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ABSTRACT

The feasibility of durian peel as a non-conventional low cost adsorbent for the removal of Remazol Brilliant Orange 3R (RBO3R) was investigated. In this study, durian peel had been chemically modified by cationic surfactant cetylpyridinium chloride monohydrate (CPC) for the removal of Remazol Brilliant Orange 3R (RBO3R) in a continuous adsorption process on a fixed-bed column. The surfactant modified durian peel (SMDP) was found to be an efficient media for the removal of dye from wastewater. Bulk density and pH all seem to play important roles in the adsorption of Remazol Brilliant Orange 3R (RBO3R). Scanning electron microscopy (SEM) micrograph showed raw durian peel (RDP) have elongated fiber line with small pores while surfactant modified durian peel (SMDP) showed crater-like-holes with large pore space that increase active binding site on SMDP surface and improve adsorption processes. According to FTIR analysis, a successful impregnation of CPC onto the surface of durian peel was presented at peak of 2853 cm^{-1} on surfactant modified durian peel (SMDP) showed C-H vibration of carbonyl group bands originated from CPC. At peak 3369 cm^{-1} on SMDP indicate the O-H group in cellulose. All important functional group such as carbonyl and hydroxyl on durian peel surface improve its performance as adsorbent in binding and sequestering RBO3R dyes from aqueous solution. In column studies, the breakthrough time (t_b), exhaustion times (t_{exh}) and dye removal efficiency depend strongly on column parameters which was initial dye concentration, column bed height and flow rate. The breakthrough time (t_b), exhaustion time (t_{exh}) was proportional to column bed height and inversely proportional to initial dye concentration and flow rate. The dye removal increases from 79% to 99% when the initial concentration of dye solution decreases from 150 mg/L to 25 mg/L. The dye removal increases from 69% to 93% when the column bed height increase from 1 cm to 3 cm. The dye removal increases from 86% to 97% when the influent flow rate decreases from 5 mL/min to 1 mL/min. This study suggests the potential application of durian peel as adsorbents as an alternative to activated carbon can overcome biomass waste problem and sequester dye from colouring wastewater.

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TABLE OF CONTENTS

	Page
CONFIRMATION BY PANEL OF EXAMINERS	ii
AUTHOR'S DECLARATION	iii
ABSTRACT	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF SYMBOLS	xii
LIST OF ABBREVIATIONS	xiv
CHAPTER ONE INTRODUCTION	1
1.1 Research Background	1
1.2 Problem Statements	3
1.3 Significance of Study	3
1.4 Objectives	3
CHAPTER TWO LITERATURE REVIEW	4
2.1 Batik Industry in Malaysia	4
2.1.1 Types of dyes in Batik Industry	4
2.1.2 Treatment for dye removal in batik industry	5
2.2 Dye	6
2.3 Low-cost Adsorbents for Dyes Removal in Aqueous Phase	9
2.3.1 Adsorption by Agricultural Wastes	10
2.3.2 Adsorption process mechanism	11
2.3.3 Durian peel	11
2.4 Surfactant modified adsorbent	13
2.4.1 Mechanism of surfactant impregnation onto adsorbent	16
2.5 Column Adsorption study	18
2.5.1 Column sorption parameters	19