ADSORPTION OF PARACETAMOL FROM AQUEOUS SOLUTION USING MAGNETIC BIOCHAR DERIVED FROM RICE HUSK

ANNIS SYAFIQA BINTI ANUAR

BACHELOR OF SCIENCE (Hons.) CHEMISTRY WITH MANAGEMENT
FACULTY OF APPLIED SCIENCESUNIVERSITI TEKNOLOGI MARA

FEBRUARY 2023

ASDORPTION OF PARACETAMOL FROM AQUEOUS SOLUTION USING MAGNETIC BIOCHAR DERIVED FROM RICE HUSK

ANNIS SYAFIQA BINTI ANUAR

Final Year Project Report Submitted in Partial Fulfilment of the Requirements for the Degree of Bachelor Science (Hons.) Chemistry With Management in the Faculty of Applied Sciences Universiti Teknologi MARA

FEBRUARY 2023

This Final Year Project Report entitled "**Adsorption of Paracetamol from Aqueous Solution using Magnetic Biochar Derived from Rice Husk"** was submitted by Annis Syafiqa binti Anuar partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management, in the faculty of Applied Sciences and was approved by

_____

Dr. Zaidi Ab Ghani
Supervisor
B. Sc. (Hons) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Nurlia binti Ali
Project Coordinator
B. Sc. (Hons) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Zuliahani binti Ahmad
Head of Programmed
B. Sc. (Hons) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

TABLE OF CONTENTS

ABSTRACT

ADSORPTION OF PARACETAMOL FROM AQUEOUS SOLUTION USING MAGNETIC BIOCHAR DERIVED FROM RICE HUSK

To reduce pharmaceutical contaminants in aqueous solution, a lot of research has been carried out to convert organic material such as rice husk into biochar, serving as an adsorbent for the adsorption of paracetamol. This review paper studies the optimization of adsorption parameters which are pH, dosage, initial concentration, contact time, and temperature on the adsorption of paracetamol using biochar derived from rice husk. This paper also aims to evaluate the adsorption isotherm (Langmuir and Freundlich), kinetic (pseudo-first-order and pseudo-second-order) and study the effect of thermodynamic (ΔG°, ΔH°, and ΔS°) parameters based on the obtained experimental data. The adsorption capacity was found to increase with increases in initial concentration (from 0.0029 mg/g in 1 mg/L to 0.0047 mg/g in 10 mg/L) and time (from 0.1688 mg/g in 30 min to 0.3335 mg/g in 230 min). At the same time, it decreased with an increase in the adsorbent dose (from 0.3081 mg/g in 0.5 g to 0.2203 mg/g in 1.0 g) due to aggregation. Additionally, the highest adsorption was attained at pH 8 with an optimum temperature of 40 $^{\circ}$C. The experimental data fit well with the Langmuir isotherm equation ($R^2 = 0.9996$) and the pseudo-second-order kinetic model ($R^2 = 0.9374$) suggesting a chemisorption pathway. But the negative values of ΔG° were observed to indicate that the adsorption of paracetamol is a non-spontaneous process, while ΔH° value obtained was positive (4.2521 kJ/mol), which confirms the endothermic nature of the adsorption process. Meanwhile, ΔS° value is positive (104.1577 kJ/mol) indicating an increase in disorder at the solid/liquid contact during the sorption process. The findings of this study can be applied to future research to determine the optimum strategy for pharmaceutical removal treatment.