OXIDATION OF CELLULOSE AND EFFECT OF ACID/BASE ON THE FORMATION OF COPPER COMPLEX

HAZIQ BIN ZAMRULHIZAM

BACHELOR OF SCIENCES (Hons.) CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

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Ahmad Husaini Mohamed
Supervisor
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

_____

Nurul Huda Abdul Halim
Project Coordinator
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

_____

Mazni Musa
Head of Programme
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
72000 Kuala Pilah
Negeri Sembilan

Date: _____

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ABSTRACT

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There has been an increasing interest in recent years from researchers to modify cellulose. However, reaction conducted mostly are not environmental friendly. In this study, the oxidation reaction of microcrystalline cellulose (MCC) using potassium permanganate ($KMnO_4$) has the ability to be recycled, therefore the process is environmental friendly. This reaction involved the primary hydroxyl groups of the pyranose ring resulting in oxidized MCC (OMCC). The reaction was proceeded by the complexation of OMCC and resulting product is copper-cellulose complex (Cu-OMCC). The optimization of concentration based on mass ratio of $KMnO_4$ to MCC was investigated to get the ideal condition for the oxidation reaction. The reaction conditions for complexation also revealed that higher alkaline solution would be needed to promote complexing ability of OMCC. The result revealed that oxidation of MCC was successful as indicated by the characteristic peaks in the Fourier Transform Infrared (FTIR) spectra through the appearance of COO^- peaks at the range from 1635 to 1640 cm^{-1} and the complexation of OMCC was proved by the appearance of Cu-O peaks at the range from 589 to 617 cm^{-1}. While thermogravimetric (TGA) analysis stated that Cu-OMCC-NH_3 has higher thermal stability with 53.87% weight loss compared to Cu-OMCC-HCl of 72.40% weight loss.