

UNIVERSITI TEKNOLOGI MARA

**EFFECT OF EDTA TREATMENT ON FIBRE
STRUCTURE OF BANANA STEM**

HAFIDAH BINTI LAPOK

Dissertation submitted in partial fulfilment of the requirement for the
degree of

Bachelor of Engineering (Hons) Chemical

Faculty of Chemical Engineering

JULY 2019

ABSTRACT

Banana stem has the potential as alternative for wood pulp. To improve the effectiveness of soda pulping, EDTA (Ethyldiaminetetra acetic acid) was introduced as pre-treatment techniques, where it acts as a chelator to remove lignin and hemicellulose partially before it undergoes pulping. This research was performed to investigate the impact of EDTA on the structure of cellulose and the rate of lignin removal during aoda pulping of banana stem. The pulping process was performed at 20 percent wt/vol under atmospheric pressure using NaOH (Sodium hydroxide) and liquid/aolid ratio of 10. EDTA was added at different concentrations (0, 5 and 10%) and the pulping time for each sample was varied for 60, 90 and 120 minutes respectively. The produced banana stem was analysed for yield, fiber morphology, functional groups and thermal stability. Microscopic, FTIR and TGA are the tools used to analyse the pulp sample. It was discovered that soda pulping using 20% NaOH and 10% EDTA for 60 minutes showed the best fiber structure and paper where optimum circumstances were established. The experimental values and values from other studies were observed to obtain the accurate result.

ACKNOWLEDGEMENT

My sincere gratitude is extended to PM DR Junaidah Jai for her immeasurable amount of support and guidance as well as inspiration that she has given throughout this study. I also thank Madam Nurul Amal Nadhirah, my co-supervisor for her patience and dedication that led to the completion of this study. I also would like to express my gratitude to the staff of the Faculty of Chemical Engineering for their assistance and providing the facilities.

I also want to thank the lecturers of the Faculty of Chemical Engineering of Universiti Teknologi MARA (UiTM), Shah Alam who have imparted their knowledge to us. Special thanks to my course mate for helping me with sharing their knowledge to me. Finally, thank to both of my parents and family for their support.

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CHAPTER 1

INTRODUCTION

1.1 Research Background

In recent years, the use of wood in pulp and paper making have been increasing due to growth in population and constantly rising demand in paper which it led to give global climate impact to environmental consequences. In order to decrease the logging of wood, some researchers change the raw material for pulp and paper to renewable lignocellulosic material. The utilization of agricultural residue for pulp making creates many advantages especially from the environmental aspect. For example, banana stem usually left in the soil plantation after harvesting process and used as organic material.

It left generously amount of residues (Cordeiro, Belgacem, Torres, & Moura, 2004). Instead of being discarded, the banana stem can be used as raw material in pulp making which is biodegradable, have low production cost, readily available (Amir, Abidin, & Shiri, 2017) and the most important is it has low content of lignin where the energy and chemical required during pulping is much less than using wood (Feria, García, Díaz, Garrote, & López, 2012).

These recent years have seen the pulping industry utilizing mechanical or chemical processes to extract lignocellulosic plant fibres. In the native wood matrix, cellulose is the most abundant component where the polysaccharide is the desired product in the pulp and paper production. Commonly, pulping use chemical reactants to dissolve the composition of lignocellulose in raw materials, while mechanical pulping use refining or grinding methods to separate the raw material into fibrous material and there is also semi-chemical process used.

There are many types of chemical pulping processes such as organosolv, soda-anthraquinone, soda, kraft, and kraft-anthraquinone (Abrantes, Amaral, Costa, Shatalov, & Duarte, 2007). In chemical pulping process, full chemical treatment was involved to remove non-cellulose materials components from intact with the cellulose