Effect of different bleaching reagents and process sequences on the properties of steam exploded empty fruit bunch (EFB) fiber

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Abstract. Bleaching reagent process is essential for the production of cellulose, pulp and paper to increase the appearance and quality of the final products. Empty fruit bunch (EFB) is an agricultural waste with lignocellulosic constituent. Recently, the conversion of EFB towards pulp for food packaging and paper manufacturing or cellulose based materials has been actively developed in lab and pilot scales. However, obtaining efficient extraction and bleaching processes is still the main challenge. In this paper, effect of different bleaching reagent at different sequences towards the brightness properties of the EFB fiber is observed. The EFB fiber was pre-treated using steam explosion process, hot water treatment, alkaline treatment before undergo the bleaching process. Four systems of bleaching process were set using NaOCl and NaO_2Cl as the bleaching reagents. Two sets of the system are using single reagent and the other two sets are using mixed reagent. In the single reagent bleaching system, four stages of bleaching process were used for each NaO_2Cl (C) and NaOCl (H) solution respectively. While, the mixed bleaching reagent was conducted with two stages of processes with different sequence of reagents (CH and HC). The bleached cellulose obtained via these two systems were characterized in terms of brightness, chemical composition, thermal characteristic and degree of crystallinity. The mixed bleaching reagent system the HC has produced the best quality of cellulose with brightness at 77.68%. The chemical and thermal characteristic of the bleached pulp fiber does not change when the bleaching method were applied to the fibers. Even though, single bleaching reagent system with sodium chlorite shows almost similar brightness at 78.66%, the quantity of solvent used is higher compared to the mixed bleaching reagent system. As a conclusion, mixed bleaching reagent system is an efficient system to produce better quality of cellulose and paper from EFB.

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Acknowledgement
The authors would like to thank lecturers of Faculty of Chemical & Natural Resources Engineering, University Malaysia Pahang for financial support from grants [RDU1703182 and UIC171004] which has been funded by Universiti Malaysia Pahang, and not forget the LCSB company for their supports in making this project successful