

Investigation on pre-treatment process in microcrystalline cellulose (MCC) from oil palm empty fruit bunch (EFB)

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ABSTRACT

In this study, microcrystalline cellulose (MCC) was extracted from empty fruit bunch (EFB) with alkaline treatment, bleaching and acid hydrolysis treatment and its properties were compared with commercial MCC. Two conditions were optimized in this study which are fiber consistency and sodium hydroxide (NaOH) concentration in alkaline pretreatment. The obtained optimum consistency and alkaline concentration are 5% and 20% respectively. The physicochemical and morphological characteristics, elemental composition and size distribution of the obtained alpha cellulose and MCC were analyzed in this work. Fourier transform infrared spectroscopy (FTIR) analysis provided clear evidence that the characteristic peak of lignin and hemicellulose were absent in the spectrum of the alpha cellulose and MCC. The difference in surface morphology and aggregation between alpha cellulose, MCC and commercialized MCC were observed by scanning electron microscopy (SEM). The mean length of approximately 251.3 μm , 41.4 μm and 138.6 μm were measured for alpha cellulose, MCC and commercialized MCC respectively. Thus, the isolated MCC from EFB has a good potential to be utilized as reinforcing agent in green composites and may be a precursor for future roselle derived nanocellulose, and thus a promising subject in nanocomposite research.

KEYWORDS:

Empty fruit bunch; microcrystalline cellulose; alpha cellulose; alkaline treatment