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# Effects of hydrolysis conditions on the crystallinity, chemical structure, morphology, and thermal stability of cellulose nanocrystals extracted from oil palm biomass residue

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**Abstract:** Cellulose nanocrystals have the hydrolysis of cellulose-based oil palm biomass residues using hydrochloric acid under sonication-hydrothermal conditions. Characterization of cellulose nanocrystals performed by analysis of FT-IR spectroscopy, SEM microgram, diffraction X-RD, and thermal analysis. FT-IR showed the occurrence elimination of lignin and hemicellulose in cellulose nanocrystals spectrum. Morphology of cellulose nanocrystals show a more compact structure and surface morphology arranged regularly compared with cellulose. High crystallinity can be obtained by hydrolysis using hydrochloric acid  $3 \text{ molL}^{-1}$  during reaction time 2 hours. The thermal stability shows the degradation temperature ( $T_{\text{max}}$ ) is high on all cellulose nanocrystals. Treatment parameters such as reaction time, reaction temperature, and the ratio of cellulosic feed stocks-acid affects the yield and crystallinity of cellulose nanocrystals.

**Keywords :** palm bunches, Cellulose nanocrystals, hydrolysis.

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