

**SYNTHESIS AND CHARACTERIZATION OF
POLYURETHANE FOAM WITH CELLULOSE
NANOWHISKER AS A FILLER**

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ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF POLYURETHANE FOAM WITH CELLULOSE NANOWHISKER AS A FILLER

In this study, there were three stages involved which are acid hydrolysis, preparation of control polyurethane (PU) and polyurethane nanocomposites and the last stages were characterization of polyurethane using Fourier Transform Infrared (FTIR) Spectroscopy and Thermogravimetric Analysis (TGA). The first stage is synthesizing of microcrystalline cellulose (MCC) to cellulose nanowhisker (CNW) using acid hydrolysis method. The CNW was analyzed using FTIR and the hydroxyl stretching peak was appear at 3339.35 cm^{-1} . Next step the preparation of control PU and the PU composite which is PU-CNW. CNW was mixed with the isocyanate and polyol using mechanical stirrer. The last stages were characterization of PU and PU-CNW. All types of PU were analyzed using FTIR, urethane linkages observed due to the NH stretching and bending vibration absorptions at 3370 cm^{-1} and 1510 cm^{-1} . The peak C=O vibration at 1708 cm^{-1} only appear in PU-CNW. The PU-CNW 0% and PU-CNW15% was then analyzed using TGA instrument, which the degradation temperature was observed. The PU-CNW 15% showed have a higher degradation temperature rather than PU-CNW 0% from $322.82\text{ }^{\circ}\text{C}$ to 332.72°C . The thermal stability of PU was enhanced by the addition of CNW. This study provides evidence that by adding of cellulose in polyurethane as a filler will increase the thermal stability of polyurethane and the strength of PU control.