

Effects of Different Filler Treatments on the Morphology and Mechanical Properties of Flexible Polyurethane Foam Composites

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Abstract :

A discontinuous foaming process has been employed to investigate the effects of two types of fillers – calcite (CaCO_3) and dolomite ($\text{CaMg}(\text{CO}_3)_2$) on the morphological and mechanical properties of flexible polyurethane foam. The particle sizes of the fillers: 6 nm, 3.5 μm , and 0.84 mm vary from composition ranges of 0 – 40 wt%. Indentation hardness, Tensile strength, and Elongation at break of the polyurethane composites were examined as a function of the filler content in the polyurethane matrix. It was found that the influence of the fillers on the Indentation hardness of polyurethane composite depend strongly on the content and particle size of the fillers. The addition of filler of upto 20 – 35wt% and of nanosizes improves the Indentation hardness of the foam much more than the micro- and macro-scaled fillers. The tensile strength and elongation at break were however, reduced with an increasing amount of filler in the polyurethane matrix for all particle sizes. Morphological examination of the foam revealed that the cell geometry characteristics exert a significant influence on the observed mechanical characteristics. [Nature and Science 2010;8(6):23-26]. (ISSN: 1545-0740).

Key Word :

Polyurethane; calcite; dolomite; Indentation hardness; tensile strength; elongation at break

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