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## Rigid polyurethane foams with infused nanoclays: Relationship between cellular structure and thermal conductivity

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### ABSTRACT

A water blown rigid polyurethane (PU) formulation has been used to manufacture cellular nanocomposites containing different concentrations of montmorillonite nanoclays. The PU foams have been produced using a low shear mixing technique for dispersing the nanoclays and by reactive foaming to generate the cellular structure. A detailed characterization of the cellular structure has been performed. The effect of the nanoparticles on the reaction kinetics and the state of intercalation of the nanoparticles in the foams has been analyzed. The thermal conductivity and extinction coefficient of the different materials has been measured and the results obtained have been correlated with the materials structure. A strong reduction of cell size and modifications on cell size distribution, anisotropy ratio and fraction of material in the struts has been detected when the clays are added. In addition, a reduction of the thermal conductivity has been observed. Different theoretical models have been employed to explain thermal conductivity changes in terms of structural features. It has been found that, in addition to the modifications in the cellular structure, changes in the extinction coefficient and thermal

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