

Thermal Insulating and Morphological Properties of Rigid Polyurethane Foams as Thermal Insulating Materials

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Polyurethane foams have been used as thermal insulating materials for electric appliances such as freezers and refrigerators, etc.. The polyurethane foams (PUFs) were prepared by polyether polyols, polymeric 4,4'-diphenylmethane diisocyanate (PMDI), silicone surfactants, amine catalysts, distilled water and cyclopentane as a blowing agent. Solid and liquid type fillers were used as a nucleating agent to increase morphological properties of the PUFs as well as improve the thermal insulating properties of the PUFs. The PUFs were prepared by adding nucleating agents in the range of 1 to 3 wt%. For the liquid type nucleating agents, the cell size of the PUFs showed minimum and found to decrease compared the PUF without adding nucleating agents. Also, thermal conductivity of the PUFs with adding nucleating agents had best thermal insulating properties. From these results, it is suggested that the thermal insulating property of the PUFs can be improved by adding nucleating agents.