

Effects of Silicone Surfactant on the Thermal Insulating Properties of Rigid Polyurethane Foams

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In this study, the effects of silicone surfactant on the thermal conductivity and cell size of rigid polyurethane foam (PUF) were investigated. PUF samples were prepared from polymeric 4, 4-diphenylmethane diisocyanate (PMDI), polyether polyol, silicone surfactant, amine catalysts, and distilled water as chemical blowing agents. In order to find the effect of silicone surfactant, four different silicone surfactants were used. The differences of each surfactant's structure were analyzed by using FT-IR spectroscopy and ¹H NMR spectroscopy. Properties of the PUF samples were obtained by thermal conductivity analyzer and scanning electron microscopy. From the results, the cell sizes and thermal conductivity of PUF showed the tendency of decrease and increase when silicone surfactants content increased respectively. Furthermore, when an exact surfactant which has the highest ratio of silicone/polyether was used in synthesis of PUF, the lowest values of both thermal conductivity and cell size of PUF were observed.