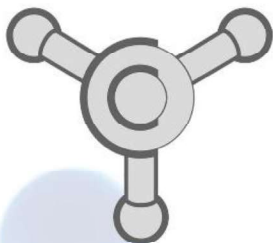


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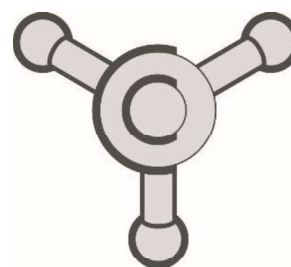
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CMN PP 04

Properties of nanocomposites based on polyurethanes and mesoporous silica nanoparticles

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A series of three polyurethane nanocomposites using mesoporous silica nanoparticles (PU-MSNs) was prepared from Boltorn® hydroxy-functional hyperbranched polyester of the second pseudo generation as a cross-linking agent, α,ω -dihydroxyethoxypropyl- poly(dimethylsiloxane) and 4,4'-methylenediphenyl diisocyanate, by *in situ* two-step polymerization in solution. Each sample of the prepared PU-MSNs had different type of mesoporous silica nanoparticles. For comparison purposes, PU without mesoporous silica nanoparticles was also synthesized. The chemical structure of the PU-MSNs and pure PU as well as the influence of the type of MSN on the hydrogen bonding formation and phase separation were analyzed by FTIR spectroscopy. The effect of the type of the MSNs on the swelling behavior and water absorption was also investigated. The uniform distribution of MSN particles within PU matrix, achieved in PU-MSN nanocomposites, allowed the formation of additional hydrogen bonding and caused enhanced hydrogen bonding compared to the pure PU network. Prepared PU-MSN nanocomposites showed better phase separation, higher swelling degree, lower crosslinking density and better hydrophobicity as compared to pure PU network.

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