

A structure-property study of polyurethane anionomers based on various diisocyanates

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ABSTRACT

Polyurethane (PU) anionomers were prepared as aqueous dispersions using dimethylol propionic acid (DMPA) as the stabilising moiety. The principal diols used were polytetrahydrofuran of molecular weight 1000 (PTHF1000) and cyclohexane dimethanol (CHDM). The diisocyanates used in this study were isophorone diisocyanate (IPDI), hydrogenated methylene bis phenylene diisocyanate (H_{12} MDI), tetramethylene xylene diisocyanate (TMXDI), hexamethylene diisocyanate (HDI) and a 50:50 blend of IPDI and HDI and a 50:50 blend of IPDI and TMXDI. All these samples were neutralised using triethylamine (TEA) and chain extended using hydrazine monohydrate. The dispersions were prepared at an NCO/OH ratio of 2 so that a comparison of their structure - property relationships could be made with respect to their mechanical and viscoelastic properties and solvent resistance. Dynamic mechanical thermal analysis, tensile testing, solvent spot and swelling studies were employed for the characterisation of these materials. The structure of the hard segment was discovered to alter significantly the properties of the PU and synergistic properties could be achieved by employing a combination of diisocyanate hard segments.