OP-13-926

Tuesday, May 10, 2011, 05:20-05:40 pm
Room: Karam 5

IONIC POLYESTERS BASED ON N-ALKYL DIETHANOLAMINE

Miroslav Huskić,[1,2] Ema Žagar,[1] Majda Žigon[1,2]

1 National Institute of Chemistry, Ljubljana, Slovenia and 2 CoE PoliMat, Ljubljana, Slovenia

Polymers based on diethanolamine (DEA) or dipropanolamine have found potential applications in refinery waste water, anticorrosive coatings, nonlinear optics, mineral montmorillonite modification, etc.
Those polymers possess nitrogen atom which enable their transformation into polyions by the addition of acids or alkyl halides. The properties (thermal, solubility…) of polyions significantly differ from those of the parent polymers.
In this work we will present the synthesis, characterization and properties of various N-alkyl diethanolamine based polyesters, polyester hydrochlorides and quarternary polyesters.
Side-chain polyesters were synthesized from N-octyl-, N-dodecyl or N-hexadecyl diethanolamine and succinic acid anhydride. The polyesters were transformed into polyester hydrochlorides and quaternary polyesters using benzylbromide. The degree of modification was from 20 mol% up to 100 mol%.
The structure of all synthesized polyesters was determined by ^{1}H NMR spectroscopy. The thermal properties were studied by DSC and crystal structure by X-ray diffraction.
Polyester with octyl side chains and its hydrochlorides were amorphous liquids at room temperature, while polyester and polyester hydrochlorides with hexadecyl side chains formed a smectic crystalline phase. The polyester with a dodecyl side chain was also an amorphous liquid at room temperature, while its hydrochlorides were liquid crystalline.
Quaternization of polyesters with benzylbromide does not proceed as easy as protonization. 100% modification was only achieved with N-octyl polyester. Quaternary polyesters synthesized from N-octyl- and N-dodecyl diethanolamine were viscous liquids at room temperature. Only the glass transition temperature (T_g) was observed on cooling which increased with increasing degree of quaternisation. Quaternary polyesters synthesized from N-hexadecyl diethanolamine were crystalline but the melting temperature and melting enthalpy decreased with increasing degree of quaternisation.