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Synthesis, characterization and rheological properties of epoxy monomers derived from bifunctional aromatic amines

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Abstract

Several new epoxy monomers were synthesized from glycidylation of functional aromatic amines containing hydroxyl or thiol groups. The epoxy monomers were triglycidyl-2-aminophenol, triglycidyl-2-aminothiophenol, tetraglycidyl-1,2-phenylenediamine and tetraglycidyl-4-methyl-1,2-phenylenediamine. The characterization of the epoxy monomers was carried out by FTIR and 1H NMR spectroscopy. Rheological properties of solutions of the epoxy monomers in ethanol were evaluated using an advanced rheometer. The effect of solution concentration and temperature on the viscosity of the epoxy solution was evaluated. The shear rheology study at various temperatures of the epoxy resins solutions in ethanol was carried out on solutions with concentrations ranges form 0.5 to 5 wt% and temperatures (20–70 °C). The results revealed that the tetra-functional epoxy resins behave as Newtonian liquids and its viscosity is independent on the shear rate. However, the solutions of tri-functional epoxy resins are non-Newtonian liquids, and their viscosities are shear rate dependent. The activation energy of the epoxy monomers was calculated from the Arrhenius equation using solution with concentrations ranges of 0.5–5 wt%. © 2018, Springer-Verlag GmbH Germany, part of Springer Nature.

Author Keywords

Epoxy monomers; FTIR; NMR; Rheological properties and activation energy

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