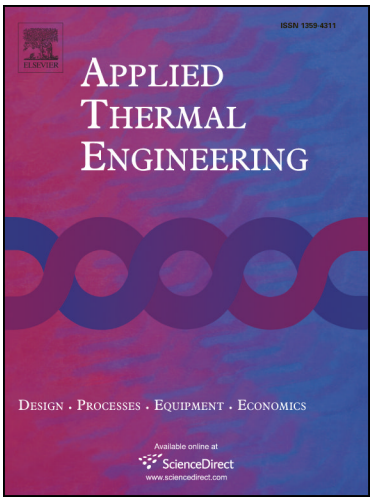

Curing kinetics and thermal characterization of epoxy resin cured with amido-dicarboxylic acids

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Curing kinetics and thermal characterization of epoxy resin cured with amidodicarboxylic acids

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ABSTRACT

Thermal properties and the curing kinetics of a system based on DGEBA as epoxy resin and two amidodicarboxylic acids as hardeners (epoxy ring/carboxylic proton at 1/0.7 molar ratio) were investigated using differential scanning calorimetry (DSC) and simultaneous TG/FT-IR/MS analysis. "Thermokinetics-3" software (Netzsch) was used to simulate the curing reaction mechanisms and thermal degradation of the crosslinked products, simultaneously with the kinetic parameters determination. According to data obtained with this program, the crosslinking proceses occurred in two or three steps while the thermal processes occurred in three steps, depending on the chemical structure of the crosslinking agents.

Keywords: Amidodicarboxylic acids, Epoxy resins, Curing kinetics, Thermal stability.

1. Introduction

Some of the most important thermosetting materials are the epoxy resins because, after curing these acquire special properties such as mechanical strength and heat resistance, resistance to solvents and humidity, high temperature glass transition and excellent behavior as electrical insulating. The properties listed above allow that these materials to be used as adhesives or matrix for composites both in industry as well as in domestic field [1-3]. The main epoxy resins contain in their chemical structure aromatic, aliphatic or cycloaliphatic moieties. The most important multifunctional epoxy resins are obtained from, polyols, polyacids, bisphenols, aromatic amines, resins of novolac type, cycloolefines, vegetable oils, levopimaric acid derivatives etc [4-8].

Generally a specific formulation for thermosetting materials is based on epoxy resin and hardener. At these components are added, depending on the purpose: catalysts, agents for