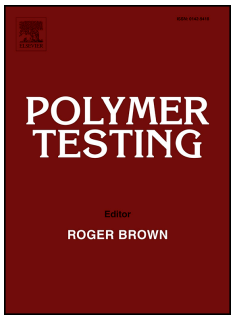

The thermal decomposition behavior and kinetics of epoxy resins cured with a novel phthalide-containing aromatic diamine

Xuhai Xiong, Lu Zhou, Rong Ren, Siyang Liu, Ping Chen

PII: S0142-9418(17)31927-X

DOI: 10.1016/j.polymertesting.2018.02.012

Reference: POTE 5336

To appear in: *Polymer Testing*

Received Date: 30 December 2017

Revised Date: 9 February 2018

Accepted Date: 9 February 2018

Please cite this article as: X. Xiong, L. Zhou, R. Ren, S. Liu, P. Chen, The thermal decomposition behavior and kinetics of epoxy resins cured with a novel phthalide-containing aromatic diamine, *Polymer Testing* (2018), doi: 10.1016/j.polymertesting.2018.02.012.

The thermal decomposition behavior and kinetics of epoxy resins cured with a novel phthalide-containing aromatic diamine

Xuhai Xiong [a], Lu Zhou [a], RongRen[a,*] Siyang Liu[b], Ping Chen[b*]

[a] *Liaoning Key Laboratory of Advanced Polymer Matrix Composites, Shenyang Aerospace University, Shenyang 110136, China*

[b] *State Key Laboratory of Fine Chemicals, School of Chemical Engineering, Dalian University of Technology, Dalian 116012, China*

Abstract

The thermal decomposition behaviors and kinetics of diglycidyl ether of bisphenol A (DGEBA) epoxy resin cured by a novel phthalide-containing aromatic diamine (BAPP), were studied by thermal gravimetric analysis (TGA) technique in comparison with these of epoxy systems cured by 4,4′-diaminodiphenylsulfone (DDS) and equimolar mixture of DDS/BAPP, respectively. The initial decomposition temperature ($T_{initial}$) and integral procedure decomposition temperature (IPDT) were used to evaluate the thermal stability of cured epoxy resins. $T_{initial}$ values are reduced with increasing BAPP content, while IPDT results show the cured DGEBA/BAPP system has the highest inherent thermal stability. The microstructure morphology of charred products, derived from the thermal decomposition of the cured epoxy networks, were characterized by scanning electron microscope (SEM). The decomposition kinetics was investigated by isoconversional approach and the activation energy (E_a) calculated by Starink equation exhibits different dependence on conversion (α) for three epoxy systems. Truncated Sestak-Berggren model was used to describe the thermal decomposition mechanism, and the result shows a good agreement between the experimental data and the theoretical model.

Keywords: thermal decomposition; epoxy resin; aromatic diamine; isoconversional approach

* Corresponding author.
Tel.: +86 24 89723970.
E-mail address: Ren Rong@sau.edu.cn (R. Rong), Chenping_898@126.com