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Thermal degradation behavior of liquid crystalline thermoset with MgO

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A weighed amount of diglycidyl ether of 4, 4-bisphenol (DGEBP) was placed in the 170 °C convection oven to be melted. Once sample was melted, a stoichiometric amount of sulfanilamide (SAA) was added to the melt. To fabricate composites, DGEBP were melt-blended with the filler, MgO. The mixture was cured for 4 hours at 180 °C. The liquid crystalline phase change of DGEBP was investigated by POM and DSC. The dispersion of filler was investigated by FE-SEM and EDS. The thermal stability of composites was investigated by thermogravimetric analysis (TGA) over the temperature range of 25 to 1000 °C. The heating rates were used to calculate the activation energies for thermal decomposition under nitrogen were 5, 10, 20 and 40 °C/min. The activation energies of thermal degradation were calculated by Flynn-Wall method and Kissinger method, respectively. Activation energies for decomposition (Ed) of DGEBP-SAA-MgO composite system were calculated as follows. It is an integral method which allows determination of Ed as a function of conversion α by a weight loss process as follows, ln q=C-(Ed/R) (1/T) where Ed is the overall activation energy for weight loss measured at conversion α, q is the heating rate, C is a constant, R is the gas constant and T is the absolute temperature where conversion α is reached at heating rate q. The conversion was calculated as the ratio of actual weight loss to total loss corresponding to a given stage of the degradation process as follows, α=(Mo-Mt)/(Mo-M∞) where Mo is the initial mass, Mt is the mass at time t and M∞ is the residual mass after completion of weight loss process. The activation energies for DGEBP-SAA-MgO system calculated by slopes of plots of Flynn-Wall method and Kissinger method are compared in Table 1.

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