

Thermal Analysis of Poly acrylonitrile-co-
bis(2-chloroethyl) vinyl phosphate

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Polyacrylonitrile (PAN) and copolymer of acrylonitrile (AN) and bis-(Beta chloroethyl) vinylphosphate (BBCVP) were synthesized by emulsion polymerization with a redox initiator at 55°C. The copolymer compositions were determined by the elemental analysis of nitrogen content.

Thermal behavior was examined by Defferential Scanning Calorimetry (DSC) and Thermogravimetry (TG) under nitrogen atmosphere. In the DSC experiment, PAN homopolymer exhibits a very sharp exotherm at 270°C caused by the oligomerization of nitrile groups. However, copolymer shows that the exotherm temperature is decreased with increasing BBCVP content due to the strong initiating effect of BBCVP. TG analysis of the copolymer reveals that the weight loss of copolymer is reduced in comparison to PAN homopolymer owing to the flame retardant function of the chlorine and phosphorus of BBCVP.

Comparative rate of the degradation has proposed on the basis of Fourier Transform Infrared (FTIR) studies of the PAN and copolymer isothermally heated at 180°C for 10min, 20min, and 30min respectively. The rate of degradation is observed to be markedly increased with the increment of BBCVP content.