

Thermal Behavior of Polyacrylonitrile and Poly(vinylpyrrolidone-graft-acrylonitrile) Blend

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The role of hydrophilic poly(vinylpyrrolidone-graft-acrylonitrile) (PGA) copolymer and the plasticization effect of water in melting behavior of polyacrylonitrile (PAN)-PGA blend were investigated. The PAN-rich PGA blend was obtained by *in-situ* polymerization of the PAN homopolymer and the PGA copolymer. Depression of the melting point of PAN in the presence of the PGA occurred thereby involving an endothermic transition of the wet blend powder at atmospheric pressure (Figure 1). This was due to a plasticization effect of water inducted into PAN matrix by the PGA. X-ray scattering showed that in the blend powder the crystalline phase of PAN was unaffected by PGA and the amorphous phase of PAN contained PGA domain. On compressing with heating, the wet blend powder formed a transparent sheet, in which the crystalline structure of PAN was changed from hexagonal to orthorhombic lattice. The amount of PAN chain participating in thermal motion for melting varies with absorbed water content.

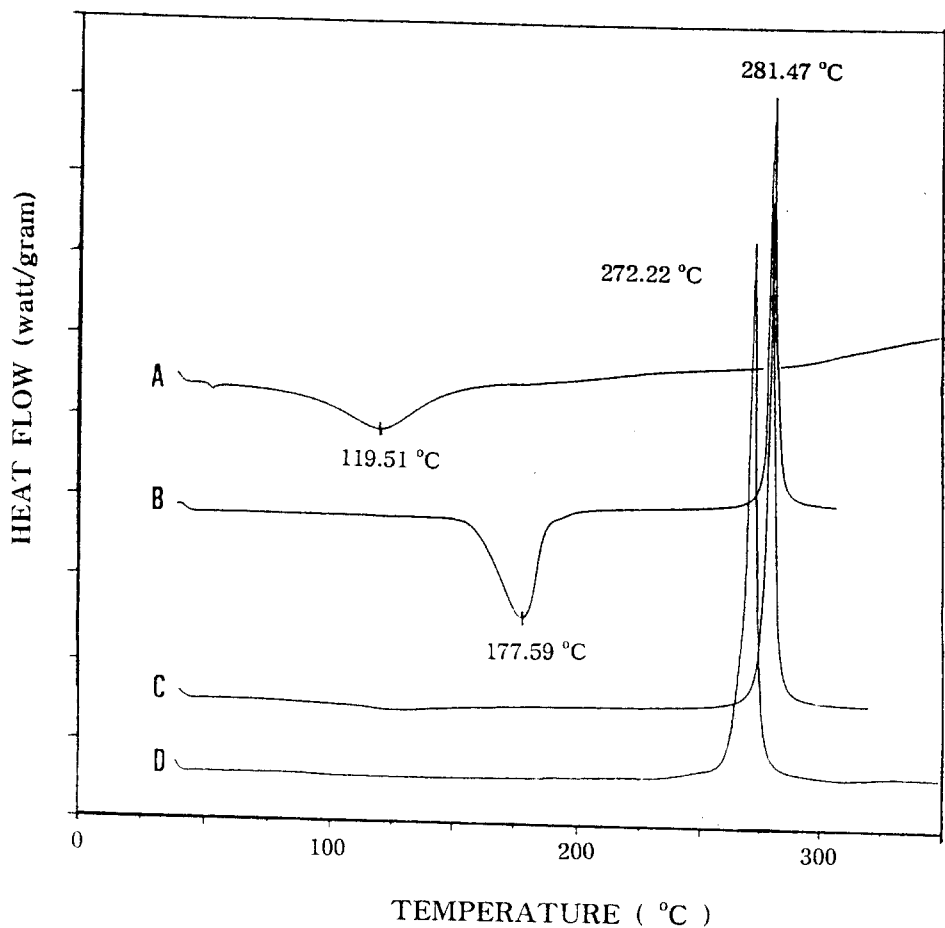


Figure 1. DSC thermograms of (A) wet PVP, (B) wet PAN-PGA blend, (C) dry PAN-PGA blend, and (D) PAN that were measured in the atmospheric condition. The unit scale of the ordinate is 2.5 watt/gram.