

The Effect of Low-Temperature Photo-Bulk Polymerization Conditions of Vinyl Acetate on the Molecular Parameters of Poly(vinyl Alcohol)

류원석, 하완식*

한국과학기술연구원 고분자연구부, *서울대학교 섬유고분자공학과

Vinyl acetate was polymerized in the ultraviolet-ray initiated bulk system at low temperatures using 2,2'-azobis(2,4-dimethylvaleronitrile) (ADMVN) and 2,2'-azobis(isobutyronitrile) (AIBN) as photoinitiators, respectively. High molecular weight (HMW) poly(vinyl alcohol) (PVA) having number-average degree of polymerization (P_n) of 3,900-7,800, syndiotactic diad (S-diad) content of 53-54% could be prepared by the complete saponification of synthesized poly(vinyl acetate) (PVAc) having P_n of 5,900-9,400. The degree of branching for acetyl group was about 0.25-0.40, and that increased with an increase in the polymerization temperature and conversion. P_n of PVA using ADMVN was larger than that of PVA using AIBN. On the other hand, the conversion of the former was smaller than that of the latter, and it was found that the initiation rate of ADMVN was lower than that of AIBN. P_n of PVA was constant and independent of the increase of P_n of PVAc contrary to the increase of conversion. The syndiotacticity (Figure 1), crystal melting temperature, thermal stability, and whiteness of PVA from PVAc polymerized at lower temperatures were much superior to those of PVA from PVAc polymerized at higher temperatures (Figure 1).

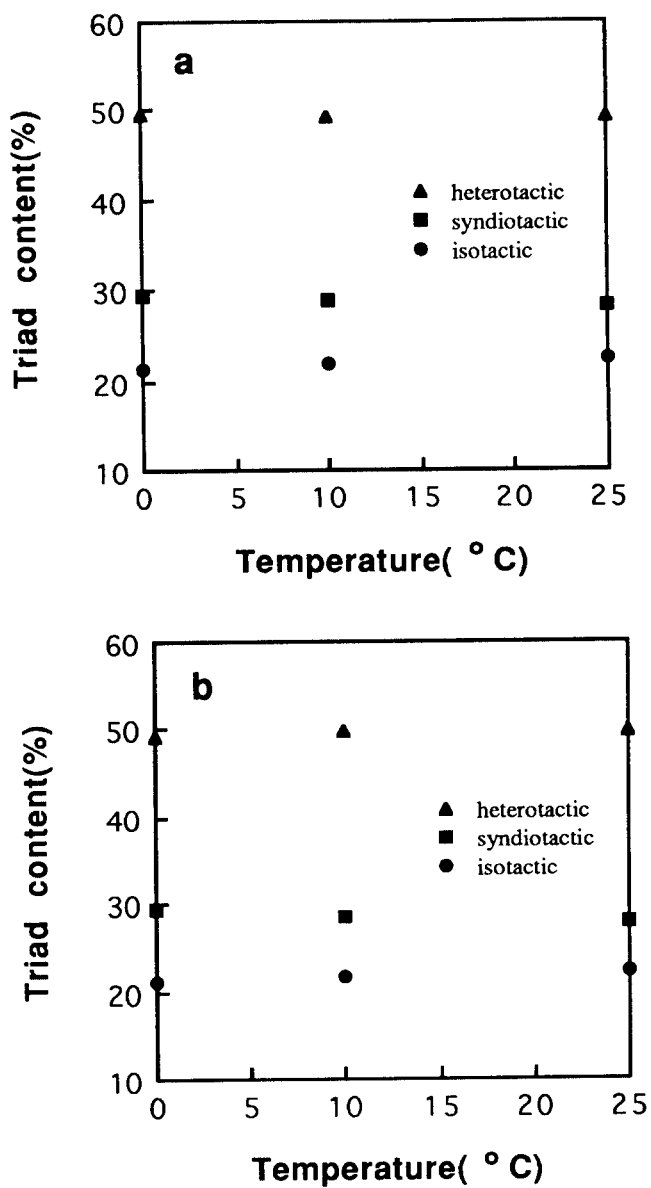


Figure 1. Triad tacticities of (PVA)s from (PVAc)s photo-bulk polymerized using AIBN (a) and ADMVN (b) at three different polymerization temperatures.