

Synthesis and Characterization of Cross-linked Poly(ethylene terephthalate) Containing Sodium Sulfonate Groups

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Sodium sulfonate group containing polyesters have a variety of applications. Copolyesters containing more than 10mol% of dimethyl 5-sulfoisophthalate sodium salt(DMS) have good water dispersibility and are usually used for sizing components. Many workers studied the water dispersibility of these polymers from both the academic and the industrial viewpoint. Though water dispersibility is one of the characteristic feature of these polymers, it can also restrict further application where chemical or dimensional stability is important. For example, sulfonate groups in a polymer impart ionic properties to the polymer and can act as reactive sites for many applications such as ion exchange resins and ionic substrates for conductive polymer synthesis.

In this study we have attempted to prepare a cross-linked poly(ethylene terephthalate) containing sodium sulfonate groups. Conventional two-stage polymerization was performed on a laboratory scale polymerization reactor in the melt. The first stage was the transesterification of dimethyl terephthalate, ethylene glycol, DMS, and trimethyl trimellitate(TMTM) as a cross-linking agent. DMS content was 10mol% of total diacid derivatives and TMTM content was varied from 0 to 10mol%. Spectroscopic techniques were performed in order to identify the microstructure of the polymers. As increasing TMTM content, solubility in water decreased and the resultant solutions gradually showed gel-like properties. The glass transition temperature did not vary significantly with TMTM content. Scanning electron microscopic analysis was also performed to investigate the effect of cross-linking on the microporosity of the polymers.