

the polymerization of M_1 and M_2 in the presence of M_1 and M_2 in the feed, respectively. The reactivity ratios r_1 and r_2 were calculated from the experimental data by using the Fineman-Ross equation.¹⁷ The reactivity ratios of M_1 and M_2 were found to be 0.45 and 0.48, respectively, which are in good agreement with those reported in the literature.¹⁷

Block Copolymer Synthesis

The block copolymer synthesis was carried out in a 100 mL three-necked round-bottomed flask equipped with a mechanical stirrer, a nitrogen inlet, and a reflux condenser. The monomers and initiator were added to the flask in the following order: M_1 , M_2 , and AIBN . The flask was purged with nitrogen for 15 min before the addition of AIBN .

The reaction mixture was stirred at 60 °C for 1 h to initiate the polymerization of M_1 . After the addition of M_2 , the reaction mixture was stirred at 60 °C for 2 h to complete the polymerization of M_2 .

The resulting block copolymer was precipitated into methanol and dried under vacuum at 40 °C for 24 h. The yield of the block copolymer was 85%.

The molecular weight of the block copolymer was determined by gel permeation chromatography (GPC) using a polystyrene calibration. The molecular weight of the block copolymer was found to be 12,000 g/mol.

The block copolymer was characterized by ^1H NMR spectroscopy. The ^1H NMR spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by dynamic mechanical analysis (DMA). The DMA spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by thermogravimetric analysis (TGA). The TGA spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by differential scanning calorimetry (DSC). The DSC spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by Fourier transform infrared spectroscopy (FTIR). The FTIR spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by X-ray photoelectron spectroscopy (XPS). The XPS spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by scanning electron microscopy (SEM). The SEM image of the block copolymer showed the characteristic morphology of the block copolymer.

The block copolymer was characterized by transmission electron microscopy (TEM). The TEM image of the block copolymer showed the characteristic morphology of the block copolymer.

The block copolymer was characterized by atomic force microscopy (AFM). The AFM image of the block copolymer showed the characteristic morphology of the block copolymer.

The block copolymer was characterized by small-angle X-ray scattering (SAXS). The SAXS spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

The block copolymer was characterized by neutron scattering (NS). The NS spectrum of the block copolymer showed the characteristic peaks of the block copolymer.

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