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Manipulating the structural conformation of block copolymer micelles using co-solvent mixtures ELIZABETH G. KELLEY, THOMAS P. SMART, MILLICENT O. SULLIVAN, THOMAS H. EPPS, III, Department of Chemical Engineering, University of Delaware — The internal structure of poly(butadiene-*b*-ethylene oxide) (PB-PEO) block copolymer micelles was manipulated through the use of co-solvent mixtures. In aqueous solutions, the PB-PEO block copolymers self-assembled into monodisperse, spherical micelles with well-defined PB cores surrounded by PEO coronas. The addition of tetrahydrofuran (THF) to the micelle solution improved the solvent quality for the PB block and resulted in the swelling of the micelle cores. The average micelle size decreased with increasing THF content as shown by dynamic light scattering, small angle X-ray scattering, and cryogenic transmission electron microscopy. The distribution of PB in the micelles was studied using nuclear magnetic resonance spectroscopy and small angle neutron scattering. Finally, the spherical micelles disassembled in co-solvent mixtures containing greater than 72 vol% THF. This result was consistent with phase behavior studies of PB homopolymer, which indicated that PB is soluble in water-THF mixtures up to a similar THF solution composition.

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