36−54 Formation of thermosensitive water-soluble copolymers with phosphinic acid groups and the thermosensitivity of the copolymers and copolymer/metal complexes

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Thermosensitive and water-soluble copolymers were prepared through the copolymerization of acryloyloxypropyl phosphinic acid (APPA) and N-isopropyl acrylamide (NIPAAm). The thermosensitivity of the copolymers and copolymer/metal complexes was studied. The APPA-NIPAAm copolymers with less than 11 mol % APPA moiety had a lower critical solution temperature (LCST) of approximately 45℃, but the APPA-NIPAAm copolymers with greater than 21 mol % APPA moiety had no LCST from 25 to 55℃. The APPA-NIPAAm copolymers had a higher adsorption capacity for Sm^{3+}, Nd^{3+}, and La^{3+} than for Cu^{2+}, Ni^{2+} and Co^{2+}. The APPA-NIPAAm (10:90) copolymer/metal (Sm^{3+}, Nd^{3+}, or La^{3+}) complexes became water-insoluble above 45℃ at pH 6-7, but the APPA-NIPAAm (10:90) copolymer/metal (Cu^{2+},Ni^{2+}, or Co^{2+}) complexes were water-soluble from 25 to 55℃ at pH 6-7. The temperature at which both the APPA-NIPAAm copolymers and the copolymer/metal complexes became water-insoluble increased as the pH values of the solutions increased. The APPA-NIPAAm copolymers were able to separate metal ions from their mixed solutions when the temperature of the solutions was changed; this was followed by centrifugation of the copolymer/metal complexes after the copolymers were added to the metal solutions.

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