Synthesis and Surface Behavior of Novel Nonionic Di-block Water-borne Polyurethane Surfactants

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Abstract: A novel series of nonionic polymeric surfactants, i.e. water-borne di-block polyurethane (PU) surfactants, were synthesized by the addition polymerization of Analytical-grade isocyanic acid, ethylene (3, 5, 5-trimethyl-3, 1-cyclohexylene) ester (IPDI), vinyl-terminated polyethylene glycol(PEO) and polypropylene oxide(PPO). Their chemical structures were characterized and confirmed by FTIR and ¹HNMR analysis. The surface behaviors of these PU surfactants in the aqueous solution were investigated. The results show that the critical micelle concentrations of these nonionic PU surfactants were about 10⁻⁸ mol/L with the lowest surface tension of 35.1mN/m. Some influences of factors on the surface tension of these surfactants were also discussed, such as molecular weight, composition of the hydrophilic/hydrophobic segments, electrolyte and the rest time. Finally, UV-visible spectroscopic studies demonstrated the presence of colloidal aggregates.

Key words: polymeric surfactants; polyurethane; synthesis; surface activity