

**COMPLEX FORMATION OF BETA-CYCLODEXTRIN IN AQUEOUS
MEDIA WITH POLY(N,N-DIMETHYLACRYLAMIDE) CONTAINING
PENDENT PERFLUOROOCTANESULFONAMIDO GROUPS**

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The effect of time on the viscosity of solutions of 0.50-1.0 weight % polyacrylamide copolymers containing 2-(N-ethylperfluorooctanesulfonamido)ethyl acrylate (FOSA) comonomer units was monitored at constant shear rates varying from 0.60 to 3.0 sec⁻¹. The viscosities decreased to a plateau over a period of about thirty minutes. The copolymer solutions sheared at much higher shear rates of 24 sec⁻¹ showed pronounced shear thinning but regained most of their original viscosities after standing for 20 minutes. Heating the solutions less than one hour caused an increase in the low shear viscosity whereas longer heating times decreased solution viscosities presumably due to hydrolysis of the acrylate groups. Addition of beta-cyclodextrin to solutions of the hydrophobically modified polyacrylamide resulted in sharply decreased copolymer viscosities at cyclodextrin concentrations on the order of about 10³ M. The above is consistent with competitive hydrophobic association of the perfluorocarbon groups of the copolymer with the cyclodextrin disrupting the mutual association of the perfluorocarbon groups.

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Also water-soluble poly(N,N-dimethylacrylamide) (PDMA) copolymers hydrophobically modified with 2-(N-ethylperfluorooctanesulfonamido)ethyl acrylate (FOSA) comonomer were prepared by ammonium persulfate/Na₂S₂O₈ initiated free-radical copolymerization of N,N-dimethylacrylamide (DMA) (4-40 wt%) and FOSA in deionized water and potassium perfluorooctanoate surfactant at 50°C. Alternatively AIBN initiated aqueous polymerizations were carried out at higher DMA concentrations (70-90%) or in bulk, in or without the presence of beta cyclodextrin (β -CD) at 50°C.

Complex formation with β -CD of two of the latter type of copolymers containing 0.1 mole % FOSA was studied by viscometry. Thus addition of β -CD to solutions of these copolymers resulted in sharply decreased viscosities. The decreases observed were found to be consistent with the formation of 1:1 β -CD -FOSA complexes. From these data approximate β -CD -FOSA binding constants were determined on the order of 10⁴ M⁻¹ to 10⁵ M⁻¹. The addition of β -CD to solutions of PDMA homopolymer had no effect on the viscosity.

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