The effect of time on the viscosity of solutions of 0.50-1.0 weight % polyacrylamide copolymers containing 2-(N-ethylperfluoroctanesulfonamide)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 10\(^3\) 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.
Also water-soluble poly(N,N-dimethylacrylamide) (PDMA) copolymers hydrophobically modified with 2-(N-ethylperfluorooctanesulfonamido)ethyl acrylate (FOSA) comonomer were prepared by ammonium persulfate/Na2S2O5 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 10^4 M^-1 to 10^3 M^-1. The addition of β-CD to solutions of PDMA homopolymer had no effect on the viscosity.
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.