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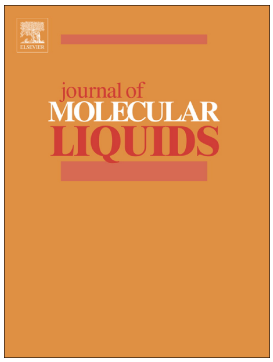

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Adsorption equilibrium and dynamic surface tension of alkyl polyglucosides and their mixed surfactant systems with CTAB and SDS in the surface of aqueous solutions

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ABSTRACT

The surface adsorption equilibrium and dynamic surface tension (DST) of alkyl polyglucosides (APGs) with single or mixed carbon chains ($C_8G_{1.46}$,$C_{10}G_{1.54}$,$C_{12}G_{1.46}$,$C_{8/10}G_{1.31}$ and $C_{12/14}G_{1.43}$), and of the mixed surfactant systems $C_8G_{1.46}$-CTAB and $C_8G_{1.46}$-SDS in aqueous solutions were studied. The magnitude in descending order for cmc and γ_{cmc} values of various APGs were C_8G_1>$C_{10}G_1$>$C_{12}G_1$ and $C_{8/10}G_{1.31}$> $C_{12/14}G_{1.43}$. Both the APGs with single carbon chain and the APGs with mixed carbon chains, have approximately the same Γ_m and A_{min} values.

When the concentration of APG is relatively small, the adsorption is controlled by diffusion. When APG concentrations increase, the adsorption mechanism changes from diffusion controlled into barrier controlled.

The apparent diffusion coefficient (D_a) decreases with an increase in APG concentrations. And the D_a values of various APGs at the same concentration in descending order of magnitude is $C_8G_{1.46}$ > $C_{10}G_{1.54}$ > $C_{12}G_{1.46}$ and $C_{8/10}G_{1.31}$ > $C_{12/14}G_{1.43}$. The magnitude in descending order for the adsorption barrier values (E_a) of different APG products was $C_8G_{1.46}$ > $C_{10}G_{1.54}$ > $C_{8/10}G_{1.31}$ > $C_{12/14}G_{1.43}$ > $C_{12}G_{1.46}$. The longer the carbon chain of the APG molecules, the smaller the repulsive force of the APG molecules on the surface, and the faster the DST drops.

In the $C_8G_{1.46}$-CTAB mixed system, when CTAB has relatively small concentration, adding $C_8G_{1.46}$ to CTAB solution will result in significantly lowered DST values. But when CTAB

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