Association of cationic surfactants to humic acid: Effect on the surface activity

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Surface properties of aqueous solutions of mixtures of humic acid, HA, and a series of cationic surfactants, CnTAB, have been studied. For a fixed amount of HA, the concentration of surfactant at which micelle-like aggregates are formed, cac, were determined. The log(cac) varies with the number of carbon atoms in the surfactant alkyl chain in a way similar to that shown by the log(cmc) of the pure surfactants. The addition of small amounts of C nTAB to an aqueous solution of HA has a huge effect on the surface tension decrease of water. This enhancement of the surface activity exhibited by mixtures of HA and CnTAB is explained in terms of the efficiency and effectiveness of surface adsorption. These parameters were determined by measuring the values of pC20, and the excess surface concentration ?, respectively. The values of the standard free energy of adsorption, ?Gad°, were also determined as a function of the surfactant chain length, and from this relation the contribution by methyl