



ABSTRACT

The kinetics study of the oxidation of vitamin C by ferric chloride hexahydrate was investigated in the ethanol solution of nonionic surfactant viz. octadecylamine (ODA) at pH 3 under pseudo-first order conditions. The critical micelle concentration (CMC) of surfactant was determined by surface tension measurement. The effect of pH (2.5-4.5) and temperature (15-35°C) in the presence and absence of surfactant were investigated. Activation parameters for the reaction were calculated by using Arrhenius and Eyring plots. The values of these parameters in the absence of ODA were,  $\Delta E^\ddagger = +39.65 \text{ kJ mol}^{-1}$ ,  $\Delta H^\ddagger = +37.12 \text{ kJ mol}^{-1}$ ,  $\Delta S^\ddagger = -188.01 \text{ JK}^{-1}\text{mol}^{-1}$ ,  $\Delta G^\ddagger = +41.82 \text{ kJ mol}^{-1}$  and in the presence of ODA were  $\Delta E^\ddagger = +44.56 \text{ kJ mol}^{-1}$ ,  $\Delta H^\ddagger = +42.07 \text{ kJ mol}^{-1}$ ,  $\Delta S^\ddagger = -74.32 \text{ JK}^{-1}\text{mol}^{-1}$ ,  $\Delta G^\ddagger = +43.92 \text{ kJ mol}^{-1}$ . Surface excess concentration ( $\Gamma_{max} = 1.40 \text{ mol m}^{-2}$ ), minimum area per surfactant molecule ( $A_{min} = 2.3 \times 10^{-10} \text{ m}^2$ ), average area occupied by each molecule of surfactant ( $a = 118.0 \text{ m}^2$ ), surface pressure at the CMC ( $\Pi_{max} = 29.2 \times 10^{-2} \text{ mNm}^{-1}$ ), Gibb's energy of micellization ( $-\Delta G_M^0 = 13.68 \text{ kJ mol}^{-1}$ ), Gibb's energy of adsorption ( $-\Delta G_{ad}^0 = 13.88 \text{ kJ mol}^{-1}$ ) were calculated. It was found that the micellar solution of surfactant showed faster oxidation rate than in the pure ethanol. The micellar effects were quantitatively explained by using pseudophase kinetic model. The mechanism was established as following, in the absence of ODA and in the presence of ODA, respectively.

