

**Kinetics and Mechanism of Aquation of Tris
(3, 4, 7, 8 - Tetramethyl - 1, 10 -
Phenanthroline) Iron (II) Suphate in
Aqueous Sodium Lauryl Sulphate.**

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Abstract:

In this thesis we report the kinetics and mechanism of the aquation of tris(3, 4, 7, 8-tetramethyl, 10 phenanthroline) Iron(II) sulphate in aqueous micellar solution of Sodium Lauryl sulphate (NaLS).

The aquation is inhibited by NaLS in the presence of H^+ , OH^- , SO_4^{2-} , NH_4^+ and tetraethylammonium ion (Et_4N^+). The inhibition is attributed to the stable association or binding between the complex and the micelle and the decrease in the activity of water in the micellar phase. The partitioning of the substrate between the bulk water solution and the micellar phase is in favour of the latter. The k_{ψ} -[surfactant] profiles are structured due to micellar evolution.

A mechanism which fits kinetic data at low surfactant concentration is proposed. From the rate law obtained and kinetic data observed, the micelle-complex binding constant K_1 and micelle-acid binding constant K_3 are calculated to be 2.81×10^5 and $13.80 \text{ mol}^{-1} \text{ dm}^3$ respectively in acid medium. Using Scatchard method, K_1 in neutral medium is $3.95 \times 10^5 \text{ mol}^{-1} \text{ dm}^3$. The decrease in K_1 in acid medium is due to competition for the binding sites on the micelle by the acid proton H^+ and the complex ion.

The rate of reaction is a function of equilibrium distribution of all the substrates between the micellar phase and bulk water phase. The evolution of the micelle with respect to the c.m.c. is also a function of the nature of the substrate present in solution. Calculated activation parameters suggest strong steric stabilisation of the transition state with respect to entropy. The magnitudes of activation parameters ΔH^\ddagger and ΔS^\ddagger are functions of the surfactant concentration. ΔH^\ddagger (KJ mol^{-1}) and ΔS^\ddagger ($\text{JK}^{-1} \text{ mol}^{-1}$) for the aquation in 0.00, 1.0×10^{-4} and $2.0 \times 10^{-4} \text{ mol dm}^{-3}$ NaLS are respectively: 100.40 ± 2.04 , 22.58 ± 0.16 ; 111.48 ± 1.15 , 48.94 ± 0.09 ; 119.19 ± 1.15 , 67.16 ± 0.09 in 1.00M H_2SO_4 .

Keywords: Kinetics/ aquation of tris

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