E2-05 : A KINETIC STUDY OF THE OXIDATION OF PIPERIDINE BY POTASSIUM FERRICYANIDE

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A large number of kinetic studies of oxidation of organic compounds by ferricyanide have hitherto been made. However, the reaction of piperidine with ferricyanide has not been studied. As such, the study of the kinetics of this reaction was attempted in the present work.

The kinetics were studied under pseudo order conditions by mixing ferricyanide with excess piperidine using aqueous NaOH as the solvent. The progress of the reaction was monitored spectrophotometrically by measuring the absorbance of ferricyanide at 420 nm.

A series of experiments were carried out varying the concentration of piperidine, keeping the pH constant. Graphs of logarithm of absorbance versus reaction time gave straight lines indicating that the order with respect to ferricyanide is 1. The logarithm of the slopes of the above graphs, when plotted against the logarithm of the concentration of piperidine gave a straight line with a slope of 1, showing that the reaction is first order in piperidine too. By a similar method it was found that the order with respect to H^+ is -1.

From the intercept of the above log-log plot the overall rate constant was calculated to be 2.11×10^{-15} s^{-1}, at 300 K. The following mechanism is proposed which is in agreement with the observed orders:-