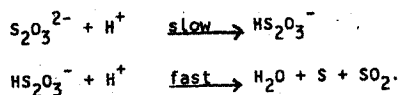


**A KINETIC STUDY OF THE ACID DECOMPOSITION  
OF SODIUM THIOSULPHATE**

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Very few studies have been done on the acid decomposition of thiosulphate ions although the reaction looks simple according to the stoichiometric equation,  $S_2O_3^{2-} + 2H^+ \longrightarrow SO_2 + S + H_2O$ . The reaction having a trimolecular stoichiometry is very unlikely to be an elementary reaction. Multistep mechanisms have been proposed without referring to any kinetic studied. Further, there are no reported values for the rate constant of this reaction.

In the present work an attempt was made to study the kinetics of the decomposition reaction using two different experimental procedures. In the first procedure the reaction kinetics were investigated under pseudo-order conditions at very early stages of the reaction. These experiments revealed that the rate law has the form, rate =  $k[S_2O_3^{2-}][H^+]$ . In the second procedure the conventional sampling method was used to determine the overall rate constant of the reaction.  $NaHCO_3$  was used as the quencher. From experiments done at 292 K varying the initial amounts of  $S_2O_3^{2-}$  and  $H^+$  the rate constant was found to be  $1.64 \times 10^{-3} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ . From experiments done at different temperatures with the same initial concentrations of  $S_2O_3^{2-}$  and  $H^+$  the activation energy and the pre-exponential factor were found to be  $6.5 \text{ KJ mol}^{-1}$  and  $1.1 \times 10^3 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ , respectively. Experiments with different acids revealed that the anion of the acid has no effect on the reaction rate. The following mechanism is proposed which is consistent with the observed rate law.



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