

# A KINETIC ANALYTICAL METHOD FOR THE DETERMINATION OF THIOSULPHATE AND TRACE COPPER

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The kinetics of the reaction  $2\text{Fe}^{3+} + 2\text{S}_2\text{O}_3^{2-} \rightarrow 2\text{Fe}^{2+} + \text{S}_4\text{O}_6^{2-}$ , was studied colorimetrically by measuring the absorption of the complex of Fe with thiocyanate at 470nm. The kinetics of the reaction is given by  $-\frac{d}{dt}[\text{Fe}^{3+}] = k [\text{Fe}^{3+}][\text{S}_2\text{O}_3^{2-}]$ , where  $k = 5.398 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$  at  $29.0^\circ\text{C}$ . This enabled us to determine the concentration of thiosulphate from a linear calibration plot where  $\frac{1}{\Delta t}$  is plotted against  $[\text{S}_2\text{O}_3^{2-}]$ ,  $t$ , being the time taken for absorption to decrease from 0.6 to 0.4. This method has extended the sensitivity of the determination of thiosulphate to the range  $10^{-3}$  to  $10^{-4} \text{ mol dm}^{-3}$ . The catalytic activity of Cu (II) on the iron (III)—thiosulphate reaction was reported by Hahn, Ramaswamy and Halimdoss where their determination was based on a non linear calibration graph which could involve large errors. Our study enabled us to determine Cu(II) from linear calibration plot where  $\frac{1}{\Delta t}$  is plotted against Cu (II) concentration,  $\Delta t$ , being the time taken for absorption to decrease from 0.6 to 0.2. Our study also showed that of the 20 metal ions tested only Cu(II) showed activity.

## References:

1. Hahn, F. L. and Leimbach, G. (1922) *Ber. dt. chem. Ges.* **55**, 3070
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3. Halimdoss, K. K. and Awadallah, R. (1970), *Analyst*, **95**, 207.