E2-06: Kinetic spectrophotometric determination of trace amounts of mercuric ions

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The catalytic effect of Hg(II) on the reaction of nitrosobenzene with hexacyanoferrate(II) has been used for the determination of trace amounts of Hg(II). The method involves the measurement of absorbance of the product at 525 nm in the presence of different amounts of Hg(II). Previous workers assumed that a graph of the inverse of the time required to increase the absorbance by a constant amount against Hg(II) concentration was a straight line for calibration purposes.

In this study it was observed that the absorbance of the product varied with time, non-linearly, indicating that the increase in absorbance was not only a function of Hg(II) concentration. The above graph will thus be curved unless the reaction time is extremely small. The above calibration was modified in this work because of the inability to perform kinetic experiments at short times with the available instruments in Sri Lanka.

Experiments were carried out keeping hexacyanoferrate(II) in excess varying the Hg(II) concentration. Absorbance of the product (A) was measured at different reaction times (t). The experimental results were fitted to the theoretical model $A=p_1, [-\exp(-p_2t)]$, to determine the 2 parameters p_1 and p_2. It was observed that the parameter, was a function of Hg(II) concentration. A graph of p_2 against Hg(II) concentration can be used as the calibration line to determine trace amounts of Hg(II).