Investigation of the use of Potassium Manganate (VII) in the Determination of Chemical Oxygen Demand (COD)

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An important parameter for the evaluation of the extent of pollution of a water body is the chemical oxygen demand (COD). In the process of determining COD, the available standard method uses chromium (VI) (dichromate) as the oxidizing agent. This is a cancer causing substance. In the above method silver sulphate is used which is costly and also hazardous. In this project a method was developed to determine COD, using potassium manganate (VII) (permanganate) as the oxidizing agent.

The major problem associated with the use of manganese (VII) is the oxidation of water. The use of hydrogen peroxide and sodium oxalate to prevent this was a failure. Further investigation revealed that the careful adjustment of the concentration of hydrogen ion in the medium can mitigate the oxidation of water. The maintenance of hydrogen ion concentration in a range 0.3 – 0.4 mol dm^{-3} with respect to sulphuric acid and the refluxing of the water sample containing organic matter with 0.02 mol dm^{-3} solution of potassium manganate(VII) for 60 minutes gave results similar to the theoretically expected. The proposed method was applied to standard solutions potassium hydrogen phthalate and fructose of known values of theoretical oxygen demand (ThOD or theoretical COD). A close correlation could be established between the observed COD values by the proposed method and theoretical COD values in the range 50–400 mg dm^{-3} of oxygen. The COD values were determined in water samples from Muthurajawela sand-fill site by using the proposed method. The evaluation of the results in comparison with the standard method of determining COD revealed a successful correlation.

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