E2-47: Use of cuprous oxide catalyst for the determination of Chemical Oxygen demand (COD) of water

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COD, an important parameter used in estimating the degree of organic pollution, can be determined within a few hours using the standard ASTM method, which involves determination of the quantity of oxygen that certain impurities in water will consume based on the reduction of a standard solution of dichromate under a specified condition. This condition requires the use of silver sulphate as a catalyst. The high cost of silver sulphate

prevents many Sri Lankan chemists measuring this important water quality parameter frequently. Since it is possible to correlate Biochemical Oxygen Demand (BOD) and COD an estimate of the BOD may be obtained in a few hours through the detemination of COD.

The catalytic activity of silver(I) may be expected to be similar to that of copper(I) ion (cuprous ion). Therefore, cuprous oxide brings about the same effect as silver sulphate in the standard method of determining COD. However, cuprous oxide undergoes oxidation by dichromate solution. A new method is presented, based on the use of cuprous oxide in place of silver sulphate. In the standard ASTM procedure for the determination of COD, silver (I) was substituted by an equivalent amount of copper (I). In the calculation, the oxidation of cuprous oxide was considered. Comparative studies with many impurities in water and some industrial effluents revealed that cuprous oxide was a suitable substitute for silver sulphate.