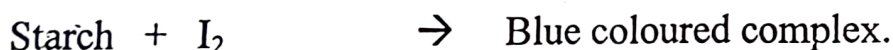
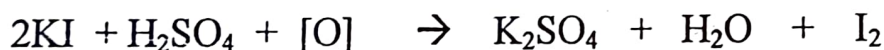


EXPERIMENT NO: 07

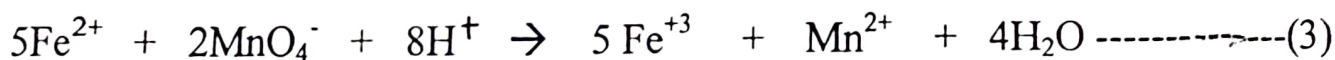
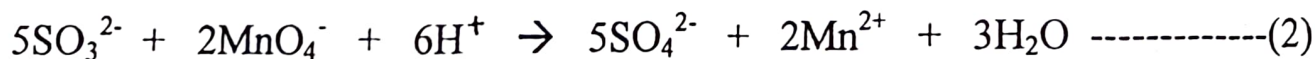
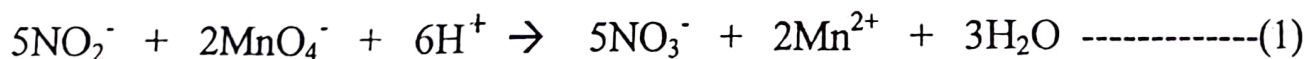
WATER ANALYSIS

AIM: Determination of dissolved Oxygen present in given water sample (Winkler's method.)

THEORY: The principle involved in the determination of D.O. is to bring about the oxidation of potassium Iodide to Iodine with the dissolved oxygen present in the water sample after adding MnSO_4 , KOH and KI , the basic manganic oxide formed acts as an oxygen carrier to enable the dissolved oxygen in the molecular form to take part in the reaction. The liberated Iodine is titrated against standard sodium thiosulphate (HYPO) solution, using starch as indicator.



In the modified winkler's method, the interference due to certain oxidizing agents such as NO_2^- or reducing agents such as Fe^{+2} or SO_3^{2-} is removed by treating the sample with an excess of KMnO_4 in acid medium the following reaction takes place:



NO_3^- and SO_4^{2-} formed in reaction (1) and (2) do not interfere. Fe^{+3} interferes only when present in amounts above 10mg/lit. Excess of KMnO_4 is destroyed by adding potassium oxalate.



REQUIREMENTS: Burette, Pipette, Standard sodium thiosulphate (N/50), KMnO_4 (N/10), Potassium Oxalate (2%), Manganous Sulphate solution (4.8%), Alkaline potassium Iodide, freshly prepared starch, Conc. H_2SO_4 , water sample.

PROCEDURE: Collect water sample in 300ml glass stoppered bottle and with the help of a graduated pipette, add 0.9ml Conc. H_2SO_4 and 0.2ml (4drops) KMnO_4 solution. Stopper the bottle and mix the contents of the bottle by inverting it a few times. If the permanganate colour disappears within five minutes, add additional amount of KMnO_4 . Add 0.5ml of Potassium Oxalate solution, stopper and mix well. Add additional amount of oxalate solution if the permanganate colour is not discharged within ten minutes. Add 2ml of MnSO_4 solution followed by 3ml of Alkaline KI solution. Stopper and shake and allow the precipitate to settle. Now add 1ml of conc. H_2SO_4 solution and mix until the precipitate is completely dissolved. Measure 102.2ml of this solution with a measuring cylinder into a conical flask and titrate slowly against N/50 Hypo solution. When the colour of the solution is light yellowish, add about 2ml of freshly prepared starch solution and continue the titration to the disappearance of the blue colour and note down the volume of the Hypo used.

OBSERVATION:

Total volume of the sample taken = 300ml.

Volume of reagents added during the preparation of Iodine solution = 0.9ml H_2SO_4 + 0.2ml KMnO_4 + 0.5ml $\text{K}_2\text{C}_2\text{O}_4$ + 2ml MnSO_4 + 3ml alkaline KI = 6.6ml

Volume of prepared solution

(Iodine) taken for titration = 102.2ml.

Concordant volume of N/50 Hypo = Vml.
solution used.

Indicator = Starch solution.

Colour change = Blue to colourless

Burette reading

Reading	1 st in ml.	2 nd in ml.	3 rd in ml.	Mean in ml.
Final	3.2	3.2	3.2	
Initial	0	0	0	
Difference				

CALCULATIONS:

6.6ml of the reagents have been added under such conditions that approximately equal volume of the sample is displaced. This dilutes the sample so a correction is needed.

$$\begin{array}{ccc} N_1 V_1 & = & N_2 V_2 \\ \text{(Oxygen Solution)} & & \text{(Hypo Solution)} \end{array}$$

$$N_1 \times 100 = 1/50 \times V$$

or

$$\begin{aligned} N_1 \text{ (Normality of the sample with respect to D.O.)} &= \frac{1}{100} \times \frac{1}{50} V \\ &= \frac{1}{100} \times \frac{1}{50} V \times 8 \text{g/lit.} \\ &= \frac{1}{100} \times \frac{1}{50} \times V \times 8 \times 1000 \text{mg/lit.} \\ &= 1.6 V \text{ mg/lit.} \end{aligned}$$

RESULT: The Amount of dissolved Oxygen present in water = _____ ppm.