EXPERIMENT: 7

Date: 17-01-2019

AIM: Determination of DO in waste water.

THEORY:

The Wrinkler or Iodometric method and its modifications are the standard procedures for determining dissolved oxygen. Oxygen oxidizes Mn^{2+} to a higher state of valance under alkaline conditions, which is capable of oxidizing I^- to free I_2 under acidic conditions. Thus the amount Iodine released is equivalent to the dissolved oxygen originally present and is measured with standard sodium thiosulphate solution and interpreted in terms of dissolved oxygen in mg/L unit.

REQUIREMENT: 0.005N $Na_2S_2O_3$ solution, alkaline KI solution, $MnSO_4$ solution, starch solution as indicator

PROCEDURE:

Take 50 mL of given water sample in a conical flask. Add 2 mL each of alkaline KI solution and $MnSO_4$ solution. Shake the flask vigorously. Brown precipitates will be produced. Now add carefully 2 mL of conc. H_2SO_4 solution and shake. Brownish solution with liberated Iodine (I_2) will be produced. Quickly add 2 mL of freshly prepared starch solution (indicator), which gives blue color. Titrate slowly against standard 0.005N $Na_2S_2O_3$ solutions till the blue color just disappears. Repeat the titration 4 times.

OBSERVATION:

Burette : 0.005 N $Na_2S_2O_3.5H_2O$ solution.

Flask : 50 mL of water sample + 2 mL alkaline KI solution + 2 mL of $MnSO_4$ solution + 2 mL of conc. H_2SO_4

Indicator : 2 mL of starch solution

Color Change : Blue to colorless

OBSERVATION TABLE:

Sr. No.	Initial Burette Reading (mL)	Final Burette Reading (mL)	Differences (mL)	Concurrent Reading (mL)
1	0.0	14	14	
2	0.0	14.5	14.5	14.5
3	0.0	14.5	14.5	
4	0.0	14.5	14.5	

EQUATIONS:

$Mn^{+2} + 2OH^- + \frac{1}{2} O_2 \longrightarrow MnO_2 + 7\ H_2O$ [Basic]

$MnO_2 + 2I^- + 4\ H^+ \longrightarrow Mn^{+2} + I_2 + 2\ H_2O$ [Acidic]

$2S_2O_3^{-2} + I_2 \longrightarrow S_4O_6^{-2} + I^-$

CALCULATION:

1000 mL 1N $Na_2S_2O_3$ = 8 g of dissolved oxygen

1 mL 1 N $Na_2S_2O_3$ = 8 mg of dissolved oxygen

1 mL 0.005N $Na_2S_2O_3$ = 0.04 mg of dissolved oxygen

SAMPLE TAKEN:

$$(mg/L) = \frac{1000 \times B.R \times 0.04}{50}$$

(Because B.R. of $Na_2S_2O_3$ = I_2 liberated)

RESULTS:

(1) Volume of 0.005N $Na_2S_2O_3$ solution required for 50 mL of given water sample = 14.5 mg/L.

(2) Dissolved oxygen in the given water sample = 11.6 mg/L.