Experiment no : **DATE:**

Determination of Iron in the given sample of Haematite ore solutionusing Potassium dichromate Crystals by external indicator method.

PRINCIPLE: Haematite is the ore containing iron in the form of ferric oxide. The estimation involves the dissolution of the ore in hydrochloric acid and reducing the ferric ions into ferrous ions using a reducing agent like stannous chloride and titrating the ferrous iron formed against standard potassium dichromate solution.

$2FeCl_3 + SnCl_2 \rightarrow 2FeCl_2 + SnCl_4$

Yellow **Colourless**

$SnCl_2 + HgCl_2 \rightarrow SnCl_4 + Hg_2Cl_2$

Silky white ppt

$K_2Cr_2O_7 + 8HCl \rightarrow 2KCl + 2CrCl_3 + 4H_2O + 3[O]$

$[2FeCl_2 + [O] + 2HCl \rightarrow 2FeCl_3 + H_2O\} \times 3$

$K_2Cr_2O_7 + 14HCl + 6FeCl_2 \rightarrow 2KCl + 6FeCl_3 + 2CrCl_3 + 7H_2O$

Green

PROCEDURE:

Part: Preparation of standard potassium dichromate solution

Weigh exactly the given amount of potassium dichromate crystals and transfer on to the funnel placed on a clean 250cm^3 volumetric flask. Dissolve it in small quantities of de-ionised water and make it up to the mark and mix well to get uniform concentration.

Part B: Estimation of iron

Pipette out 25cm^3 of the given haematite ore solution and add ¼ test tube of 1:1 hydrochloric acid solution. Heat the solution nearly to boiling. Add stannous chloride slowly from a burette till the solution becomes colourless. Add 2-3 drops of stannous chloride in excess in order to ensure complete reduction. Cool the solution to room temperature under tap and add two test tubes of de-ionised water. Now add 3cm^3 of mercuric chloride into the conical flask at a stretch. A silky white precipitate of mercurous chloride is formed. **If there is a formation of greyish precipitate in the conical flask then reject the contents and repeat from the beginning.**

Titrate the solution in the conical flask against standard potassium dichromate solution taken in the burette using potassium ferricyanide as external indicator. Add small quantity of potassium dichromate solution into the conical flask mix well and take out a drop of the mixture with the help of the glass rod provided and place it on the indicator drop. The colour of the drop changes to blue. Continue the testing of the indicator drop after the addition of small quantities of potassium dichromate. At the end point there will be no blue or green colour formation on the indicator drop when a drop of the reaction mixture is places on it. Note down the burette reading and repeat the experiment to get concordant values.

Observation and Calculations

Part A: Preparation of standard $K_2Cr_2O_7$ solution

Weight of weighing bottle and $K_2Cr_2O_7$salt **:……..** g
Weight of empty weighing bottle**:…….** g
Weight of $K_2Cr_2O_7$salt**:…….** g

$$\text{Normality of } K_2Cr_2O_7: \frac{\text{Weight of } K_2Cr_2O_7 \text{ salt X 4}}{\text{Equivalent weight of } K_2Cr_2O_7\ 49} = \frac{\text{W X 4}}{---------} \quad (X)$$

Part B: Estimation of Iron

Burette: Standard $K_2Cr_2O_7$solution
Conical flask: 25cm3 ofhaematite ore solution + ¼ test tube of 1:1 HCl Heat nearly to Boiling + add $SnCl_2$ from a burette till the solution becomes
Colourless, add 2 drops extra of $SnCl_2$, two test tube of distilled water and Cool the solution to room temperature and add 3 $cm^3$of $HgCl_2$ at a stretch
Indicator: Drops of potassium ferricyanide ona paraffin wax paper
End point: No blue or green colouration when a drop of the mixture is placed on Indicator drop.

Pilot Trail - Range :

Trials Burette readings	I	II	III
Final reading			
Initial reading			
Volume of $K_2Cr_2O_7$ run down in cm^3			

1000cm^3 of 1N $K_2Cr_2O_7$solution =1 equivalent of iron =55.85g of iron

$$\text{Therefore V}cm^3 \text{ of X N } K_2Cr_2O_7 = \frac{\text{X x V x55.85}}{1000} \quad (\text{a g})$$

25cm^3 of haematite ore solution contains**……** (a) g of iron

250cm^3 of haematite ore solution contains**…….** (a x 10) g of iron

Weight of haematite ore dissolved in 250cm^3 of its solution = W g =**……**

$$\text{Therefore percentage of iron in haematite ore solution} = \frac{\text{10a x 100}}{\text{W}} = \text{……} \quad (B)$$

Result: Percentage of iron in given haematite ore sample= B =…….

Signature of the teacher