Chemistry Lab Report

Exp No: *04*
Exp Name: Determination of Fe in supplied $FeSO_4$ by using standardized $0.02(M)KMnO_4$ solution.
Equipments: 1. Burette($500mL$) 2. Conical flask($250mL$) 3. Funnel 4. Wash bottle 5. Pipette 6. Burette stand.

Theory: Titration is a common laboratory method of quantitative chemical analysis to determine the concentration of an identified analyte (a substance to be analyzed). A reagent, termed the titrant or titrator, is prepared as a standard solution of known concentration and volume. The titrant reacts with a solution of analyte to determine the analyte's concentration. The volume of titrant that reacted with the analyte is termed the titration volume.

Chemicals: 1. $KMnO_4$ 2. $FeSO_4$ 3. Distilled water 4. Indicator(Methyl orange).

Chemical Reaction:

$$2KMnO_4 + 10FeSO_4 + 8H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 8H_2O \ ...(1)$$

Description:

01. $0.1(M)KMnO_4$ solution preparation: We obtained $0.02(M)KMnO_4$ provided by our lab assistant.

02. Standardization of $FeSO_4$ solution: At first fil the burette with $KMnO_4$ solution and record the initial burette reading. Then take $10mLKMnO_4$ in conical flask and mix it up with 1/2 drops of methyl orange.

03. Determination: Mix $KMnO_4$ with $FeSO_4$ drop by drop carefully until $KMnO_4$ solution changes it's color. When $FeSO_4$ changes it's color that means it's the end point of our titration. Now mark the reading for $KMnO_4$ from burette for our further
calculation.

Data Table:

		Burette $KMnO_4$ volume		
SN	$FeSO_{4mL}$	$Initial_{(mL)}$	$Final_{(mL)}$	$Diff_{initial-final}$
01	$10mL$	$0mL$	$3.3mL$	$3.3mL$
02	$10mL$	$3.3mL$	$6.6mL$	$3.3mL$
02	$10mL$	$6.6mL$	$10.1mL$	$3.5mL$

Calculation:

From the table, Mean value of $KMnO_4 = \frac{3.3+3.3+3.5}{3} = 3.3666mL$

From equation (1) we get,

$1000mL\ 1(M)\ KMnO_4 \equiv 5mol\ Fe^{2+}$

$1mL\ 1(M)\ KMnO_4 \equiv \frac{5}{1000}mol\ Fe^{2+}$

$3.36mL\ 0.02(M)\ KMnO_4 \equiv \frac{5\times3.36\times0.02\times55.85}{1000}g\ Fe^{2+}$

Therefore,

$10mL\ Fe^{2+} = 0.0187656g\ Fe^{2+}$

$100mL\ Fe^{2+} = \frac{0.0187656\times100}{10} = 0.187656g\ Fe^{2+}$

Result: The amount of Fe^{2+} is **0.0.187656g**.

Discussion: The amount of Fe may not be totally correct for same certain chemical fault.

Precaution:

01. Usually an air bubble is present in the nozzele of the burette. It must be removed before taking the inital readint.

02. There should not be any kind of leakage from the burette during titration.

03. Always add acid to water.

04. Dont't let base level in burrete to reach zero.