# EXPERIMENT NO. 2

**Objective:** Using N Phenyl anthraniilc acid as internal indicator determine the amount of Ferrous ammonium sulphate in grams/L in the given sample solution Use Potassium dichromate solution as an intermediate solution. Standard Ferrous Ammonium sulphate solution is provided for titration.

# Apparatus Required

Burette, pipette, conical flask, measuring flask, funnel, etc.

# Reagents required

Standard FAS (N/ 50) solution (Standard solution), Potassium dichromate(K2Cr2O7) (Intermediate solution)**,** and dilute H2SO4 (to provide acidic medium),N-phenyl anthranilic acid (Indicator).

# Theory

This is a redox titration. In this reaction potassium dichromate acts as an oxidizing agent in acidic medium. It oxidize FAS (Fe+2) in Ferric sulphate (Fe+3). As the K2Cr2O7 is added in FAS initially green color appears due to formation of reduction product Cr2 (SO4)3, (Cr+3) which on further addition of K2Cr2O7 change to purple red color.

K2Cr2O7 + 4H2SO4 → K2SO4 + Cr2(SO4)3 + 4 H2O + 3 [O] 6 FeSO4 + 3 H2SO4+ 3[O] →3 Fe 2 (SO4)3 + 3 H2O

The complete reaction is:

6[FeSO4 (NH4)2SO4.6H2O] + 7 H2SO4 + K2Cr2O7 →3Fe2(SO4)3+6(NH4)2SO4 + Cr2(SO4)+K2SO4 +4H2O

# Procedure:

**Standardization of K2Cr2O7solution:**

1. Rinse and fill the burette with K2Cr2O7 solution.
2. Take 10 ml. of standard FAS solution in a conical flask.
3. Add 5-10 ml of dilute H2SO4 solution in above flask.
4. Now add 2-3 drops of N-phenyl anthranilic acid indicator.
5. Titrate it against K2Cr2O7 solution till the color of the solution changes from green to Purple red.
6. Appearance of purple red colour indicates end point.
7. Note this reading from burette.

10. Repeat the same procedure and get the concordant reading.

# Titration of Sample FAS solution with K2Cr2O7:

1. Rinse and fill the burette with K2Cr2O7 solution.
2. Take 10 ml. of sample FAS solution in a conical flask.
3. Add 5-10 ml of dilute H2SO4 solution in above flask.
4. Now add 2-3 drops of N-phenyl anthranilic acid indicator.
5. Titrate it against K2Cr2O7 solution till the color of the solution changes from green to Purple red.
6. Appearance of purple red colour indicates end point.
7. Repeat the above procedure to get the concordant reading.

# Observations:

**Standardization of K2Cr2O7 solution:**

| S.NO. | Volume of Known FAS taken (ml) | Burette reading (K2Cr2O7) | | | Concordant reading(ml) A |
| --- | --- | --- | --- | --- | --- |
| IBR (ml) | FBR (ml) | Difference (ml) | 11.9 |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
| 3. |  |  |  |  |

**Titration of unknown FAS with K2Cr2O7:**

| S.NO. | Volume of unknown FAS taken (ml) | Burette reading (K2Cr2O7) | | | Concordant reading(ml)B |
| --- | --- | --- | --- | --- | --- |
| IBR (ml) | FBR (ml) | Difference (ml) |  |
| 1. |  |  |  |  |
| 2. |  |  |  |  |
| 3. |  |  |  |  |

**Calculations:**

**Calculation for standardization of K2Cr2O7:**

N1V1 = N2V2Where: N1=Normality of FAS N/50 V1=Volume of FAS=10.0 ml

N2 = 1 X 10 N2=Normality of K2Cr2O7 ?

50 XA V2= Volume of K2Cr2O7 =A

# Calculation for determination of Unknown FAS:

N3V3 = N4V4 Where : N3=Normality of FAS ?

V3=Volume of FAS =10.0 ml

N3 = 1 X 10X B N4=Normality of K2Cr2O7= N2

50 X A X 10 V4= Volume of K2Cr2O7 = B ml

Strength = Normality X Equivalent wt. of [FeSO4 (NH4)2SO4.6H2O] (392.14) 1 X 10X B X 392.14 g/l

50 X A X 10

= g/L

# Result:

The strength of given FAS solution is g/L.

# Precautions:

1. Wash the glassware properly with distilled water.
2. Rinse the burette and pipette with respective solutions.
3. Use dil.H2SO4 or dil. HCl to provide acidic medium.
4. Continuous stirring should be there.
5. Always use freshly prepared indicator.
6. Read upper meniscus in burette (in case of colored solution).

# Discussion:

This analysis is an important method to determine the amount of IRON in any of its ore or alloy. This titration method is used to determine the quantitative measurement of number of metals and their compounds in different industries. This method is simple, accurate, reproducible and rapid.

# Questions related to this experiment

**Viva questions**

1. What is function of H2SO4 in this titration? Which alternate acid can weuse?
2. What is the common name of FAS?
3. Identify OXIDISING agent and REDUICNG agent in above titration.
4. Find out OXIDATION state of oxidizing agent and reducing agent in products and reactants.
5. What is the equivalent weight of K2Cr2O7 and FAS and how can you calculate it?
6. Give structural formula of N-phenyl anthranilic acid.