EXPERIMENT

Objective:

To determine the iron content of a given ferrous ammonium sulphate [$FeSO_4(NH_4)_2.6H_2O$] solution by titrating it against N/50 $K_2Cr_2O_7$ solution using potassium ferricyanide $K_3[Fe(CN)_6$ as an external indicator.

Apparatus and Chemical required:

Solution of ferrous ammonium sulphate (FAS) or Mohr's salt, $K_2Cr_2O_7$ solution, $K_3[Fe(CN)_6$ distilled water, burette, Pipette, conical flask, diluted sulphuric acid.

Theory:

Acidic $K_2Cr_2O_7$ is a strong oxidizing agent. When it is added to FAS solution containing dil. H_2SO_4. Only $FeSO_4$ is oxidized and $(NH_4)_2SO_4$ remain unchanged.

$$6Fe^{2+} + 14H^{+} + Cr_2O_7^{2-} \longrightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$$

$$3Fe^{2+} + 2[Fe(CN)_6]^{3-} \longrightarrow Fe_3[Fe(CN)_6]_2$$

[Ferro- ferricyanide]
Dark-blue color

The end point is detected when the yellow color of the indicator does not change

Procedure:

Pipette out 10 ml. FAS + 2ml of dil. H_2SO_4 → titrate it against $K_2Cr_2O_7$ from burette → take a drop of this solution and place it on the external indicator on a piece of paper observe the color change → repeat the above step till the end point reaches → note the reading → repeat the same for 5 times.

Observation:

S.No.	Volume of $K_2Cr_2O_7$ used (ml)
1.	
2.	
3.	
4.	
5.	

Calculation:

Volume of FAS taken = 10 ml.

Normality of potassium dichromate taken = 1/50 N

Volume of potassium dichromate used = V ml.

$N_{FAS} \times 10 = N/50 \times V$

Strength of FAS (S) = $N_{FAS} \times 392.16$ gm/lit.

Thus, Iron content = $S \times 56/392.16$ gm.

Result:

The strength of FAS is = …….. gm/lit.

The iron content is = …….. gm.

Precautions:

(1) Burette should be vertical throughout the experiment.

(2) The reaction mixture should continuously be shaken during titration.

(3) Glass ware should be washed and dried before doing the experiment.