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POTASSIUM DICHROMATE TITRATION

Preparation and standardisation of 0.0167 M Potassium Dichromate

Potassium Dichromate Solution Preparation

Weigh 4.9 g of potassium dichromate, previously powdered and dried in a desiccator for 4 hours.

Dissolve in sufficient water to produce 1000 ml. Standardize the solution in the following manner.

Potassium Dichromate Solution Standardization

To 20.0 ml of the solution add 1 g of potassium iodide and 7 ml of 2 M hydrochloric acid.

Add 250 ml of water and titrate with 0.1 M sodium thiosulphate, using 3 ml of starch solution, added towards the end point of the titration, as indicator until the color changes from blue to light green.

1 ml of 0.1 M sodium thiosulphate is equivalent to 0.0049 g of K2Cr2O7.

$K_2Cr_2O_7 + 6KI + 14HCl \longrightarrow 3I_2 + 2CrCl_3 + 8KCl$

(Potassium dichromate) Iodine Chromium chloride

$2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2\ NaI$

Sodium thiosulphate Sodium tetrathionate

ASSAY OF FERROUS SULPHATE

Ferrous ammonium sulphate [$FeSO_4$, $(NH_4)_2SO_4,6H_2O$] is a stable double salt with $FeSO_4$ being its active constituent. Acidic potassium dichromate ($K_2Cr_2O_7$) solution is a strong oxidizing agent and is rapidly reduced by ferrous ion at the ordinary temperature to a green chromic salt when added to ferrous ammonium sulphate or Mohr's salt [$FeSO_4$, $(NH_4)_2SO_4,6H_2O$] solution containing dilute H_2SO_4. In this reaction ferrous sulphate is oxidized to ferric sulphate, while, ammonium sulphate remains unreacted.

$$K_2Cr_2O_7 + 4\ H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + 4\ H_2O + 3\ [O]$$

$$6\ FeSO_4 + 3\ H_2SO_4 + 3\ [O] \rightarrow 3\ Fe_2(SO_4)_3 + 3\ H_2O$$

$$K_2Cr_2O_7 + 6FeSO_4 + 7H_2SO_4 = 3\ Fe_2(SO_4)_3 + K_2SO_4 + Cr_2(SO_4)_3 + 7\ H_2O$$

N-phenyl anthranilic acid is used as an indicator. Indicator is not oxidized as long as Fe^{2+} ions are there in the solution. The slight excess amount of dichromate will oxidize the indicator when all of the Fe^{2+} ions have been converted to Fe^{3+} ions resulting in colour change of the solution from greenish (due to Cr^{3+}) to purple.

PROCEDURE:

10 ml of ferrous ammonium sulphate solution was pipette out and taken into a clean 100 ml conical flask. 10 ml of ~5N H_2SO_4 solution was added to the solution taken in the conical flask, using marked test tube. Then 2-3 drops of N-phenylanthranilic acid was added into the solution as an indicator. The solution mixture of flask was then titrated with constant stirring against dichromate solution taken in burette until the colour of the solution was changed from greenish to purple by a single drop addition. The titration was repeated for several times until concordant burette readings were obtained.