Modified limit test

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→ This test is performed if the limit test for a sample can not be done by normal method. specially coloured compound.

ex. $KmNO_4$

→ The main difference b/w limit test and modified limit test is that, a modified limit test eliminates the need for some reagent.

ex. In SO_4^{2-} limit test, → Eliminate the need for $BaSO_4$ reagents.

Modified limit test for "chloride"

→ This test is used for coloured compound & can not be tested by normal test.

Prineiple

→ $KMnO_4$ is decolourised by boiling C_2H_5OH, filtered and remove precipitate of Magnese dioxide & the filtrate is now used for further test.

→ It is based on chemical reaction of freely soluble Cl^- and $AgNO_3$ in presence of dil HNO_3 to form the opalescence of AgCl.

$$Cl^- + AgNO_3 \xrightarrow{\text{dil } HNO_3} AgCl\downarrow + NO_3^-$$

$$2KMnO_4 + 3C_2H_5OH \longrightarrow 3CH_3CHO + 2KOH + 2MnO_2 + 2H_2O$$

Procedure

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Preparation of test solution ($KMnO_4$)

Dissolve 1.5 gm $KMnO_4$ (Sample) in 50 ml dist. H_2O

↓

heat on water bath

↓

Gradually add 6 mL of C_2H_5OH (95%)

↓

cool & dilute to 60 ml ∈ dist. H_2O + filter.

↓

~~Use~~ ~~filt~~ Filtrate

→ Take two Nesseler cylinder, as Test & Standard.

	Test	Standard
→	Take 40 ml of above test sol" in N.C.	1) take 10 ml of Cl^- standard sol" (250 ppm Cl) & 5 ml of H_2O
→	Add 1 ml dil HNO_3	2) + 1 ml dil HNO_3
→	dilute to 50 ml ∈ dist. H_2O	3) dilute to 50 ml. dist. H_2O
→	Add 1.0 ml of $AgNO_3$ solution	4) Add 1.0 ml $AgNO_3$

→ Stir imidiatly and allow for 5 minute

OBSERVATION

1) Opalescence produced in test should not be greater than standard.

Modified Limit test for Sulphate

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→ This test is performed for the compound which can not be tested by simple limit test.

Principle

It is based on reaction b/w K_2SO_4 & $BaCl_2$ in presence of Acetic acid, which produce opalescence / turbidity of $BaSO_4$ ↓.

$$K_2SO_4 + BaCl_2 \xrightarrow{CH_3COOH} BaSO_4 \downarrow + 2KCl$$

$$SO_4^{2-} + BaCl_2 \xrightarrow{CH_3COOH} BaSO_4 \downarrow + 2Cl^-$$

$$2KMnO_4 + 3C_2H_5OH \longrightarrow 3CH_3CHO + 2KOH + 2MnO_2 + 2H_2O$$

Procedure

Preparation of Test solution ($KMnO_4$)

Dissolve 1.5 gm in 50 ml of dist. H_2O

↓

heat on H_2O bath

↓

Add gradually 6 mL of C_2H_5OH (95%)

↓

cool & ~~add~~ or make up volume 60 mL with dist. H_2O

↓

Now take 2 H.C as Test & standard.

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Test	standard
1) Take 10 ml of above test sol in N.C.	1) Take 15 ml SO_4^{2-} standard & Add 15 mL of dist. H_2O in N.C.
2) Add 0.15 mL of 5.0 M CH_3COOH	2) — do —
3) + 2.5 ml Barium	3) — do —
4) + make up volume upto 50 ml & dist. H_2O	4) — do —
5) Stir immidiatly & allow for 5 minuti	5) — do —

OBSERVATION

→ The Turbidity of test should not be greater than standard.

→ Turbidity of Test > standard → sample fails

→ Turbidity of test < standard → sample pass.