TITLE: **HYDROGEN PEROXIDE- PARACETIC ACID & H2O2 CONTENT**

1.0 SCOPE:

This procedure is applicable to peracetic acid solutions from 1% to 35% concentration by weight.

2.0 PRINCIPLE:

The hydrogen peroxide present in Peracetic acid is initially estimated by an oxidation reduction titration with potassium permanganate as per the equation no.1. After the end point is reached, an excess of potassium iodide is added to the solution. The hydroiodic acid formed in acidic media reacts with Peracetic acid to liberate iodine, as per the equation no.2. A standard solution of sodium thiosulphate is used to titrate the liberated iodine as per equation no.3. The end point of this titration is used to calculate the Peracetic acid content.

1. $5H_2O_2 + 2\,KMnO_4 + 3H_2SO_4 \longrightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 5O_2$

2. $2\,KI + H_2SO_4 \longrightarrow 2\,HI + K_2SO_4$

$$CH_3\text{---}\underset{\displaystyle OOH}{\overset{\displaystyle |}{C}}=O + 2HI \longrightarrow I_2 + CH_3\text{---}\underset{\displaystyle OH}{\overset{\displaystyle |}{C}}=O + H_2O$$

3. $I_2 + 2\,S_2O_3^{2-} \longrightarrow S_4O_6^{2-} + 2I^-$

3.0 REAGENTS:

Sulphuric Acid (H_2SO_4) :1:3;
Potassium Permanganate ($KMnO_4$): 0.1 N;
Potassium Iodide solution (KI): 10% w/v;
Sodium Thiosulphate (H_2SO_4): 0.1 N
Starch Indicator stabilized with salicylic acid or $HgCl_2$: 1%

4.0 SAFETY PRECAUTIONS:-

Peracetic acid is a strong oxidizer and corrosive. Handling of 35% PAA needs to be done in a hood. Avoid contact of PAA 35% with organic material. Spills need to be diluted with water immediately.

Wear gloves, safety glasses, face shield and lab coat.

5.0 PROCEDURE:

Hydrogen Peroxide content:

Weigh to the nearest of 0.0001 gm ("W"gm) of Peracetic acid sample in a weighing bottle according to the assumed concentration of PAA as presented below.

PAA concentration (% w/w)	Sample Weight (gms)
35	0.2
15	0.2
5	0.5
1-2	0.5

Transfer the weighing bottle into a 250 ml conical flask containing 100 ml of ice-cooled (below $10^{O}C$) distilled water. Add 30 ml of 1:3 Sulphuric Acid Solution. Swirl to mix well. Titrate it against standardized 0.1N Potassium permanganate solution until the same pink color of neutralized acid. Let the reading be noted as "A" ml.

Peracetic Acid content:

To the above flask add 10 ml of 10% KI solution. Mix properly and titrate it against standardized Sodium thiosulphate (0.1N) solution till the iodine color lightens to brown-yellow. Add few ml of starch solution as indicator to produce purple color. Continue the titration till the solution becomes colorless. Let this reading be noted as "B" ml.

6.0 CALCULATION :

% H_2O_2 content = $$\frac{1.7008 \times N1 \times A}{W}$$

where N1 = Normality of $KMnO_4$.

A = Volume of 0.1N $KMnO_4$ used

W = Weight of sample in gm.

% PAA content = $$\frac{3.8 \times N2 \times B}{W}$$

where N2 = Normality of Sodium thiosulphate.

B = Volume of 0.1N Sodium thiosulphate used.

W = Weight of sample in gm.