

DETERMINATION of HYDROGEN PEROXIDE (H₂O₂): CERIC SULFATE METHOD

SCOPE

This method is suitable for the determination of hydrogen peroxide in the presence of other peroxygens. The range covered is 5 - 200 g/kg of hydrogen peroxide.

PRINCIPLE

The sample is diluted in dilute sulfuric acid cooled with ice. The hydrogen peroxide is titrated with ceric sulfate solution using ferroin as an indicator.

Caution: Safety glasses must be worn when using this method.

REAGENTS

All reagents should be analytical reagent grade unless otherwise stated. Distilled water, or water of equivalent purity, should be used in this method.

Ceric sulfate solution (0.1 N).

Sulfuric acid solution (1:19) v/v.

Carefully and slowly add 50 mL of concentrated sulfuric acid (d 1.84) to 950 mL of water in a 2-liter beaker with continuous stirring and cooling.

Caution: Safety goggles must be worn when handling concentrated sulfuric acid.

Ferroin indicator solution

Dissolve 0.1740 g of ferrous sulfate in 25 mL of water. Add 0.3712 g 1,10 - phenanthroline hydrate to the solution and stir to dissolve. Alternatively a commercially available ferroin indicator solution may be used.

APPARATUS

Weighing bottles, glass or polyethylene, 1-5 mL capacity.

PROCEDURE

1. Weigh (to ± 0.001 g) about 0.4 g of sample into a weighing bottle. Let the mass of the sample taken be W_g .
2. Measure 150 mL of sulfuric acid (1:19) into a 500-mL conical flask and add sufficient crushed ice to maintain a temperature of less than 10°C during the titration. When the temperature of the solution is below 10°C, add about three drops of ferroin indicator solution and titrate drop-wise with ceric sulfate solution (0.1N) until the indicator changes to a blue color.
3. Add the weighing bottle containing the sample to the cold solution and swirl to mix. Titrate rapidly with ceric sulfate solution (0.1N) to the same blue color.
4. Let the titration obtained be A mL.

CALCULATION

$$\text{Hydrogen peroxide content (as H}_2\text{O}_2\text{)} = \frac{A \times N \times 17.01 \times 1000 \text{ g/kg}}{1000 \times W} = \frac{A \times N \times 17.01 \text{ g/kg}}{W}$$

Where N is the Normality of the ceric sulfate solution.

FIRST AID

In case of product splashing into the eyes and face, treat eyes first.

Eye contact: Flush eyes immediately with water for at least 15 minutes. Call a physician.

Skin contact: Immediately flush skin with water while removing contaminated clothing and shoes. Call a physician if irritation persists.

Inhalation: Remove the victim from the contaminated area to fresh air. Call a physician in case of respiratory symptoms.

Ingestion: Consult with a physician immediately in all cases. DO NOT induce vomiting. If victim is conscious, rinse mouth and give fresh water.

DANGER

Hydrogen peroxide solutions are strong oxidizers and corrosive to the eyes, mucous membranes and skin. Consult the SDS for the appropriate Personal Protective Equipment to wear when handling hydrogen peroxide. In case of contact with the eyes, skin or clothing, flush with large amounts of water for 15 minutes. In case of ingestion, sit upright, drink large quantities of water to dilute the stomach contents and seek immediate medical attention. Product in contact with combustible materials may cause fires.

Before using, read Safety Data Sheet (SDS) for this chemical.
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