

International Standard



8467

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Water quality — Determination of permanganate index

Qualité de l'eau — Détermination de l'indice de permanganate

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8467 was prepared by Technical Committee ISO/TC 147, *Water quality*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Water quality — Determination of permanganate index

0 Introduction

The permanganate index is a conventional measure of the contamination by organic and oxidizable inorganic matter in a water sample. It is primarily intended for judging the quality of potable water and raw waters, such as well and surface waters. More heavily contaminated waters may be analysed provided an appropriate pre-dilution step is adopted. The permanganate index can be determined for waters containing less than 500 mg/l of chloride ion. Reducing compounds such as iron(II) salts, nitrites or hydrogen sulfide may contribute to the permanganate index but are not classified as impurities.

The permanganate index cannot be considered as a measure of the theoretical oxygen demand or the total content of organic matter. Many organic compounds are only partially oxidized in this test as oxidation is generally incomplete. Volatile matter that evaporates before the addition of permanganate will not be included.

The method is not recommended for determining organic load in waste waters; for this purpose the chemical oxygen demand should be determined [see ISO 6060, *Water quality — Determination of the chemical oxygen demand*].

The method is simple and convenient for surveying the quality of large numbers of water samples.

1 Scope and field of application

This International Standard specifies a method for the determination of the permanganate index of water. It is primarily intended for water for human consumption and domestic use. It is applicable to waters having a chloride ion concentration of less than 500 mg/l. Samples having a permanganate index over 10 mg/l should be diluted before analysis. The lower limit of the optimum range of the test is 2,5 mg/l.

2 Definition

permanganate index (of water): The mass concentration of oxygen equivalent to the amount of permanganate ion consumed when a water sample is treated with that oxidant under defined conditions.

3 Principle

Heating of a sample in a boiling water-bath with a known amount of potassium permanganate and sulfuric acid for a fixed period of time (10 min). Reduction of part of the permanganate by oxidizable material in the sample and determination of the consumed permanganate by addition of an excess of oxalate solution followed by titration with permanganate.

NOTE — The suggested maximum permanganate index of 10 mg/l is equivalent to a consumption of approximately 60 % of the added permanganate by the non-diluted sample.

4 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity. Do not use deionized water from an organic ion exchanger.

NOTE — Non-reducing water can be prepared as follows. Add 10 ml of sulfuric acid (4.2) and a small excess of the potassium permanganate stock solution (4.5) to 1 litre of distilled water. Distil in an all-glass apparatus and discard the first 100 ml of distillate. Store in a glass bottle with a glass stopper.

4.1 Sulfuric acid, $c(\text{H}_2\text{SO}_4) = 7,5 \text{ mol/l}$.

Add slowly and with continuous stirring 420 ml of 18 mol/l sulfuric acid ($\rho = 1,84 \text{ g/ml}$) to 500 ml of water. Allow to cool and dilute to 1 litre.

4.2 Sulfuric acid, $c(\text{H}_2\text{SO}_4) = 2 \text{ mol/l}$.

Add slowly and with continuous stirring 110 ml of 18 mol/l sulfuric acid ($\rho = 1,84 \text{ g/ml}$) to about 500 ml of water. Add slowly potassium permanganate solution (4.6) until a faint pink colour persists. Allow to cool, dilute with water to 1 litre and mix.

4.3 Sodium oxalate, stock solution, $c(\text{Na}_2\text{C}_2\text{O}_4) = 0,05 \text{ mol/l}$.

Dry sodium oxalate at 120 °C for 2 h. Dissolve 6,700 g of the dried solid in water in a 1 000 ml one-mark volumetric flask. Make up to the mark with water and mix.

This solution is stable for 6 months if stored in a dark place.