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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

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8467 was prepared by Technical Committee ISO/TC 147, *Water quality*, Sub-Committee SC 2, *Physical, chemical, biochemical methods*.

This second edition cancels and replaces the first edition (ISO 8467:1986), of which it constitutes a technical revision.

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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 is not included.

The method is not recommended for determining organic load in waste waters; for this purpose the chemical oxygen demand should be determined as described in ISO 6060:1989, *Water quality — Determination of the chemical oxygen demand*.

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

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Water quality — Determination of permanganate index

1 Scope

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, drinking water, natural mineral water, well and table water, as well as water from swimming pools. It is used for the determination of the parameter "oxidizability". It is applicable to waters having a chloride ion concentration of less than 300 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 0,5 mg/l.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 385-1:1984, *Laboratory glassware — Burettes — Part 1: General requirements*.

3 Definition

3.1 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.

4 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). Re-

duction 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 1 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.

5 Reagents

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

NOTE 2 Non-reducing water can be prepared as follows. Add 10 ml of sulfuric acid (5.3) and a small excess of the potassium permanganate stock solution (5.6) 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.

The volume of the consumed potassium permanganate standard solution V_0 (see 8.4) shall not exceed 0,1 ml, otherwise the procedure shall be repeated or a water of lower organic content shall be used.

5.1 Sulfuric acid, $\rho(\text{H}_2\text{SO}_4) = 1,84 \text{ g/ml}$, 18 mol/l.

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

Add slowly, while stirring continuously, 420 ml of sulfuric acid (5.1) to 500 ml of water. Allow to cool and dilute to 1 litre.

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

Add slowly, while stirring continuously, 110 ml of sulfuric acid (5.1) to about 500 ml of water. Slowly add potassium permanganate solution (5.7) until a faint pink colour persists. Allow to cool, dilute with water to 1 litre and mix.