

International Standard



5814

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Water quality — Determination of dissolved oxygen — Electrochemical probe method

Qualité de l'eau — Dosage de l'oxygène dissous — Méthode électrochimique à la sonde

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

International Standard ISO 5814 was developed by Technical Committee ISO/TC 147, *Water quality*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries:

Australia	Hungary	Norway
Austria	India	Poland
Belgium	Iran	Romania
Canada	Iraq	South Africa, Rep. of
China	Ireland	Spain
Czechoslovakia	Italy	Sweden
Denmark	Japan	Switzerland
Egypt, Arab Rep. of	Korea, Dem. P. Rep. of	Thailand
Finland	Mexico	United Kingdom
France	Netherlands	USSR
Germany, F.R.	New Zealand	

No member body expressed disapproval of the document.

Water quality — Determination of dissolved oxygen — Electrochemical probe method

1 Scope and field of application

This International Standard specifies an electrochemical method for the determination of dissolved oxygen in water by means of an electrochemical cell which is isolated from the sample by a gas permeable membrane.

Depending on the type of probe employed, measurement can be made either as concentration of oxygen (mg/l), percentage saturation (% dissolved oxygen) or both. The method measures oxygen in water corresponding to 0 % to 100 % saturation. However, most instruments permit measurement of values higher than 100 % i.e. supersaturation.

The method is suitable for measurements made in the field and for continuous monitoring of dissolved oxygen as well as measurements made in the laboratory. It is the preferred method for highly coloured and turbid waters, and also for waters containing iron and iodine fixing substances, all of which may interfere in the iodometric method specified in ISO 5813. Gases and vapours such as chlorine, sulfur dioxide, hydrogen sulfide, amines, ammonia, carbon dioxide, bromine and iodine which diffuse through the membrane, may interfere, if present, by affecting the measured current. Other substances present in the sample may interfere with the measured current by causing obstruction, or deterioration of the membrane or corrosion of the electrodes. These include solvents, oils, sulfides, carbonates and algae.

The method is suitable for natural, waste and saline waters. If used for saline waters such as sea waters, or estuarine waters, a correction for salinity is essential.

2 Reference

ISO 5813, *Water quality — Determination of dissolved oxygen — Iodometric method.*

3 Principle

Immersion of a probe, consisting of a cell enclosed by a selective membrane and containing the electrolyte and two metallic electrodes, in the water to be analysed. (The membrane is practically impermeable to water and ionic dissolved matter, but is permeable to oxygen and a certain number of the other gases and lyophobic substances.)

Because of the potential difference between the electrodes, caused by galvanic action or an external voltage, oxygen passing through the membrane is reduced at the cathode, while metal ions pass into solution at the anode.

The current so produced is directly proportional to the rate of transport of oxygen through the membrane and the layer of electrolyte and hence to the partial pressure of the oxygen in the sample at a given temperature.

Since the permeability of the membrane varies greatly with temperature, compensation has to be made, either mathematically (by using a nomogram or a computer program), or by regulating the apparatus, or by the inclusion of heat-sensitive elements in the electrode circuit. Some instruments also compensate for variation in the solubility of oxygen at different temperatures.

4 Reagents

During the analysis, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

4.1 Sodium sulfite, anhydrous (Na_2SO_3) or heptahydrate, ($\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$).

4.2 Cobalt(II) salt, for example cobalt(II) chloride hexahydrate ($\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$).

5 Apparatus

5.1 Measuring instrument, comprising the following components:

5.1.1 Measuring probe, either of the galvanic type (for example lead/silver) or the polarographic type (for example silver, gold), with, if required, a temperature sensitive compensating device.

5.1.2 Meter, graduated to show the concentration of dissolved oxygen directly, and/or the percentage saturation with oxygen, or the current in microamperes.

5.2 Thermometer, graduated in divisions of 0,5 °C.

5.3 Barometer, graduated in divisions of 10 Pa.

6 Procedure

When using the measuring instrument, the manufacturer's instructions should be followed.