
**Water quality — Determination of total
alkalinity in sea water using high
precision potentiometric titration**

*Qualité de l'eau — Détermination de l'alcalinité totale dans l'eau de mer
en utilisant une titration potentiométrique de haute précision*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
5 Apparatus	2
6 Reagents	3
7 Procedure	3
8 Calculation and expression of results	6
Annex A (informative) Theoretical background and calculation of alkalinity in sea water	9
Annex B (informative) Quality assurance	14
Annex C (informative) Data from a comparability test	15
Bibliography	16

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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22719 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

This document is a preview generated by EVS

Introduction

The greenhouse effect, induced by anthropogenic carbon dioxide, CO₂, in the atmosphere is a serious global environmental issue. A key factor controlling the concentration of atmospheric CO₂ is its absorption into the ocean. Since the volume of ocean water is huge, the change in the oceanic carbonate system from year to year is slight, and it is necessary to measure its components continuously with great precision over a long period. Furthermore, the oceanic carbonate system is related to many components such as water temperature, salinity, dissolved oxygen, and nutrient elements.

The oceanic carbonate system can be depicted by measuring at least two parameters of four: total inorganic carbon; total alkalinity; fugacity of CO₂; and pH of sea water. At the time of publication, it is possible to determine the first two parameters more precisely for subsurface water. Analytical methods for sea water samples, however, require specific conditions and techniques essential to the precise and accurate determination. This International Standard describes a method for the determination of total alkalinity in sea water with an error of less than 0,1 %.

This method is designed to provide international compatibility of accurate data sets on total alkalinity in sea water, which are collected by various communities. Such compatibility is the basis for national and international operational observation and monitoring programs of the oceanic carbonate system, as well as individual research work.

This document is a preview generated by EVS

Water quality — Determination of total alkalinity in sea water using high precision potentiometric titration

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is absolutely essential that tests conducted according to this International Standard be carried out by suitably trained staff.

1 Scope

This International Standard specifies an open-cell potentiometric titration determination of total alkalinity in sea water. The results are expressed in moles per kilogram of sea water. The method is suitable for assaying oceanic levels of total alkalinity ($2\,000\ \mu\text{mol kg}^{-1}$ to $2\,500\ \mu\text{mol kg}^{-1}$) for normal sea water of practical salinity ranging from 30 to 40.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5667-1, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes and sampling techniques*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

total alkalinity

A_T

(sea water) number of moles of hydrogen ion equivalent to the excess of proton acceptors (bases formed from weak acids with a dissociation constant, $K \leq 10^{-4.5}$ at $25\ ^\circ\text{C}$ and zero ionic strength) over proton donors (acids with $K > 10^{-4.5}$) in 1 kg of sample

NOTE This definition is taken from Reference [5].

3.2

practical salinity

S

(sea water) the ratio K_{15} of the electrical conductivity of the sea water sample at the temperature of $15\ ^\circ\text{C}$ and the pressure of one standard atmosphere, to that of a potassium chloride (KCl) solution, in which the mass fraction of KCl is $32,435\ 6 \times 10^{-3}$, at the same temperature and pressure

NOTE This definition is taken from Reference [6], p.12, and was formulated and adopted by the UNESCO/ICES/SCOR/IAPSO Joint Panel on Oceanographic Tables and Standards, Sidney, B.C., Canada, September 1-5, 1980, and endorsed by those international bodies. As a ratio, the practical salinity has no unit.