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Techniques of Water-Resources Investigations
of the United States Geological Survey

Chapter A1

METHODS FOR DETERMINATION OF INORGANIC SUBSTANCES IN WATER AND FLUVIAL SEDIMENTS

By Marvin J. Fishman and Linda C. Friedman, Editors

First Edition 1970
Second Edition 1979
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Book 5
LABORATORY ANALYSIS

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METHODS FOR DETERMINATION OF INORGANIC SUBSTANCES IN WATER AND FLUVIAL SEDIMENTS

By Marvin J. Fishman and Linda C. Friedman, editors

Abstract

Chapter A1 of the laboratory manual contains methods used by the U.S. Geological Survey to analyze samples of water, suspended sediments, and bottom material for their content of inorganic constituents. Included are methods for determining the concentration of dissolved constituents in water, the total recoverable and total of constituents in water-suspended sediment samples, and the recoverable and total concentrations of constituents in samples of bottom material. The introduction to the manual includes essential definitions and a brief discussion of the use of significant figures in calculating and reporting analytical results. Quality control in the water-analysis laboratory is discussed, including the accuracy and precision of analyses, the use of standard-reference water samples, and the operation of an effective quality-assurance program. Methods for sample preparation and pretreatment are given also.

A brief discussion of the principles of the analytical techniques involved and their particular application to water and sediment analysis is presented. The analytical methods of these techniques are arranged alphabetically by constituent. For each method, the general topics covered are the application, the principle of the method, the interferences, the apparatus and reagents required, a detailed description of the analytical procedure, reporting results, units and significant figures, and analytical precision data, when available. More than 125 methods are given for the determination of 70 inorganic constituents and physical properties of water, suspended sediment, and bottom material.

Introduction

The Department of the Interior has a basic responsibility for the appraisal, conservation, and efficient utilization of the Nation's natural resources. As one of several Interior agencies, the U.S. Geological Survey's primary function in relation to water is to assess its availability and utility as a national resource for all uses. The U.S. Geological Survey's responsibility for water appraisal includes not only assessments of the location, quantity, and availability of water, but also determinations of water quality. Inherent in this responsibility is the need for extensive water-quality studies related to the physical, chemical, and biological adequacy of natural and developed surface- and ground-water supplies. Included, also, is a need for supporting research to increase the effectiveness of these studies.

As part of its mission the U.S. Geological Survey is responsible for generating a large part of the water-quality data for rivers, lakes, and ground water that is used by planners, developers, water-quality managers, and pollution-control agencies. A high degree of reliability and standardization of these data is paramount.

This chapter is one of a series that documents and makes available data-collection and analysis procedures used by the U.S. Geological Survey. The series describes procedures for planning and executing specialized work in water-resources investigations. The unit of publication, the chapter, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as necessary. For convenience the chapters on methods for water-quality analysis are grouped into the following categories:

- Inorganic substances
- Minor elements by emission spectroscopy
- Organic substances
- Aquatic biological and microbiological samples
- Radioactive substances
- Quality assurance

METHODS FOR DETERMINATION OF INORGANIC SUBSTANCES IN WATER AND FLUVIAL SEDIMENTS

U.S. Geological Survey, Techniques of Water-Resources Investigations, Book 5, Chapter A1
By Marvin J. Fishman and Linda C. Friedman, Editors

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PREFACE

A series of chapters on techniques describes methods used by the U.S. Geological Survey for planning and conducting water-resources investigations. The material is arranged under major subject headings called books and is further subdivided into sections and chapters. Book 5 is on laboratory analyses; section A is on water. The unit of publication, the chapter, is limited to a narrow field of subject matter. "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments" is the first chapter under section A of book 5. The chapter number includes the letter of the section.

This chapter was prepared with the assistance of many chemists and hydrologists of the U.S. Geological Survey as a means of documenting and making available the methods used by the U.S. Geological Survey to analyze water, water-sediment mixtures, and sediment samples.

Any use of trade names, commercial products, manufacturers, or distributors is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey.

This chapter supersedes "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments" by M. W. Skougstad, M. J. Fishman, L. C. Friedman, D. E. Erdmann, and S. S. Duncan (U.S. Geological Survey Techniques of Water-Resources Investigation, book 5, chapter A1, 1979) and "A Supplement to Methods for the Determination of Inorganic Substances in Water and Fluvial Sediments" by M. J. Fishman and W. L. Bradford (U.S. Geological Survey Open-File Report 82-272, 1982).