

ISO 13160:2021 (E)

Water quality — Strontium 90 and strontium 89 — Test methods using liquid scintillation counting or proportional counting

Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms and definitions
4	Principle
4.1	General
4.2	Chemical separation
4.3	Detection
5	Chemical reagents and equipment
6	Procedure
6.1	Test sample preparation
6.2	Chemical separation
6.2.1	General
6.2.2	Precipitation techniques
6.2.3	Liquid–liquid extraction technique
6.2.4	Chromatographic technique
6.2.4.1	Ion exchange resin
6.2.4.2	Crown ether resin
6.3	Preparation of the source for test
6.3.1	Source preparation for liquid scintillation counter
6.3.2	Source preparation for proportional counter
6.4	Measurement
6.4.1	General
6.4.2	Liquid scintillation counter
6.4.3	Proportional counter
6.4.4	Efficiency calculation
6.4.5	Determination of the chemical yield
7	Expression of results
7.1	Determination of ^{90}Sr in equilibrium with ^{90}Y
7.1.1	Calculation of the activity concentration
7.1.2	Standard uncertainty
7.1.3	Decision threshold
7.1.4	Detection limit
7.2	Determination of ^{90}Sr from separated ^{90}Y
7.2.1	Calculation of the activity concentration
7.2.2	Standard uncertainty
7.2.3	Decision threshold
7.2.4	Detection limit
7.3	Determination of ^{90}Sr and ^{89}Sr utilizing $^{90}\text{Sr}/^{90}\text{Y}$ equilibrium
7.3.1	Calculation of the activity concentration
7.3.2	Standard uncertainty
7.3.3	Decision threshold
7.3.4	Detection limit

- 8 Limits of the coverage intervals
 - 8.1 Limits of the of the probabilistically symmetric coverage interval
 - 8.2 Limits of the shortest coverage interval
- 9 Quality control
- 10 Test report
- Annex A (informative) Determination of ^{89}Sr and ^{90}Sr by precipitation and proportional counting
 - A.1 Principle
 - A.2 Chemical reagents and equipment
 - A.2.1 Chemical reagents
 - A.2.2 Equipment
 - A.3 Procedure
 - A.3.1 Introduction
 - A.3.2 Separation of alkaline metals
 - A.3.3 Separation of calcium
 - A.3.4 Separation of barium, radium and lead
 - A.3.5 Yttrium separation
 - A.3.6 Strontium purification and sources preparation to be measured by proportional counter
 - A.3.7 Sources preparation to be measured by proportional counter
- Annex B (informative) Determination of ^{89}Sr and ^{90}Sr by precipitation and liquid scintillation counting
 - B.1 Principle
 - B.2 Chemical reagents and equipment
 - B.2.1 Chemical reagents
 - B.2.2 Equipment
 - B.3 Procedure
 - B.3.1 Introduction
 - B.3.2 Separation of alkaline metals
 - B.3.3 Separation of calcium
 - B.3.4 Separation of barium, radium and lead
 - B.3.5 Separation of fission products and yttrium
 - B.3.6 Strontium purification
 - B.3.7 LSC sources preparation
- Annex C (informative) Determination of ^{90}Sr from its decay progeny ^{90}Y at equilibrium by organic extraction and liquid scintillation counting
 - C.1 Principle
 - C.2 Chemical reagents and equipment
 - C.2.1 Chemical reagents
 - C.2.2 Equipment
 - C.3 Procedure
 - C.3.1 Chemical separation of yttrium
 - C.3.2 Source preparation to be measured
- Annex D (informative) Determination of ^{90}Sr after ionic exchange separation by proportional counting
 - D.1 Principle
 - D.2 Chemical reagents and equipment
 - D.2.1 Chemical reagents
 - D.2.2 Equipment
 - D.3 Procedure
 - D.3.1 Strontium complexation
 - D.3.2 Strontium extraction
 - D.3.3 Strontium precipitation
 - D.3.4 Preparation of sources to be measured
- Annex E (informative) Determination of ^{90}Sr after separation on a crown ether specific resin and liquid scintillation counting
 - E.1 Principle
 - E.2 Chemical reagents and equipment
 - E.2.1 Chemical reagents
 - E.2.2 Equipment

- E.3 Procedure
- E.3.1 Concentration of the sample
- E.3.2 Preparation of the column
- E.3.3 Strontium absorption
- E.3.4 Strontium extraction
- E.3.5 Preparation of the sources to be measured

Annex F (informative) Determination of ^{90}Sr from its decay progeny ^{90}Y at equilibrium by organic extraction and proportional counting

- F.1 Principle
- F.2 Chemical reagents and equipment
 - F.2.1 Chemical reagents
 - F.2.2 Equipment
- F.3 Procedure
 - F.3.1 Chemical separation of yttrium
 - F.3.2 Preparation of the source
 - F.3.2.1 Preparation of the source for measurement by PC
 - F.3.2.2 Preparation of the source for measurement by LSC
 - F.3.2.3 Determination of the chemical yields
- F.4 Counting
- F.5 Interferences

Annex G (informative) Correction factor for ^{90}Sr purity using proportional counting

Page count: 41