

ISO 18589-5:2019-12 (E)

Measurement of radioactivity in the environment - Soil - Part 5: Strontium 90 - Test method using proportional counting or liquid scintillation counting

| Contents | | Page |
|--------------------|--|-------------|
| Foreword | | v |
| Introduction | | vi |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 2 |
| 3.1 | Terms and definitions | 2 |
| 3.2 | Symbols | 2 |
| 4 | Principle | 3 |
| 4.1 | General | 3 |
| 4.2 | Chemical separation | 3 |
| 4.3 | Detection | 4 |
| 4.3.1 | General | 4 |
| 4.3.2 | Source preparation for liquid scintillation counter | 4 |
| 4.3.3 | Source preparation for proportional counter | 4 |
| 4.3.4 | Background determination | 4 |
| 5 | Chemical reagents and equipment | 5 |
| 6 | Procedure of strontium desorption | 5 |
| 6.1 | Principles | 5 |
| 6.2 | Technical resources | 6 |
| 6.2.1 | Equipment | 6 |
| 6.2.2 | Chemical reagents | 6 |
| 6.3 | Procedure | 6 |
| 7 | Chemical separation procedure by precipitation | 7 |
| 7.1 | Principles | 7 |
| 7.2 | Technical resources | 7 |
| 7.2.1 | Equipment | 7 |
| 7.2.2 | Chemical reagents | 8 |
| 7.3 | Procedure | 8 |
| 7.3.1 | Separation of alkaline metals and calcium | 8 |
| 7.3.2 | Separation of barium, radium and lead | 9 |
| 7.3.3 | Separation of fission products and yttrium | 9 |
| 7.3.4 | Strontium purification | 9 |
| 7.3.5 | Yttrium extraction | 10 |
| 7.3.6 | Determination of the chemical yields | 11 |
| 8 | Chemical separation procedure by liquid-liquid extraction | 11 |
| 8.1 | Principle | 11 |
| 8.2 | Technical resources | 12 |
| 8.2.1 | Equipment | 12 |
| 8.2.2 | Chemical reagents | 12 |
| 8.3 | Procedure | 13 |
| 8.3.1 | General | 13 |
| 8.3.2 | Chemical separation of yttrium | 13 |

| | | |
|---|--|----|
| 8.3.3 | Source preparation to be measured by PC | 14 |
| 8.3.4 | Source preparation to be measured by LSC | 14 |
| 8.3.5 | Determination of the chemical yields | 14 |
| 9 | Chemical separation procedure by chromatography (crown ether resin) | 15 |
| 9.1 | Principles | 15 |
| 9.2 | Technical resources | 15 |
| 9.2.1 | Equipment | 15 |
| 9.2.2 | Chemical reagents | 15 |
| 9.3 | Procedure | 16 |
| 9.3.1 | General | 16 |
| 9.3.2 | Chemical separation of the strontium | 16 |
| 9.3.3 | Determination of chemical yield | 17 |
| 10 | Measurement | 17 |
| 10.1 | General | 17 |
| 10.2 | Liquid scintillation counter | 17 |
| 10.3 | Gas flow proportional counter | 17 |
| 10.4 | Calculation of counting efficiency | 18 |
| 11 | Expression of results | 18 |
| 11.1 | General | 18 |
| 11.2 | Determination of ^{90}Sr in equilibrium with ^{90}Y | 18 |
| 11.2.1 | Calculation of the activity per unit of mass | 18 |
| 11.2.2 | Standard uncertainty | 19 |
| 11.2.3 | Decision threshold | 19 |
| 11.2.4 | Detection limit | 19 |
| 11.3 | Determination of ^{90}Sr by the ^{90}Y | 19 |
| 11.3.1 | Calculation of the activity per unit of mass | 19 |
| 11.3.2 | Standard uncertainty | 20 |
| 11.3.3 | Decision threshold | 20 |
| 11.3.4 | Detection limit | 21 |
| 11.4 | Determination of ^{90}Sr in presence of ^{89}Sr when ^{90}Sr is in equilibrium with ^{90}Y | 21 |
| 11.4.1 | Calculation of the activity per unit of mass | 21 |
| 11.4.2 | Standard uncertainty | 22 |
| 11.4.3 | Decision threshold | 22 |
| 11.4.4 | Detection limit | 23 |
| 11.5 | Confidence limits | 23 |
| 12 | Test report | 23 |
| Annex A (informative) Examples of evaluation models | | 25 |
| Bibliography | | 32 |