

# ISO 23655-1:2022-09 (E)

## Water quality - Nickel-59 and nickel-63 - Part 1: Test method using liquid scintillation counting

---

<b>Contents</b>		<b>Page</b>
Foreword .....		iv
Introduction .....		v
1	Scope .....	1
2	Normative references .....	1
3	Terms and definitions .....	1
4	General symbols and nickel-59 and nickel-63 specific symbols .....	2
5	Principle .....	4
6	Reagents .....	4
6.1	Standard solutions .....	5
6.1.1	Nickel-59 and <sup>63</sup> Ni standards .....	5
6.1.2	Stable nickel standards .....	5
6.2	Chemical quenching agent .....	5
6.3	Colour quenching agent .....	5
6.4	Holdback carrier .....	5
6.5	Water .....	5
6.6	Specific reagents for chemical separation .....	5
7	Equipment .....	6
7.1	Laboratory equipment for direct evaporation .....	6
7.2	Liquid scintillation vials .....	6
7.3	Measurement equipment: Liquid scintillation counter .....	6
8	Sampling .....	6
9	Liquid scintillation set up and calibration .....	7
9.1	Window setting .....	7
9.2	Background .....	7
9.3	Calibration .....	7
10	Procedure .....	9
10.1	Preliminary .....	9
10.1.1	Stable nickel content .....	9
10.1.2	Iron and nickel separation .....	9
10.2	Liquid scintillation source preparation .....	9
11	Quality control .....	10
12	Expression of results .....	10
12.1	Nickel-59 measurements .....	10
12.1.1	Nickel recovery .....	10
12.1.2	Activity calculation .....	10
12.2	Nickel-63 measurements .....	11
12.3	Uncertainties and characteristic limits .....	11
12.3.1	Nickel recovery .....	11

12.3.2	Nickel-59 measurements .....	11
12.3.3	Nickel-63 measurements .....	13
12.4	Limits of the coverage interval .....	15
12.4.1	Limits of the probabilistically symmetric coverage interval .....	15
12.4.2	Shortest coverage interval .....	16
13	Test report .....	16
Annex A (normative) Isolation and purification of nickel .....		18
Bibliography .....		20