ISO 16666:2025-11 (E)

Surface chemical analysis - Total reflection X-ray fluorescence - Principles and general requirements

Contents

Page

Foreword iv

Introduction v

1 Scope 1

2 Normative references 1

3 Terms, definitions and abbreviations 1
3.1 Abbreviated terms 1

4 Physical background of TXRF 2
4.1 General 2
4.2 Definition of angle and X-ray path in TXRF geometry 3
4.3 Beam projection 4
4.4 X-ray standing waves (XSW) 4
4.5 Fluorescence intensity 6

5 Instrumental requirements 6
5.1 Description of various possible TXRF measurement setups 6
5.2 Beam conditioning 8
5.2.1 Requirement 8
5.2.2 Beam guidance 8
5.2.3 Beam modulation (tuning) 8
5.2.4 Measurement angles in TXRF 8
5.3 Reflector (sample carrier) 9
5.3.1 General requirements 9
5.3.2 Reflectors for chemical analysis 9
5.4 Reflector alignment 9
5.5 Detector 10
5.6 Sample station 10
5.7 Control unit 10

6 Calibration and quality control 10
6.1 Angle inspection 10
6.2 Energy calibration 10
6.3 Calibration of the element sensitivities 11
6.4 Inspection of the sample excitation 12
6.5 Inspection of the element detection 12

7 Spectra analysis and Reporting 12
7.1 Spectra Processing 12
7.2 Reporting Spectra 13

8 Samples 13

9 Qualitative and quantitative analysis 14
9.1 Qualitative analysis 14
9.2 Quantitative analysis 14
9.2.1 Methods of quantitative analysis 14
9.3 Preparation of a measurement for quantitative analysis 15

9.4 Procedure of a quantitative analysis by the element-specific sensitivity method (internal standard addition) 16
9.5 Verification of quantitative TXRF measurements 17
9.6 Traceability in TXRF 17

Annex A (informative) Measurement angles in TXRF, background correction, peak correction, spectrum deconvolution 18

Annex B (informative) Round-robin test for verification of the precision and accuracy of TXRF spectroscopy 21

Bibliography 22