
**Surface chemical analysis — Use of
Total Reflection X-ray Fluorescence
spectroscopy in biological and
environmental analysis**

*Analyse chimique des surfaces — Utilisation de réflexion
spectroscopie des rayons X de fluorescence totale dans l'analyse
biologique et de l'environnement*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

| | |
|---|-----------|
| Foreword | v |
| Introduction | vi |
| 1 Scope | 1 |
| 2 Normative references | 1 |
| 3 Terms, definitions, symbols, and abbreviated terms | 1 |
| 3.1 Terms and definitions..... | 1 |
| 3.2 Symbols and abbreviated terms..... | 2 |
| 4 Background | 2 |
| 4.1 Preliminary remarks..... | 2 |
| 5 Instrumentation | 4 |
| 5.1 Instrumental requirements..... | 4 |
| 5.1.1 X-ray sources of radiation..... | 4 |
| 5.1.2 Monochromator..... | 5 |
| 5.1.3 Detector..... | 5 |
| 5.1.4 Sample station..... | 6 |
| 5.1.5 Critical and glancing angle..... | 6 |
| 5.2 Quality control of TXRF spectrometer..... | 7 |
| 5.2.1 Stability check of X-ray beam..... | 7 |
| 5.2.2 Spectroscopic resolution..... | 7 |
| 5.2.3 Energy calibration..... | 8 |
| 5.2.4 Sensitivity test..... | 8 |
| 6 Specimen preparation | 8 |
| 6.1 Preliminary remarks..... | 8 |
| 6.2 Sample carriers..... | 9 |
| 6.2.1 Choice of sample carriers..... | 9 |
| 6.2.2 Cleaning procedure for sample carriers..... | 9 |
| 6.3 Sample treatment procedures for chemical analysis by TXRF..... | 10 |
| 6.3.1 Liquid samples..... | 10 |
| 6.3.2 Solid samples..... | 12 |
| 6.3.3 Preparation of the Internal Standard solution..... | 13 |
| 7 Data Collection and Storage | 14 |
| 7.1 Preliminary remarks..... | 14 |
| 7.2 Data collection..... | 14 |
| 8 Data Analysis | 14 |
| 8.1 Qualitative analysis..... | 14 |
| 8.2 Quantitative analysis..... | 14 |
| 8.2.1 Preliminary remarks..... | 14 |
| 8.2.2 Background correction..... | 14 |
| 8.2.3 X-ray intensities of each element..... | 15 |
| 8.2.4 Experimental derivation of relative sensitivities..... | 15 |
| 8.2.5 Quantification by means of internal standard..... | 15 |
| 8.2.6 Statistical treatment..... | 16 |
| 9 Information required when reporting TXRF analysis | 16 |
| 9.1 Preliminary remarks..... | 16 |
| 9.2 Experimental details..... | 16 |
| 9.3 Analysis procedures..... | 17 |
| Annex A (informative) Comparison of detection limits of TXRF, AAS, and ICP-MS | 18 |
| Annex B (informative) Case studies of TXRF analysis for environmental applications | 21 |
| Annex C (informative) Case studies of TXRF analysis for biological applications | 24 |