

LS Measuring Procedures in Analysis

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Motivation

This Handbook on Liquid Scintillation LS presents a compilation of the contemporary most important radioanalytical procedures applying this measuring technology. It serves as a manual for the determination of radionuclides by LS. We wish that the fully revised and extended 3rd edition would further spread this modern and future prospective methodology also beyond Radioanalysis.

Content

- **1. Introduction**
 - 1.1. The Liquid Scintillation Process
 - 1.2. Quenching
 - 1.3. Cerenkov Counting
 - 1.4. Separation of α - and β/γ -Radiation
 - 1.5. TDCR Method
 - 1.6. Miniaturization of LS Devices
 - 1.7. Cocktails and Sample Preparation
 - 1.8. Extraction for Radionuclide Separation and Enrichment
- **2. Measuring Procedures**
 - 2.1. Instrument Calibration Procedures
 - 2.2. Natural Radionuclides
 - 2.3. Radionuclides from Nuclear Fission Activities
 - 2.4. Radiation Protection
- **3. Solid Scintillators and Microspheres**
- **4. Quality Assurance and Uncertainty Budget**
- **5. Literature**

Selected Procedures

- Quick Method for Key Nuclides in Drinking Water (Rn-222, Ra-226/8, Pb-210, H-3, gross α/β)
 - LL Tritium in Sea Water by Electrolytic Enrichment
 - RAD Disk Based Methods and Plastic Scintillator Microspheres for Ra and Sr-isotopes, Pb-210 and Tc-99(m)
 - TDCR Cerenkov Counting in Targeted α -Therapy (Ra-224/Pb-212)
 - Radiocarbon in Biobased Products (Fuel)
 - Rapid Method for Sr Isotopes by TDCR Cerenkov
 - Artificial Radionuclides in the Nuclear Fuel Cycle (Fe-55, Ni-63 and Ca-41 in decommissioning activities)
 - Contamination (e.g. α - and Ni-63 by smear) and Incorporation Control (e.g. P-32 in urine)
- and others also related to FIA and Luminescence Counting

Abstract

Modern LS with extractive sample preparation, α/β Pulse Shape Discrimination, Cerenkov Counting and Triple-to-Double-Coincidence-Ratio for absolute counting is summarized. Measuring procedures are dedicated to natural radionuclides as well as radionuclides from nuclear fission activities like decommissioning. Applications in Radiation Protection and Medicine as well as solid microsphere applications with relevance to FIA round up the spectrum of content. Quality Assurance aspects are discussed in the last part. A comprehensive literature survey till 2024 facilitates further studies.



LIQUID SCINTILLATION
- MEASURING PROCEDURES, NEW DEVELOPMENTS -
3rd completely revised and extended Edition 2024

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