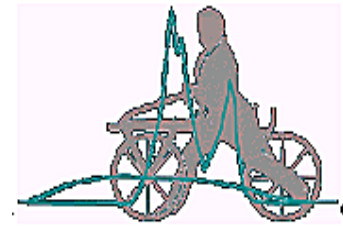


Liquid Scintillation LS

- Key Technique in Joint Research and Training -

Siegurd Moebius

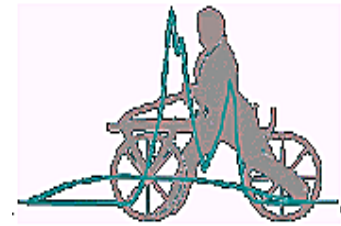
German Society for Liquid Scintillation DGFS e.V.



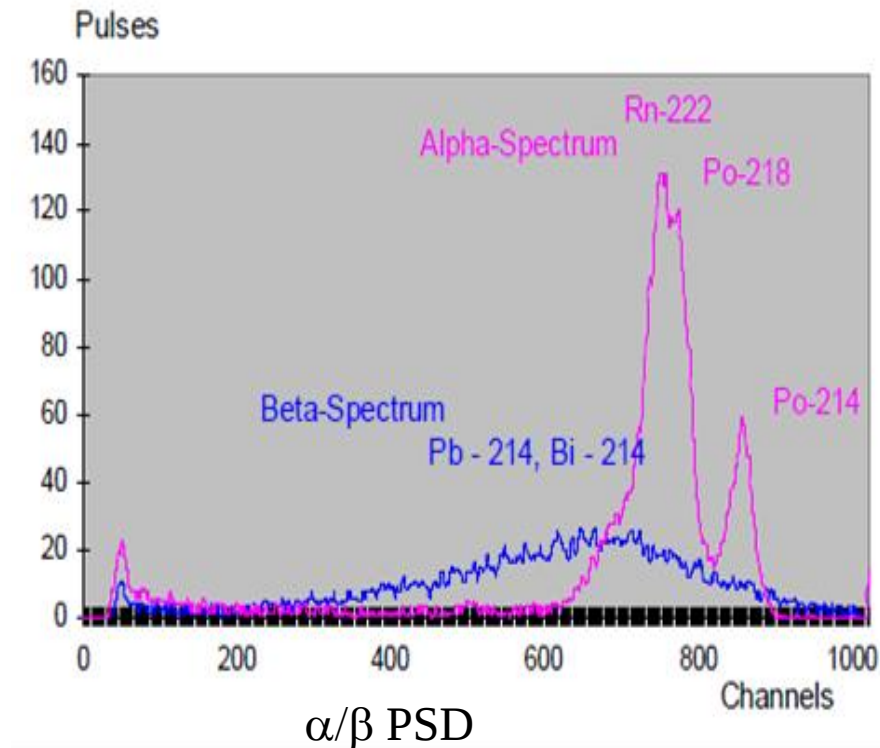
Summary LS

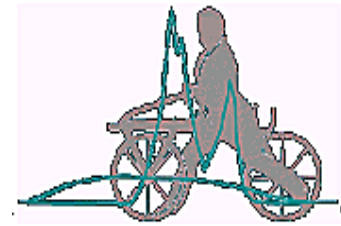
- Liquid Scintillation is a Measuring Technique that converts transition energy into light photons.
- The method is universal (α , β , γ , Cerenkov, luminescence), efficient (upto 100%) and easy to handle.
- Modern LS methods include as key techniques **electronical α/β PSD, extractive methods** for sample preparation and TDCR for quantitative detection.

α/β PSD



Discrimination between α - and β/γ radiation applies the pulse shape discrimination. PSD makes use of the longer life time α -pulses for their electronical separation.





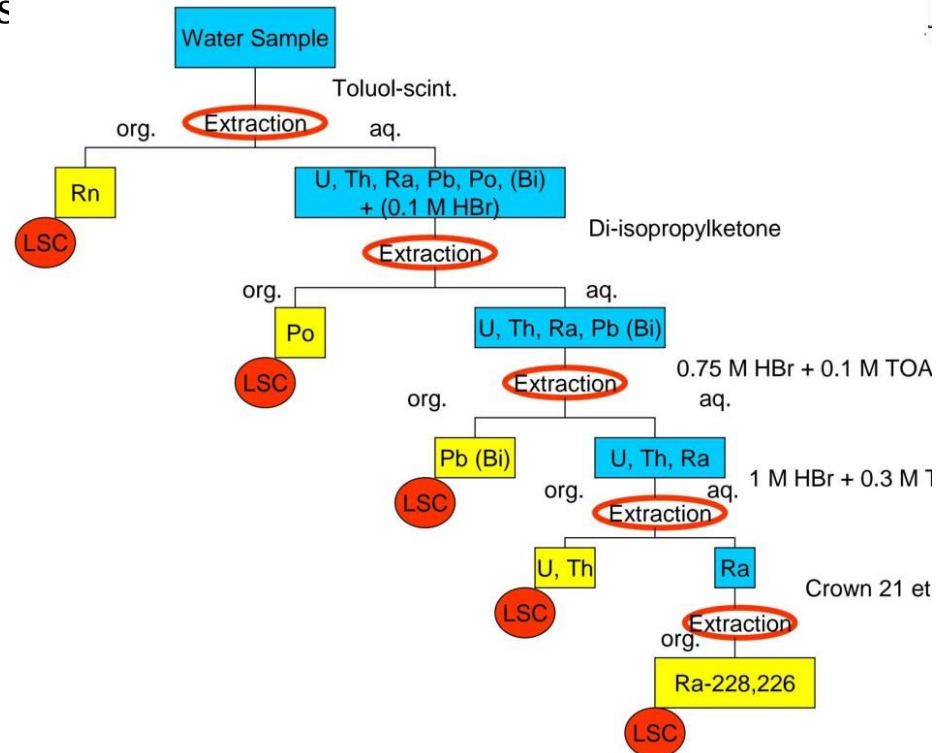
Extractive Scintillators

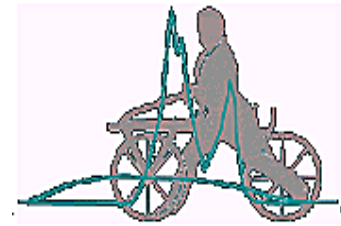
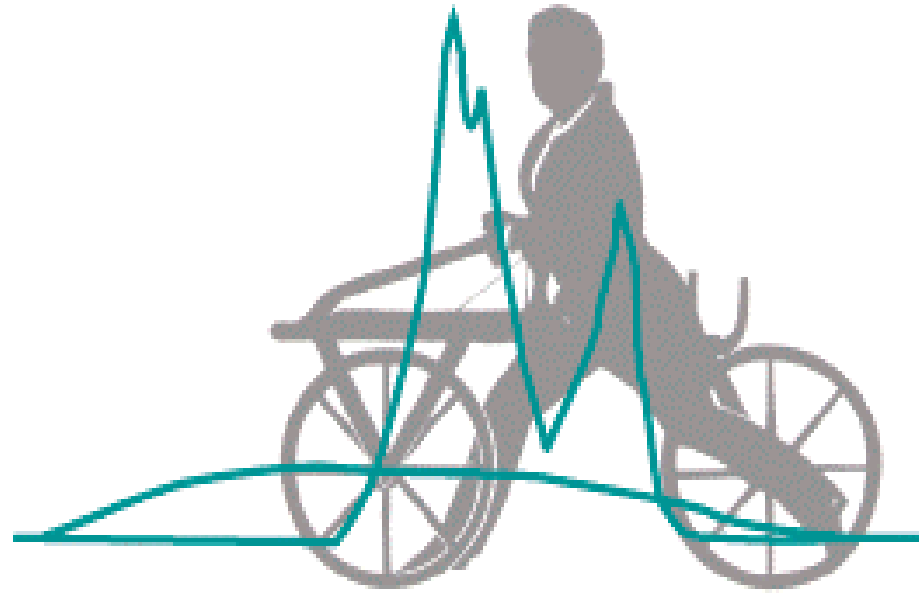


Combination of Extractive Scintillators

= Homogeneous Solution of Scintillators + Organic Solution + Extractive Agent
Sequence for Natural Radionuclides

Rn, Ra, Po, Pb, U, Th



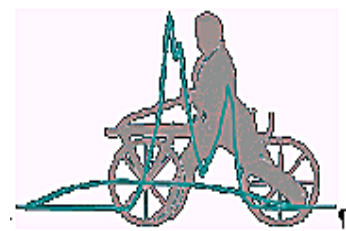


LSC 2001

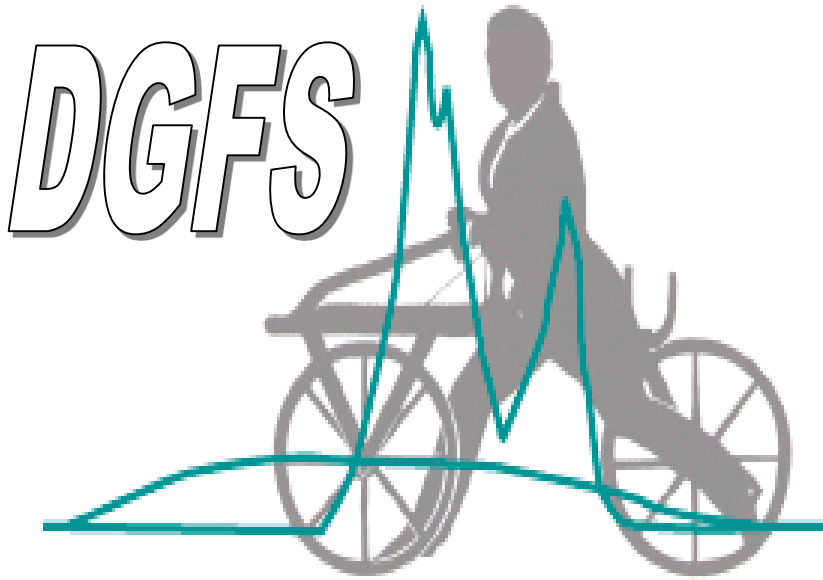
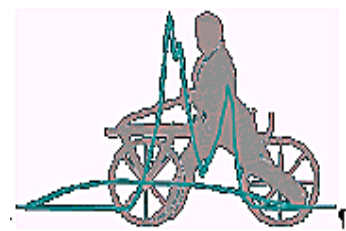
International Conference on Advances in Liquid Scintillation Spectrometry

*Karlsruhe, Germany
May 7 – 11, 2001*

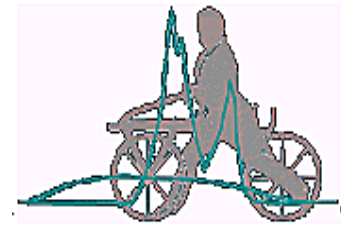
Foundation of DGFS



Karlsruhe 2001



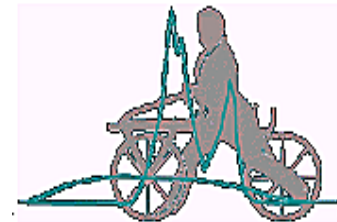
Freiherr von Drais 1817



Social Events

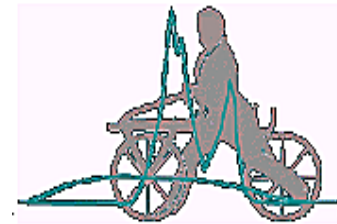


LSC2001 Karlsruhe



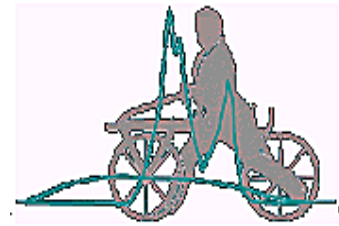
DGFS Aims

- **Development and exchange of experiences in modern Liquid Scintillation (LS) to a broader community**
- Development and improvement of analytical procedures for LS with special emphasis on natural radionuclides
- Academical education and training in Liquid Scintillation; International Training Courses



DGFS Aims

- Development and exchange of experiences in modern Liquid Scintillation (LS) to a broader community
- **Development and improvement of analytical procedures for LS (LS Handbook) with special emphasis on natural radionuclides**
- Academical education and training in Liquid Scintillation; International Training Courses

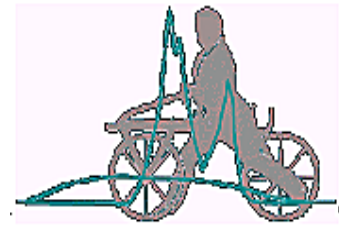


LIQUID SCINTILLATION - MEASURING PROCEDURES, NEW DEVELOPMENTS -

**3rd completely revised and
extended Edition 2024**

MOEBIUS Siegurd
MOEBIUS Tiana
TARANCON Alex
WENDEL Juergen

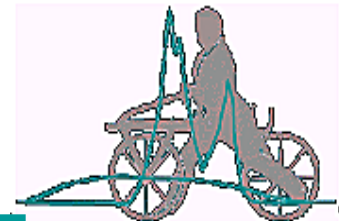
DGFS e.V. German Society for Liquid Scintillation Spectrometry
Karlsruhe Institute of Technology, 2024 Karlsruhe



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 as well beyond Radioanalysis!

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)

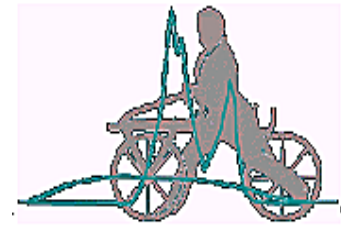
Rapid Method for Sr Isotopes by TDCR Cerenkov

Artificial Radionuclides in the Nuclear Fuel Cycle
(Fe-55, Ni-63 and Ca-41 in decommissioning activities)

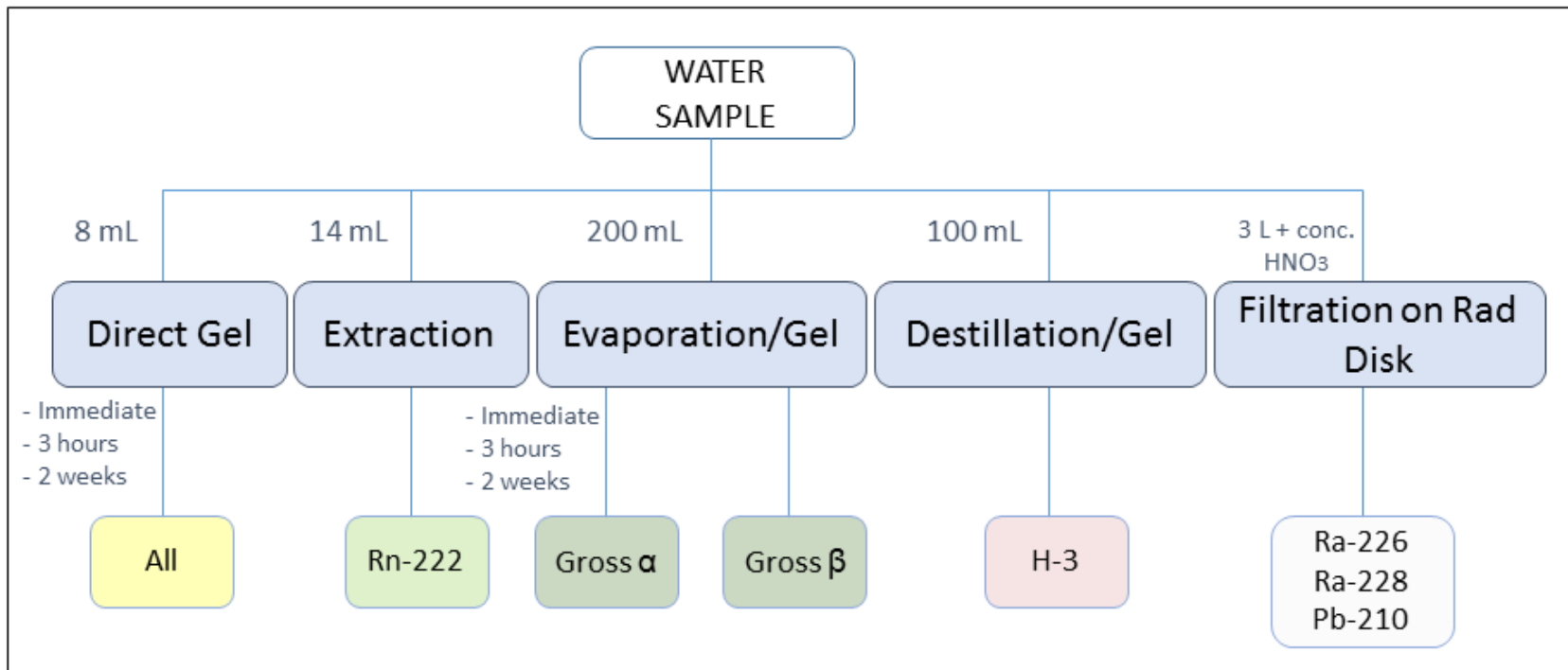
Contamination (e.g. α - and Ni-63 by smear) and
Incorporation Control (e.g. P-32 in urine)

and others also related to FIA and Luminescence Counting

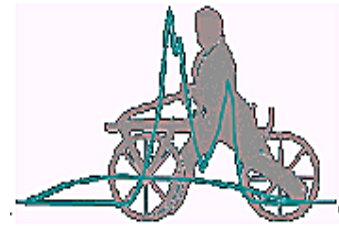
Radioanalysis of Drinking Water



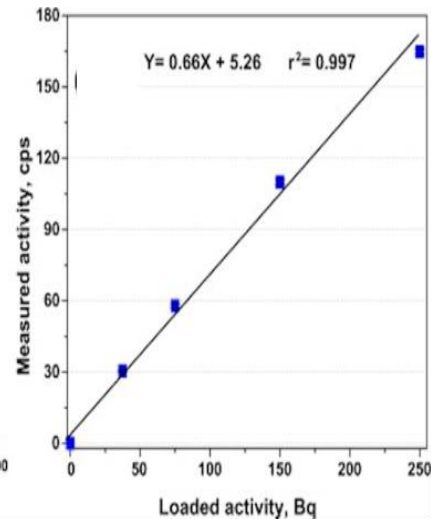
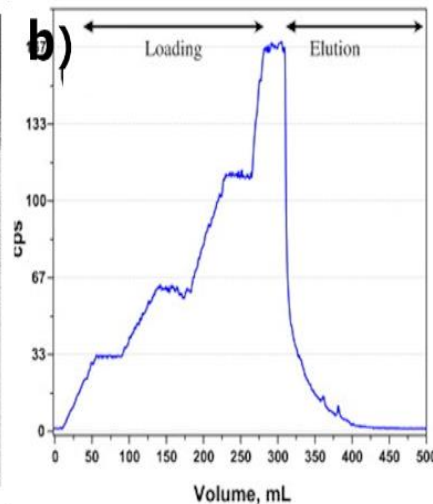
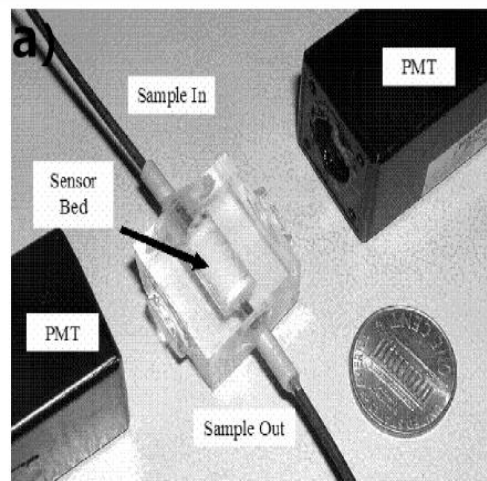
Measuring procedures are dedicated to natural radionuclides as well as radionuclides from nuclear fission activities like decommissioning.



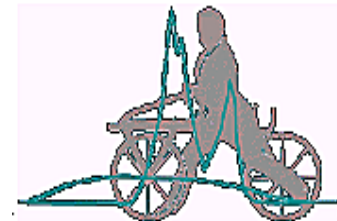
Quick Method for Key Nuclides in Drinking Water



Applications in Radiation Protection and Medicine as well as solid microsphere applications with relevance to FIA round up the spectrum of content.

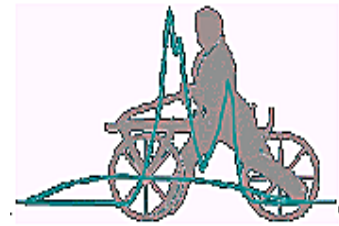


(a) Photograph of a composite bed sensor flow cell (Plastic Scintillator Microspheres) and
(b) The response of the sensor to pertechnetate solutions
(Hamel 2021)



DGFS Aims

- Development and exchange of experiences in modern Liquid Scintillation (LS) to a broader community
- Development and improvement of analytical procedures for LS with special emphasis on natural radionuclides
- **Academical education and training in LS:
International Training Activities (Tiana!)**



Heading for More

- Spreading Measuring Handbooks for Academical Education
- **Extending LS for FIA Applications**
- Providing Knowledge on simple, fashion made LS Arrangements

Thank's to CMU as well for the fruitful cooperation

