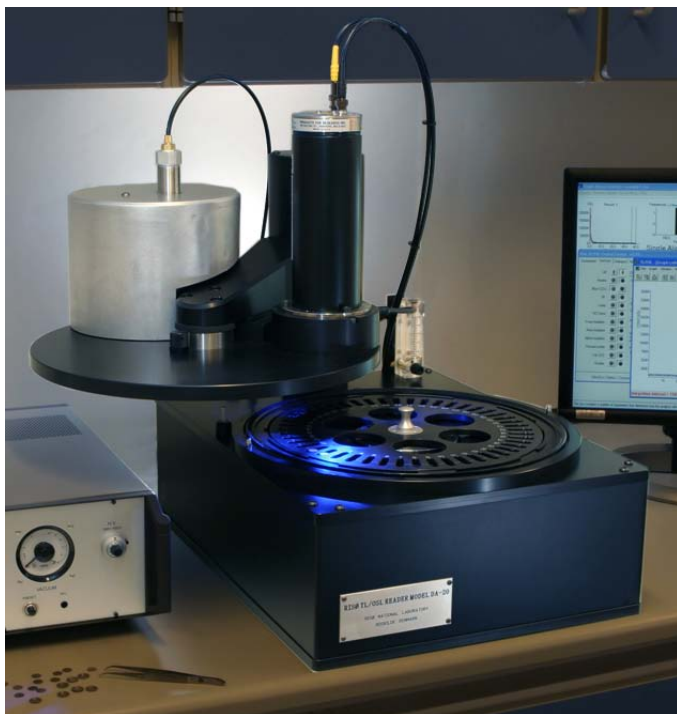


Risø TL/OSL Reader Radiation Safety



Responsibility

It is assumed that one person is responsible for the reader regarding radiation protection and that this person behave according to national legislation and directions given by the national authorities.

Source strength of $^{90}\text{Sr}/^{90}\text{Y}$

Inside the reader there is a $^{90}\text{Sr}/^{90}\text{Y}$ source (half-life 28.5 years) with an activity of up to 1.5 GBq. The source emits high energy β -particles. When the particles are stopped in the source itself or in the shielding, bremsstrahlung (X-ray radiation) is generated.

Bremsstrahlung dose rate

When placed in the reader the source is well shielded, but low dose rates due to the bremsstrahlung can be measured outside the reader. It is recommended that the space underneath the reader is blocked or furnished with e.g. a cupboard. The effective dose rate is highest at the immediate front of the reader with a few $\mu\text{Sv/h}$ when irradiating samples.

Radiation protection

It is advised to use the ALARA-principle, which states that all doses shall be kept as low as reasonably achievable. This translates in practice to measure the dose rates around the reader and plan the work to keep doses as low as reasonable achievable. If space and work procedures allow, shielding plates can be placed at the side of the reader to lower the radiation level here. The effect can be checked by measurements.

It is recommended that personal dose meters are used as a reassurance in the first time after a new work pattern has been established. It is also recommended that pregnant women are monitored with dose meters.

Source integrity

When the source is loaded into or unloaded from the reader, it is important that the detailed instructions provided by the supplier of the reader are followed strictly. Both written and video materials are available. In case something is unclear the supplier must be contacted. It is especially important to protect the eyes by wearing glasses, never to touch the source and never to direct the unshielded side of the source towards any person.

It is advised to inspect the beryllium-window between the source and the irradiation position in the reader every second year. This inspection should also follow the instructions of the supplier and always be made by the use of a mirror.

If doubt arises whether the source integrity has been compromised the apparatus should be checked for contamination. This can be done by wiping the sample holder by a cloth and checking the cloth for contamination (away from the reader). If contamination is present further wipe testing is necessary to determine the extent of the contamination. In the case of a compromised source, decontamination and change of the source shall be carried by a qualified person.

Dose rate and contamination measurements

The instrument used to measure the dose rates from bremsstrahlung, e.g. an energy compensated GM-detector, must be able to measure photons with energies from 100 keV to 2 MeV and show true dose rate. This instrument will not be able to measure dose rate contributions from direct β -radiation from the source itself or from any contamination.

A GM-detector with a thin window can be used to measure $^{90}\text{Sr}/^{90}\text{Y}$ -contamination.

Dose rate measurements

Reference point	Measured dose rate [$\mu\text{Sv/h}$]		Dose rate maximum [$\mu\text{Sv/h}$]	
	β off	β on	β off	β on
A ₁			1.2	20
A ₂			0.6	0.8
B ₁			8	150
B ₂				26
C			8	6
D			5	60
E			60	
F			0.8	
Instrument				
Reader ID				
Date				
Name				
Signature				

