

^{99m}Tc

Radioisotope Safety Data Sheet Technetium 99m

Half life 6 hours

Radiations emitted

| Radiation | Energy, keV | Yield |
|-------------|-------------|-------|
| Gamma ray 1 | 18 | 6% |
| Gamma ray 2 | 21 | 1% |
| Gamma ray 3 | 141 | 89% |

Safety precautions

^{99m}Tc is a medium energy gamma ray emitter that presents a mainly external irradiation hazard.

Handling tools and standard laboratory PPE (gloves, lab coat, safety glasses) should be used to minimise exposure.

Because of the relatively low gamma ray constant, lead shielding at a workstation will only be required where sources with activities greater than about 100 MBq are handled in an unshielded condition. Although ^{99m}Tc decays very rapidly, wastes stored in the laboratory containing more than about 50 MBq may require shielding with lead sheet. Wastes should be monitored with a survey meter to ensure radiation levels are acceptable.

NB radiation levels in controlled areas must not exceed 40 µSv per week, and in areas accessible to non-radiation workers, 10 µSv per week.

Radiotoxicity data

^{99m}Tc is classed as being of low hazard (group 4) according to AS 2243.4.

The Annual Limit on Intake by ingestion (ALI_{ing}) is 910 MBq and the most restrictive inhalation limit (ALI)_{inhal} is 690 MBq.

Dose rates

The gamma ray dose rate constant for ^{99m}Tc is 23 µSv/h/ GBq @ 1 m

Dose rate to the basal skin cells from contamination of 1 kBq cm⁻² 246 µSv h⁻¹

Dose rate from a 1 kBq (0.05 ml) droplet on skin: 8.8 µSv h⁻¹

Shielding

Half value layer (HVL) is less than 1mm of Pb

NB Perspex workstation shielding offers no protection from ^{99m}Tc Gamma radiation.

Licensing requirements

Under the *Radiation Safety Regulation 2010* a licence is required to possess ^{99m}Tc sources with concentrations equal to or greater than 100 Bq per gram and with activities of 10 MBq or greater.

In the University, individual user licences are required for persons who use licenceable sources for research purposes.

Disposal data

The maximum concentration of ^{99m}Tc in aqueous wastes released to a sewerage system is given in the 2010 Radiation Safety Regulation as 62.3 MBq per m³ i.e. 62.3 kBq per litre.

The concentration of ^{99m}Tc in solid wastes disposed of to either the general or pathology waste streams must be less than 50 Bq per gram (50 kBq per kg) – i.e. half the concentration limit for licensing.

NB because of the very short half-life, retention of all ^{99m}Tc wastes for 1 week will ensure compliance with the disposal limits.

Radiation detection and monitoring

A large diameter end window or pancake type GM tube contamination monitor is the most suitable type of meter for contamination control. TLD dosimeters are recommended for whole body personal monitoring. (For details see the Personal Radiation Monitoring Safety Guideline).

Laboratory requirements

Low level lab maximum activities

Bench: 10 MBq

Fume cupboard: 100 MBq

Medium level lab maximum activities

Bench: 30 MBq

Fume cupboard: 300 MB