TECHNETIUM-99
HANDLING PRECAUTIONS

^{99}Tc
2.13 x 10^5y
ß$^-$ 0.294
No γ
E 0.294

PHYSICAL DATA

Maximum Beta Energy: 0.294 MeV (100%)[1]

Maximum Range of Beta in Air: 63 cm (25 in.)[2]

OCCUPATIONAL LIMITS[3]

Annual Limit on Intake: 4 mCi (150 MBq) for oral ingestion and 700 µCi (26 MBq) for inhalation.

Derived Air Concentration: 3 x 10^{-7} µCi/mL (11 kBq/m^3).

DOSIMETRY

Millicurie (37 MBq) quantities of ^{99}Tc do not present a significant external exposure hazard because the low-energy betas emitted barely penetrate gloves and the outer dead layer of skin. It may be assumed that technetium is retained in the transfer compartment with a biological half-life of 0.02 days[4]. 4% of technetium leaving the transfer compartment is transferred to the thyroid where it is retained with a biological half-life of 0.5 days[4]. 10%, 3% and 83% of technetium leaving the transfer compartment are translocated to the stomach wall, liver and all other organs and tissues of the body, respectively; and 75%, 20% and 5% of technetium in all organs and tissues, except the thyroid, retained with biological half-lives of 1.6, 3.7 and 22 days, respectively[4].

GENERAL HANDLING PRECAUTIONS FOR TECHNETIUM-99

1. Designate area for handling ^{99}Tc and clearly label all containers.
2. Prohibit eating, drinking, smoking and mouth pipetting in room where ^{99}Tc is handled.
3. Use transfer pipettes, spill trays and absorbent coverings to confine contamination.
4. Handle ^{99}Tc compounds that are potentially volatile or in powder form in ventilated enclosures.
5. Sample exhausted effluent and room air by continuously drawing a known volume through membrane filters.
6. Wear disposable lab coat, gloves and wrist guards for secondary protection.
7. Select gloves appropriate for chemicals handled.
8. Maintain contamination control by regularly monitoring and promptly decontaminating gloves and surfaces.
9. Use pancake or end-window Geiger-Mueller detectors or liquid scintillation counter to detect ^{99}Tc.
10. Submit periodic urine samples for bioassay to determine uptake by personnel.
11. Isolate waste in clearly labeled containers and dispose of according to approved guidelines.
12. Establish air concentration, surface contamination and bioassay action levels below regulatory limits. Investigate and correct any conditions that may cause these levels to be exceeded.
13. On completing an operation, secure all ^{99}Tc; remove and dispose of protective clothing and coverings; monitor and decontaminate self and surfaces; wash hands and monitor them again.

REFERENCES

1. Kocher, David C., Radioactive Decay Data Tables, Springfield: National Technical Information Service, 1981 DOE/TIC-11026.
2. Kaplan, Irving, Nuclear Physics, New York: Addison-Wesley, 1964.
3. U.S. Nuclear Regulatory Commission. 10CFR 20 Appendix B – Standards for Protection Against Radiation, 1994.
4. ICRP Publication 30, Part 2, Limits for Intakes of Radionuclides by Workers. Pergamon Press, Oxford, 1980.