

Chlorine-36

Handling Precautions

^{36}Cl
 $3.01 \times 10^5 \text{ y}$
EC
 $\beta^- 0.710$
E 0.710

Physical Data

Maximum Beta Energy: 0.710 MeV (99%)⁽¹⁾

Maximum Range of Beta in Air: 2 m (7 ft)⁽²⁾

Maximum Range of Beta in Water: 2.6 mm (0.1 in)⁽²⁾

Occupational Limits⁽³⁾

Annual Limit on Intake: 2 mCi (74 MBq) for oral ingestion and 200 μCi (7.4 MBq) for inhalation.

Derived Air Concentration: $1 \times 10^{-7} \mu\text{Ci/ml}$ (3.7 kBq/m³).

PerkinElmer Life Sciences has developed the following suggestions for handling Chlorine-36 after years of experience working with this beta emitter.

General Handling Precautions for Chlorine-36

1. Designate area for handling ^{36}Cl and clearly label all containers.
2. Prohibit eating, drinking, smoking and mouth pipetting in room where ^{36}Cl is handled.
3. Use transfer pipets, spill trays and absorbent coverings to confine contamination.
4. Handle ^{36}Cl compounds that are potentially volatile or in powder form in ventilated enclosures.
5. If enhanced containment is necessary, handle volatile compounds in closed systems vented through suitable traps.
6. Sample exhausted effluent by continuously drawing a known volume through a membrane filter.
7. Avoid skin exposure by using tongs and handling tool, regular monitoring and prompt removal of contaminated protective clothing.
8. For secondary protection, wear disposable lab coat and select gloves appropriate for chemicals handled.
9. Maintain contamination control by regularly monitoring and promptly decontaminating gloves and surfaces.
10. Use pancake or end-window Geiger-Mueller detectors or liquid scintillation counter to detect ^{36}Cl .
11. Submit periodic urine samples for bioassay to determine uptake by personnel.
12. Isolate waste in clearly labeled containers according to approved guidelines.

13. Establish air concentration, surface contamination and bioassay action levels below regulatory limits. Investigate and correct any conditions that cause these levels to be exceeded.
14. On completing an operation, secure all ^{36}Cl , remove and dispose of protective clothing and coverings, monitor and decontaminate self and surfaces, wash hands and monitor them again.

^{36}Cl beta particles have sufficient energy to penetrate gloves and skin. When handling millicurie (37 MBq) quantities, do not work over an open container. Avoid glove and skin contamination or ensure that it is promptly detected and removed. Consider the need for shielding the ^{36}Cl with 6-mm (0.25-in.)-thick Lucite® and wearing wrist and finger dosimeters.

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.

This document contains general information designed to provide a basic understanding of radiation safety. While we believe the information to be accurate, regulatory requirements may change and information contained herein is not tailored to individual needs. A radiation protection specialist should be consulted for specific applications.



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