

Radiation Safety Data - ⁶³Ni Electron Capture Detectors

Nickel-63 has a low energy beta spectrum and reasonably long half-life, making it useful as an alternative for tritium in some applications. Major use is in gas chromatograph sources where the greater stability of electroplated radionickel compared to metaltritides makes it of particular value.

Physical Data (ICRP 38 and Radiation Health Handbook)

Decay mode	beta emission to stable ⁶³ Cu
Physical half-life	about 96 years
Major emission	beta minus, 67 keV max, 17 keV avg, 1/dis
Range in air	about 5 1/2 cm
Range in water	about 60 μm

Biological Data (ICRP 30 and Radiation Health Handbook)

Intake into the body via ingestion or inhalation results in about 5% uptake. Biological half-life has several components including a 1200 day half-life component. Committed effective dose equivalent is ranges from 2 to 6 mrem/uCi intake if via inhalation (depending on chemical form), and of the order of 0.6 mrem/uCi intake if via ingestion. Annual limits on intake via ingestion is 9,000μCi; for inhalation, the limit is in the range of 800 to 3,000 μCi (depending on chemical form).

Common Hazards - Precautions

⁶³Ni electron capture detector (ECD) sources are quasi-sealed sources. They are required to be leak tested at least every six months. The sources consist of nickel electroplated onto a metal surface inside the detector cell. The ECD can produce contamination from rubbing or scratching the source active surface, from overheating the source, or from cleaning the cell with caustic solutions. Thus, such sources must be handled with care. Under no circumstances should users attempt to clean an ECD.

Note that ⁶³Ni presents no external dose hazard to humans except to lenses of eyes, and the ⁶³Ni contact would have to be on the surface of the eye to produce a dose.

The low energy of the beta spectrum makes use of personnel dosimeters of no value; hence, they need not be issued to using personnel.

Surface contamination is difficult to find using normal survey equipment. Liquid scintillation counting of wipes is required to assess suspected contamination and for counting routine leak test wipes.