

IODINE-125 [¹²⁵I]

PHYSICAL DATA

- Gamma Energies:
(No betas emitted)

35.5 keV (7% abundance/93% internally converted gamma)
27.0 keV (113%, x-ray)
27-32 keV (14%, x-ray)
31.0 keV (26%, x-ray)
- Specific Gamma Ray Constant:
0.27 to 0.70 mR/hr per mCi at 1 meter
(Current literature indicates 0.27 mR/hr per mCi at 1 meter)
- Physical Half-Life:
60.1 days
- Biological Half-Life:
120-138 days (unbound iodine)-thyroid elimination
- Effective Half-Life:
42 days (unbound iodine)-thyroid gland

RADIOLOGICAL DATA

- Critical Organ (Biological Destination): Thyroid
- Routes of Intake: Ingestion, inhalation (most probable), puncture, wound, skin contamination (absorption)
- External and internal exposure and contamination concerns exist in use of ¹²⁵I

SHIELDING

- Lead foil or sheets (1/32 to 1/16 inch thick): 0.152 mm lead foil
- Half Value Layer: 0.02 mm - 0.008 inches

SURVEY INSTRUMENTATION

- Survey meter equipped with a low energy NaI scintillation probe is necessary.
- Survey meters equipped with GM pancakes or end window GM probes are inefficient. These probes are not useful for contamination monitoring; they are only about 0.1% efficient.

DOSE RATES

(from unshielded 1.0 mCi isotropic point source)

| <u>Distance</u> | <u>mrads/hr</u> |
|-----------------|-----------------|
| 1.00 cm | 156 - 275 |
| 10.00 cm | 15.5 - 27.5 |
| 100.00 cm | 0.156 - 0.28 |
| 6.00 in | 6.5 |

(Some literature indicates 0.7 mrad/hr per mCi at 100 cm.)

- The thyroid gland accumulates 20 - 30% of the soluble radioiodine taken in by the body. All radioiodines in the body can be assumed to be eliminated quite rapidly via the urine.
- Thyroid Bioassay is **required** when using unsealed volatile sources of ^{125}I or ^{131}I in excess of 0.1 mCi or 1.0 mCi nonvolatile forms. The thyroid scan is to be obtained not less than 24 hours but not more than one week after the handling or use of that quantity and form of ^{125}I . In addition, all workers who assist or observe in manipulations of the above quantity and type of ^{125}I , or are sufficiently close to the process so that intake is possible (within a few meters and in the same room) are required to obtain thyroid scans under the same conditions listed above.
- Fume hood sash glass provides adequate shielding for most iodinations. Extra shielding is not recommended, since it impedes air flow into the hood.
- Shielding is not required for most uses of this nuclide due to the low energy and low amounts typically used.
- Use a cannula adaptor needle to vent stock vials of ^{125}I used for iodinations. This prevents puff releases.
- Segregate waste from iodinations (free) from other (bound) ^{125}I waste and store it in the fume hood, in tightly sealed ziplok bags (solid waste) or screw top containers (liquid waste) until transfer to storage facility.
- Cover test tubes used to count or separate fractions from iodinations with parafilm or other tight caps to prevent release while counting or moving outside the fume hood.