Gallium 67 (Ga)
Handling Precautions

*Half life: 3.261 days

Decay mode: Electron Capture

Decays to Zn-67 (Stable)

Provided as Gallium Chloride

Volume: Variable 0.005 - 10 ml.

Activity: 5 - 1000 mCi

Gallium 67 Decay Table

Physical Half-life 3.261 days

	DAYS	0	0.2	0.4	0.6	0.8	1	1.2	1.4	1.6	1.8
	0	1.000	0.958	0.918	0.880	0.844	0.809	0.775	0.743	0.712	0.682
	1	0.809	0.775	0.743	0.712	0.682	0.654	0.626	0.600	0.575	0.551
	2	0.654	0.626	0.600	0.575	0.551	0.529	0.507	0.485	0.465	0.446
	4	0.427	0.410	0.392	0.376	0.360	0.345	0.331	0.317	0.304	0.291
	6	0.279	0.268	0.257	0.246	0.236	0.226	0.216	0.207	0.199	0.191
	8	0.183	0.175	0.168	0.161	0.154	0.148	0.141	0.136	0.130	0.125
DAYS	10	0.119	0.114	0.110	0.105	0.101	0.097	0.092	0.089	0.085	0.081
	12	0.078	0.075	0.072	0.069	0.066	0.063	0.060	0.058	0.056	0.053
	14	0.051	0.049	0.047	0.045	0.043	0.041	0.040	0.038	0.036	0.035
	16	0.033	0.032	0.031	0.029	0.028	0.027	0.026	0.025	0.024	0.023
	18	0.022	0.021	0.020	0.019	0.018	0.018	0.017	0.016	0.016	0.015
	20	0.014	0.014	0.013	0.013	0.012	0.012	0.011	0.011	0.010	0.010
	22	0.009	0.009	0.009	0.008	0.008	0.008	0.007	0.007	0.007	0.006
	24	0.006	0.006	0.006	0.005	0.005	0.005	0.005	0.005	0.004	0.004

***Radiations emitted:**

Radiation Types	Energy (keV)	Intensity (%)
Auger- L	0.67	249 3
Auger- K	5.62	105.5 14
ce-K- 2	7.3007	69.5 3
ce-K- 3	13.5666	7.78
c e -L- 3	14.3198	1.15
ce-MNO- 3	114.951	1.838
ce-K- 4	129.364	1.42
X-ray L	1	0.8
X-ray Kα2	8.6157	16.5 14
X-ray Kα1	8.63886	32 3
X-ray Kβ	9.57	6.6 6
λ 2	91.266	5
λ 3	93.311	35.7

Radiation Types	Energy (keV)	Intensity (%)
λ 4	184.577	19.7
λ 5	208.851	2.24
Λ 6	300.219	16.0
Λ 7	393.529	4.5
Λ14	887.693	0.139

7 weak γ's omitted: Σγ(avg) = 6.29.4: Σlγ= 0.12%

Unshielded exposure rate at 1 cm from a 1 mCi (37 MBq) point source ≈ 1.1 R/hr.

Half value layer for lead shielding ≈ 0.026 inches (0.066 cm)
10^{th} value layer for lead shielding ≈ 0.16 inches (0.41 cm)

Occupational limits (from USNRC 10 CFR 20, Appendix B) for Class D, all compounds except Class W compounds (oxides, hydroxides, carbides, halides, and nitrates).

Oral ingestion ALI:	7,000 uCi (259 MBq)
Inhalation ALI:	10,000 uCi (370 MBq)
*Derived Air Concentration:	6E-6 uCi/ml (2E-7MBq/ml)

Internal Dosimetry: the lower large intestine is the critical organ for inhalation and ingestion of Gallium 67. Part of the systemic Gallium 67 is rapidly eliminated from the body. A biological half-life of 6 days is a reasonably conservative average for the elimination of Gallium 67.

Whole body retention is 65% after 7 days with 26% excreted in the urine and 9% in the stools.

Gallium 67 should be handled using standard radiation safety precautions to minimize external exposure and to prevent contamination, including the following:

1. Designate area for handling Gallium 67 and clearly label all
2. Store activity in and/or behind lead shielding.
3. Wear extremity and whole body dosimeters when handling mCi quantities.
4. Use appropriate radiation detection instruments to measure exposure rates in work areas, and wear external dosimetry to measure dose when handling mCi (37MBq) quantities of activity.
5. Use shielding when handling activity, and minimize the time spent in radiation fields.
6. Use remote handling tools like tongs to reduce extremity exposure when manipulating unshielded containers and potentially contaminated objects.
7. Prohibit eating, drinking, etc., in work areas.

8. Use spill trays and absorbent or cleanable liners to confine contamination.
9. Conduct operations that may give rise to airborne contamination in appropriately ventilated areas.
10. Consider sampling of exhaust air and/or room air to detect airborne contamination.
11. Use protective clothing such as disposable gloves, lab coats, and safety glasses as secondary protection against personal contamination.
12. Regularly monitor for contamination using a NaI scintillation detector or a pan-cake GM detector and promptly decontaminate surfaces to maintain contamination control.
13. Submit urine bioassay and/or whole body counts from 4 to 14 days after handling to indicate personal uptake.
14. Isolate wastes in sealed, labeled containers.

References:

*Kocher's Radioactive Decay Data Tables. Springfield National Technical Information Services. 1981. DOE/TC-11026