



IRON-55

HANDLING PRECAUTIONS

⁵⁵Fe
 2.7 y
 EC
 no γ
 E 0.231

PHYSICAL DATA

Principal radiation emissions⁽¹⁾

K X-ray:	0.006 MeV (27.8%)
Auger Electron:	0.005 MeV (60.7%)

OCCUPATIONAL LIMITS⁽²⁾

Annual Limit on Intake: 9 mCi (330 MBq) for oral ingestion and 2 mCi (74 MBq) for inhalation.

Derived Air Concentration: 8×10^{-7} μ Ci/mL (30 kBq/m³)

DECAY TABLE

Physical Half-Life: 2.7 Years⁽¹⁾

To use the decay table, find the number of days in the top and left hand columns of the chart, then find the corresponding decay factor. To obtain a precalibration number, divide by the decay factor. For a postcalibration number, multiply by the decay factor.

		<i>Days</i>									
		0	10	20	30	40	50	60	70	80	90
<i>Days</i>	0	1.000	0.993	0.986	0.979	0.972	0.965	0.959	0.952	0.945	0.938
	100	0.932	0.925	0.919	0.912	0.906	0.899	0.893	0.887	0.881	0.874
	200	0.868	0.862	0.856	0.850	0.844	0.838	0.832	0.826	0.821	0.815
	300	0.809	0.803	0.798	0.792	0.786	0.781	0.775	0.770	0.765	0.759
	400	0.754	0.748	0.743	0.738	0.733	0.728	0.722	0.717	0.712	0.707
	500	0.702	0.697	0.692	0.688	0.683	0.678	0.673	0.668	0.664	0.659
	600	0.654	0.650	0.645	0.641	0.636	0.632	0.627	0.623	0.618	0.614
	700	0.610	0.605	0.601	0.597	0.593	0.589	0.584	0.580	0.576	0.572
	800	0.568	0.564	0.560	0.556	0.552	0.548	0.545	0.541	0.537	0.533
	900	0.529	0.526	0.522	0.518	0.515	0.511	0.507	0.504	0.500	0.497

GENERAL HANDLING

PRECAUTIONS FOR IRON-55

1. Designate area for handling ^{55}Fe and clearly label all containers.
2. Store mCi (37 MBq) quantities of ^{55}Fe behind thin lead shielding.
3. Use tools to indirectly handle unshielded sources and potentially contaminated vessels.
4. Prohibit eating, drinking, smoking and mouth pipetting in room where ^{55}Fe is handled.
5. Use transfer pipettes, spill trays and absorbent coverings to confine contamination.
6. Handle potentially volatile compounds and powders in ventilated enclosures.
7. Sample exhausted effluent and room air by continuously drawing a known quantity through membrane filters.
8. Wear disposable lab coats, wrist guards and gloves for secondary protection.
9. Maintain contamination control by regularly monitoring and decontaminating gloves and surfaces.
10. Use open-window proportional counter, NaI(Tl) detector or liquid scintillation counter to detect ^{55}Fe .
11. Collect urine for bioassay for 24 hours after handling ^{55}Fe to indicate uptake by personnel.
12. Isolate waste in sealed, clearly labeled containers and dispose of according to approved guidelines.

13. Establish surface contamination, air concentration and urinalysis action levels below regulatory limits. Investigate and correct any conditions which may cause these levels to be exceeded.
14. On completing an operation, secure all ^{55}Fe ; remove and dispose of protective clothing and coverings, monitor and decontaminate self and surfaces; wash hands and monitor them again.

^{55}Fe emits low energy x-rays and electrons that are strongly absorbed in the dead outer skin layer. The use of protective clothing should provide sufficient protection against external exposure. Urinalysis is only an effective indicator of uptake when obtained within 24 hours of handling ^{55}Fe . Urine samples normally need to be radiochemically processed in order to achieve adequate bioassay sensitivity. Fecal analysis may be used to determine uptakes weeks or years after handling ^{55}Fe .

REFERENCES

1. Koehler, David C., Radioactive Decay Data Tables, Springfield: National Technical Information Service, 1981 DOE/TIC-11026.
2. U.S. Nuclear Regulatory Commission. 10CFR 20 Appendix B – Standards for Protection Against Radiation, 1994.
3. ICRP Publication 30, Part 2, Limits for Intakes of Radionuclides by Workers. Pergamon Press, Oxford, 1980.
4. ICRP Publication 10, Evaluation of Radiation Doses to Body Tissues from Internal Contamination Due to Occupational Exposure; Pergamon Press, London, 1968.

