



I. PHYSICAL DATA			
Radiation:	Beta (100% abundance)		
Energy:	Max.: 156 keV; Average: 49 keV		
Half-Life [T1/2] :	Physical T ¹ / ₂ :	5730 years	
	Biological T _{1/2} :	12 days	
	Effective T _{1/2} :	Bound - 12 days; unbound - 40 days	
Specific Activity:	4.46 Ci/g [0.165 TBq/g] max.		
Beta Range:	Air:	24 cm [10 inches]	
	Water/Tissue:	0.28 mm [0.012 inches]	
	[~1% of ¹⁴ C betas transmitted through dead skin layer, i.e. 0.007 cm depth]		
	Plastic:	0.25 mm [0.010 inches]	

II. RADIOLOGICAL DATA

Radiotoxicity ¹ :	6.36E-12 Sv/Bq [0.023 mrem/uCi] of ¹⁴ CO ₂ inhaled;		
	5.64E-10 Sv/Bq [2.09 mrem/uCi] organic compounds inhaled/ingested		
Critical Organ:	Fat tissue [most labeled compounds]; bone [some labeled carbonates]		
Exposure Routes:	Ingestion, inhalation, puncture, wound, skin contamination absorption		
Radiological Hazard:	External Exposure - None from weak ¹⁴ C beta		
	Internal Exposure & Contamination - Primary concern		

III. SHIELDING

None required - mCi quantities not an external radiation hazard

IV. DOSIMETRY MONITORING

Urine bioassay is the most readily available method to assess intake [for ¹⁴C, no intake = no dose] Provide a urine sample to Radiation Safety whenever your monthly ¹⁴C use exceeds 5 mCi, or after any accident/incident in which an intake is suspected

V. DETECTION & MEASUREMENT

Portable Survey Meters: Geiger-Mueller [e.g. Bicron PGM, ~10% efficiency]; Beta Scintillator [e.g. Ludlum 44-21, ~5% efficiency]

Wipe Test: Liquid Scintillation Counting is the best readily available method for counting ¹⁴C wipe tests

VI. SPECIAL PRECAUTIONS

- Avoid skin contamination [absorption], ingestion, inhalation, & injection [all routes of intake]

- Many ¹⁴C compounds readily penetrate gloves and skin; handle such compounds remotely and wear double gloves, changing the outer pair at least every 20 minutes.

¹ Federal Guidance Report No. 11 [Oak Ridge, TN; Oak Ridge National Laboratory, 1988], p. 122, 156

VII. GENERAL PRECAUTIONS

- 1. Maintain your occupational exposure to radiation As Low As Reasonably Achievable [ALARA].
- 2. Ensure all persons handling radioactive material are trained, registered, & listed on an approved protocol.
- 3. Review the nuclide characteristics on (reverse side) prior to working with that nuclide. Review the protocol(s) authorizing the procedure to be performed and follow any additional precautions in the protocol. Contact the responsible Principal Investigator to view the protocol information.
- 4. Plan experiments to minimize external exposure by reducing exposure time, using shielding and increasing your distance from the radiation source. Reduce internal and external radiation dose by monitoring the worker and the work area after each use of radioactive material, then promptly cleaning up any contamination discovered. Use the smallest amount of radioisotope possible so as to minimize radiation dose and radioactive waste.
- 5. Keep an accurate inventory of radioactive material, including records of all receipts, transfers & disposal. Perform and record regular lab surveys.
- 6. Provide for safe disposal of radioactive waste by following institutional Waste Handling & Disposal Procedures. Avoid generating mixed waste (combinations of radioactive, biological, and chemical waste). Note lab that staff may not pour measurable quantities of radioactive material down the drain.
- 7. If there is a question regarding any aspect of the radiation safety program or radioactive material use, contact Radiation Safety.