^{14}C	Nuclide Safety Data Sheet Carbon-14 **radsafety@berkeley.edu**	^{14}C

I. PHYSICAL DATA

Radiation:	Beta (100% abundance)	
Energy:	Maximum: 156 keV; Average: 49 keV	
Half-life [$T_{½}$]:	Physical:	5730 days
	Biological:	12 days
	Effective:	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. 0.0007cm depth]	
	Plastic:	0.25 mm [0.010 inches]

II. RADIOLOGIAL 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 ^{14}C , no intake = no dose]

V. DECTION & MEASUREMENT

Portable Survey Meters:	Geiger-Mueller [e.g. Ludlum 44-9, ~5% efficiency]
Wipe Test:	Liquid Scintillation Counting is the best readily available method for counting ^{14}C wipe tests

VI. SPECIAL PRECAUTIONS

* Avoid skin contamination [absorption], ingestion, inhalation, & injection [all routes of intake].
* Many ^{14}C compounds readily penetrate gloves and skin; handle such compounds remotely and wear double gloves, changing the outer pair at least every 20 minutes.

VII. LAB PRACTICES

1. Disposable gloves, lab coats, and safety glasses are the minimum PPE [Personal Protective Equipment] required when handling radioactive material. Remove & discard potentially contaminated PPE prior to leaving the area where radioactive material is used.
2. Clearly outline radioactive material use areas with tape bearing the legend “radioactive.” Cover lab bench tops where radioactive material will be handled with plastic-backed absorbent paper; change this covering periodically and whenever it’s contaminated.
3. Handle radioactive solutions in trays large enough to contain the material in the event of a spill.
4. Never eat, drink, smoke, handle contact lenses, apply cosmetics, or take/apply medicine in the lab; keep food, drinks, cosmetics, etc. out of the lab entirely. Do not pipette by mouth.
5. Never store [human] food and beverage in refrigerators/freezers used for storing radioisotopes.
6. Prevent skin contact with skin-absorbable solvents containing radioactive material.
7. Fume hoods and biological safety cabinets for use with non-airborne radioactive material must be labeled "Caution Radioactive Material".

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