

<b><sup>3</sup>H</b>	<b>Nuclide Safety Data Sheet</b> <b>Hydrogen-3 [Tritium]</b> www.nchps.org	<b><sup>3</sup>H</b>
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<b>I. PHYSICAL DATA</b>
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Radiation: Beta (100% abundance)  
Energy: Max.: 18.6 keV; Average: 5.7 keV  
Half-Life [T<sub>1/2</sub>] : Physical T<sub>1/2</sub>: 12.3 years  
Biological T<sub>1/2</sub>: 10 - 12 days  
Effective T<sub>1/2</sub>: 10 - 12 days\*

\* Large liquid intake (3-4 liters/day) reduces effective T<sub>1/2</sub> by a factor of 2+; <sup>3</sup>H is easily flushed from the body

Specific Activity: 9650 Ci/g [357 TBq/g] max.  
Beta Range: Air: 6 mm [0.6 cm; 0.25 inches]  
Water: 0.006 mm [0.0006 cm; 3/10,000 inches]  
Solids/Tissue: insignificant [No <sup>3</sup>H betas pass through the dead layer of skin]

<b>II. RADIOLOGICAL DATA</b>
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Radiotoxicity<sup>1</sup>: Least radiotoxic of all nuclides; CEDE, ingestion or inhalation:  
Tritiated water: 1.73E-11 Sv/Bq (0.064 mrem/uCi) of <sup>3</sup>H intake  
Organic Compounds: 4.2E-11 Sv/Bq (0.16 mrem/uCi) of <sup>3</sup>H intake

Critical Organ: Body water or tissue  
Exposure Routes: ingestion, inhalation, puncture, wound, skin contamination absorption  
Radiological Hazard: External Exposure - None from weak <sup>3</sup>H beta  
Internal Exposure & Contamination - Primary concern

<b>III. SHIELDING</b>
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None required - not an external radiation hazard

<b>IV. DOSIMETRY MONITORING</b>
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Urine bioassay is the only readily available method to assess intake [for tritium, no intake = no dose]  
Be sure to provide a urine sample to Radiation Safety whenever your monthly <sup>3</sup>H use exceeds 100 mCi, or after any accident/incident in which an intake is suspected

<b>V. DETECTION &amp; MEASUREMENT</b>
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Liquid Scintillation Counting is the only readily available method for detecting <sup>3</sup>H  
NOTE: PORTABLE SURVEY METERS WILL NOT DETECT LABORATORY QUANTITIES OF <sup>3</sup>H

<b>VI. SPECIAL PRECAUTIONS</b>
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<sup>3</sup>H<sub>2</sub>O, they are generally less

volatile and hence do not normally present a greater hazard

- The inability of direct-reading instruments to detect tritium and the slight permeability of most material to [tritiated] water & hydrogen [tritium] facilitates undetected spread of contamination. Use extreme care in handling and storage [e.g. sealed double or multiple containment] to avoid contamination, especially with high specific activity compounds.

<sup>1</sup> Federal Guidance Report No. 11 [Oak Ridge, TN; Oak Ridge National Laboratory, 1988], p. 122, 156; Radionuclide and Radiation Protection Data Handbook [Delacroix, et al; Radiation Protection Dosimetry, Kent, England: Nuclear Technology Publishing 1998], p. 19.

## VII. GENERAL PRECAUTIONS