

Tritium Leak Detection: Strategies and Applications

- Radiological Protection
- Elemental Tritium
- Tritium Oxide
- Locating the Point of Release
- Real-time Measurement

The required radiological protection for tritium compounds is much higher than that for elemental tritium.

Elemental tritium will combine readily with oxygen to form tritium oxide and also will replace hydrogen atoms in compounds.

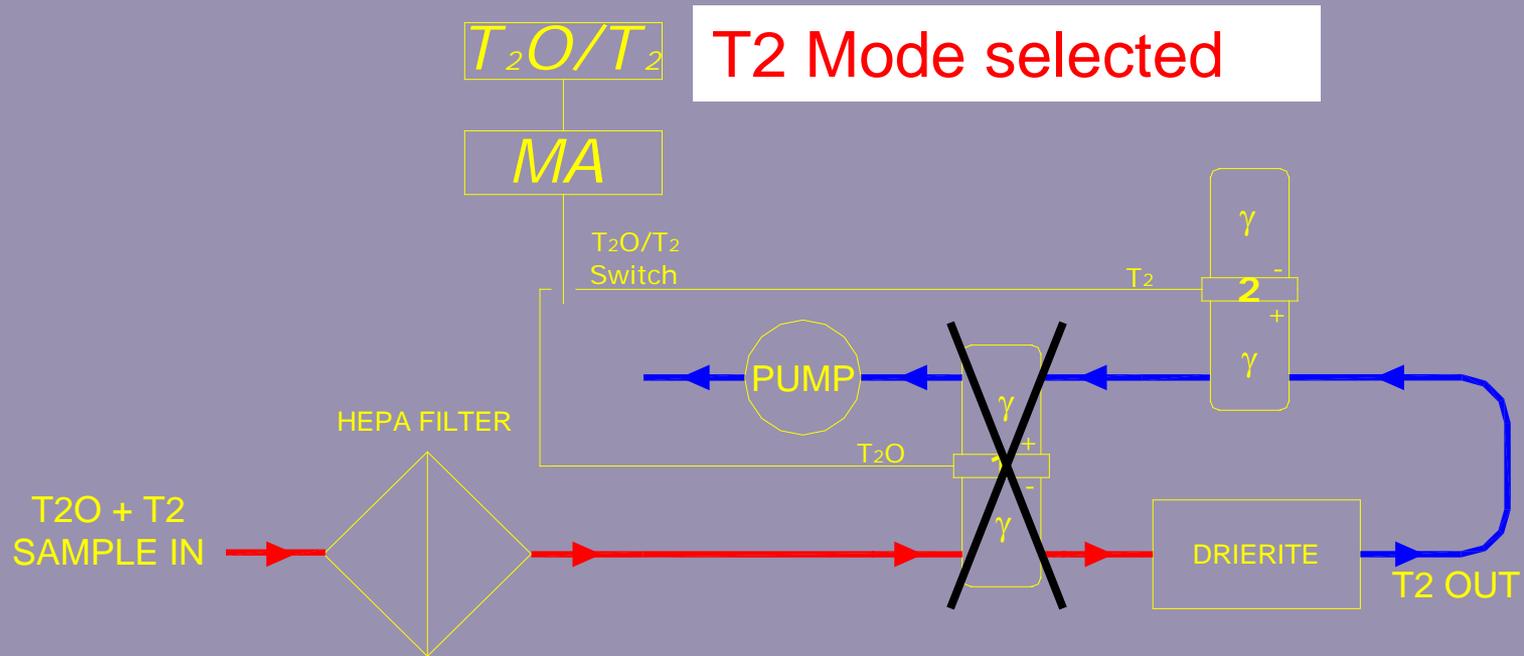
The presence of elemental tritium in the working environment is an indication of a “new” leak in process piping or a container.

To rapidly locate the point of release...

A tritium monitor configured as a “sniffer” to provide real-time indication of the T2 and T2O concentrations which allow the user to quickly identify the source of leakage of tritium from containers.

Dual Channel Tritium Leak Detector

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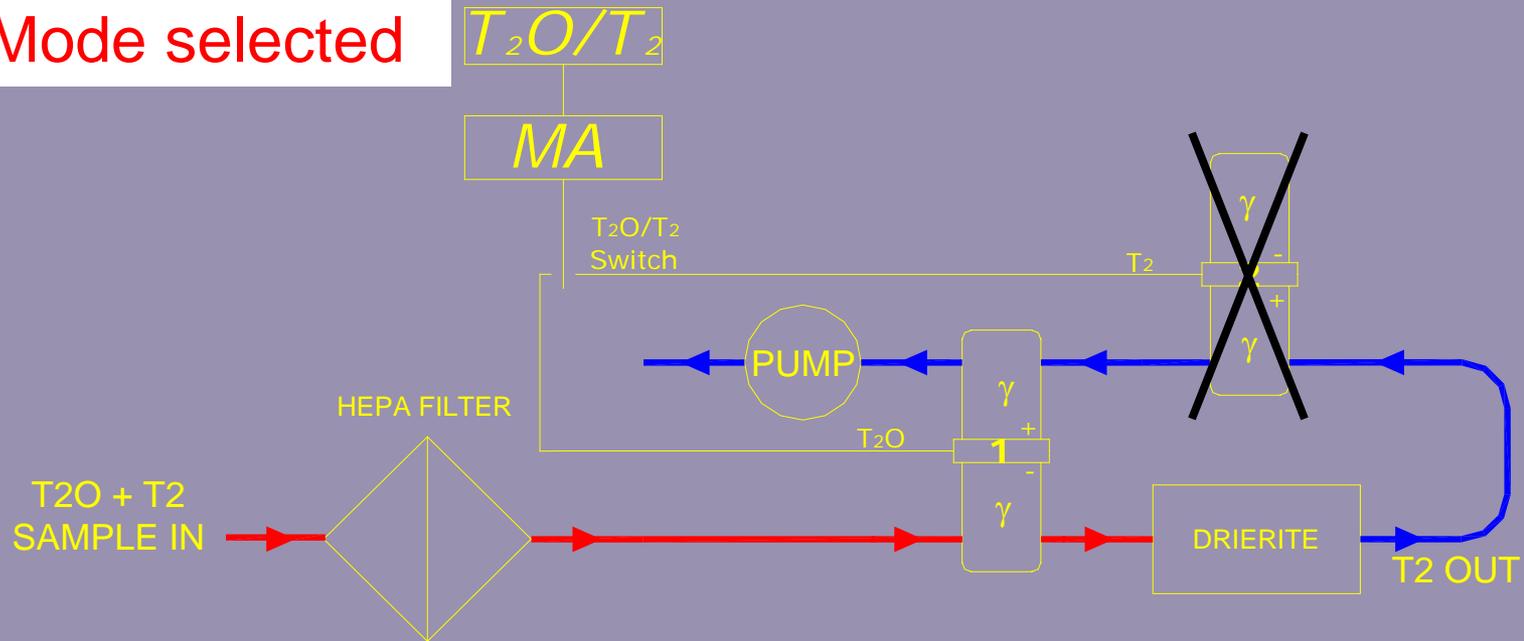


Desiccant Traps T2O, Chamber 2 measures T2-T2O

T2 is displayed

Dual Channel Tritium Leak Detector

T2O Mode selected



Desiccant Traps T2O,
Chamber 1 measures total T ($T_2 + T_2O$) – (T_2)

T2O is displayed

DESICCANT COLUMN

A desiccant column traps the tritium oxide in the sample. Indicating desiccant changes color from blue to pink when it is exhausted.

The Model 2x200-LD

Tritium Leak Detector has the unique ability to quantify T2 and T2O separately and in real-time while providing gamma compensation by using matched measuring chambers. The dual measurement channels, T2 and T2O, are selected with a front panel toggle switch and appear on one digital display.

Experiment:

Release a mixture of T2 and T2O

Bubbler samples were analyzed and found:

1.4% T2 and 98.6% T2O

Compare with the Model 2x200-LD:

1.5% T2 and 98.5% T2O



**Bubbler:
7 Day Sample Period
Analyze on LSC**

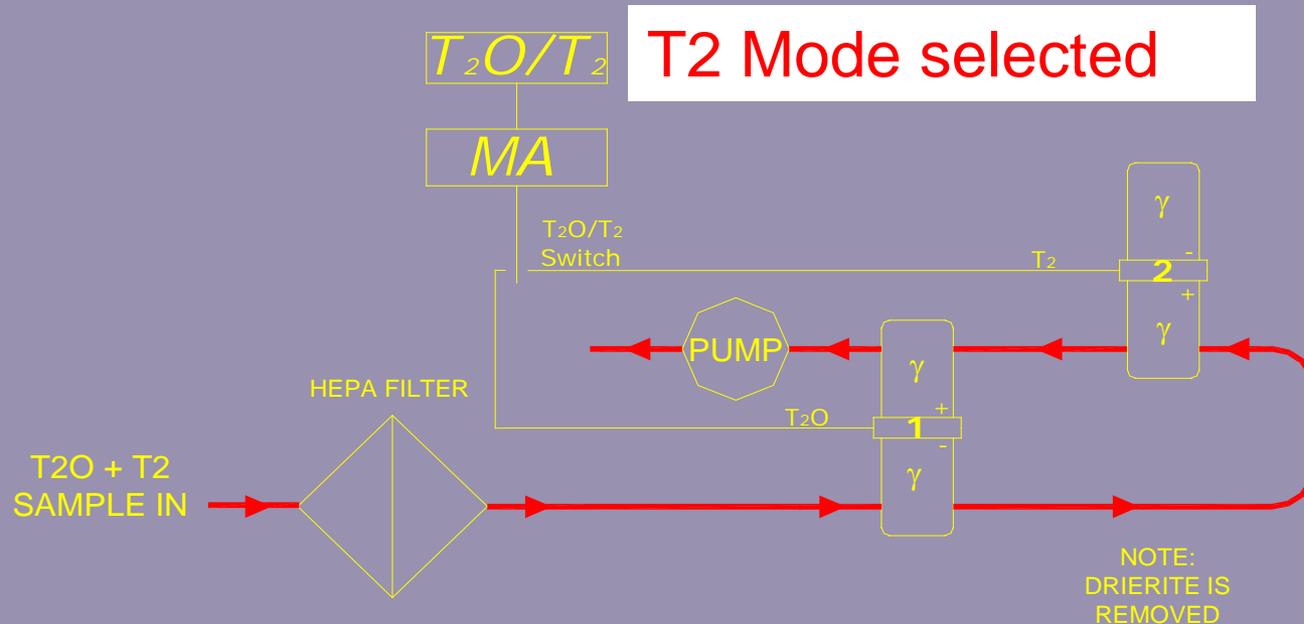


**2x200-LD
Tritium Leak Detector:
Analyze in Real-time**

A Quick Glance

Measurement Range	1 to 19,999 $\mu\text{Ci}/\text{m}^3$
T2 and T2O Modes	Two channel measurement, switch selectable
High Sensitivity	to 3 $\mu\text{Ci}/\text{m}^3$ (0.3 DAC)
Fast Response	15 second time constant
Gamma Compensated	no offset in 5 mR/h field
Response To Radon	suppression circuit ensures noise free operation
Zero Drift	better than 2 $\mu\text{Ci}/\text{m}^3$

Gas Calibration of Model 2x200-LD



Note: After Gas Calibration the T2O Channel Response is Electronically Balanced by the Using the Simulated Current Method.

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