

ABSTRACT RETS/REMP 2012

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New Test Results For Physical Separation Of Tritium From Noble Gases And It's Implications For Sensitivity And Accuracy In Air And Stack Monitoring.

INTRODUCTION: This work examines the technique of using a semi permeable membrane; Nafion tube dryer for the separation of Tritium in oxide form (HTO) from noble gases in an air sample. This technique has been known for over 30 years. Air and stack monitors are used for the specific purpose of measuring airborne content of a number of nuclides, separately, simultaneously, and accurately.

PROBLEM: This is a challenge for stack monitor designers as all signals are ionizing radiation and in high concentrations any one component can swamp or mask the signal from the others.

METHODOLOGY: The monitors use the principle that HTO can be stripped out of the wet sample flowing through the dryer. A battery of tests to identify Nafion membrane characteristics was performed. One of these tests is detailed in this work. Efficiency of the Nafion tube was the goal of this test.

RESULTS: The test described in this report provides data about how efficiency varies over the temperature range 5° C to 40° C.

CONCLUSIONS: The drying efficiency ranged from a minimum of 90% at 40° C to a maximum of 99% at 5° C. Sensitivity to airborne Tritium in the presence of common levels of noble gas improved by a factor of 10. This demonstrates greater than 90% efficacy and error brackets of +/-5% thus the use of a Nafion membrane is a viable technique for the physical separation of tritium from noble gases.