

Measurement of ^{224}Ra and ^{226}Ra activities in natural waters using a radon-in-air monitor

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We report a simple new technique for measuring low-level ^{224}Ra and ^{226}Ra in natural waters. The Ra present in natural waters is first pre-concentrated onto MnO_2 -coated acrylic fiber (Mn fiber) in a column mode. The Rn produced from the adsorbed Ra is then circulated through a closed air-loop connected to a commercial radon-in-air monitor (**Fig. 1**). The monitor counts alpha decays of Rn daughters (Po isotopes), which are electro statically collected onto a silicon semiconductor detector. Count data are collected in energy-specific windows, which eliminate interference and maintain very low backgrounds. Ra-224 is measured immediately after sampling via ^{220}Rn (^{216}Po), and ^{226}Ra is measured via ^{222}Rn (^{218}Po) after the ingrowth of ^{222}Rn is allowed for several days. This technique is rapid, simple, and accurate for measurements of low-level ^{226}Ra and ^{224}Ra activities without requiring any wet chemistry. Rapid measurements of short-lived ^{222}Rn and ^{224}Ra , along with long-lived ^{226}Ra , may thus be made in natural waters using a single portable system for environmental monitoring of radioactivity as well as tracing of various geochemical and geophysical processes.

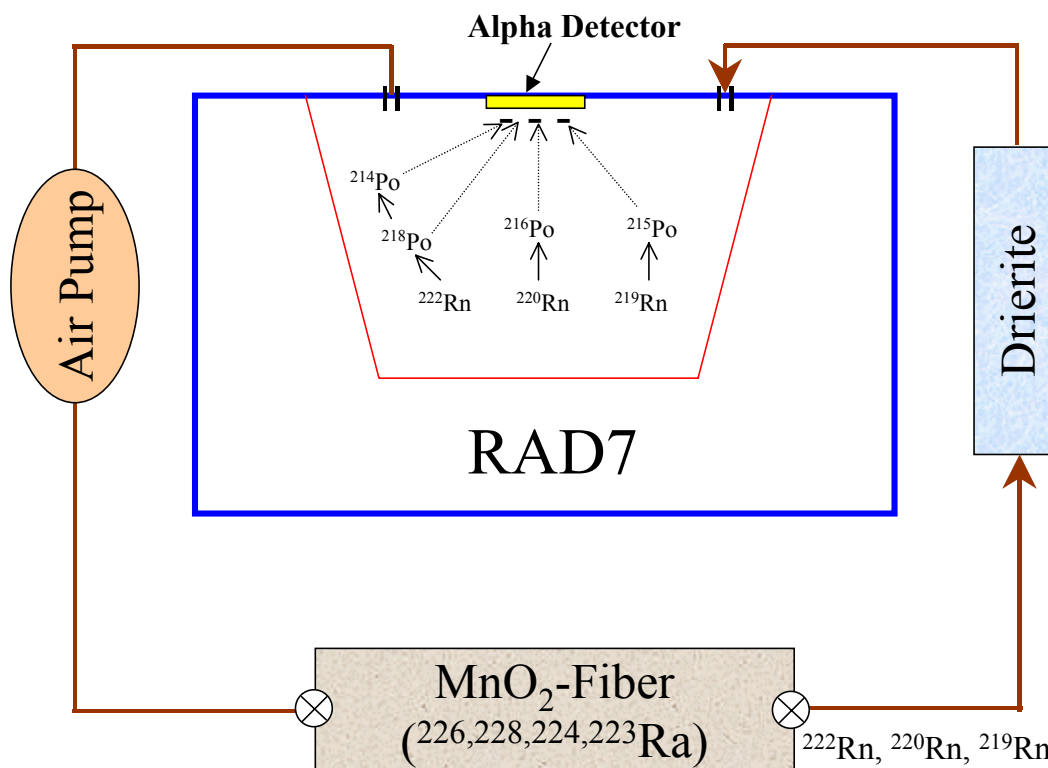


Figure 1. Schematic diagram of the Rn circulation and Po isotope measurement system. The Si detector uses electrostatic attraction to collect charged Po daughters of various isotopes of radon.