AN EFFICIENT AND COST-EFFECTIVE METHOD FOR MEASURING RADON IN WATER USING A PULSED IONIZATION CHAMBER

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Radon-222 has served as an excellent tracer for measuring the rates of water mixing and transport since it is inert and has a suitable half life of 3.8 days. However, the use of this tracer is often hampered by its extremely low activities in natural water. Thus, we developed a new method measuring ^{222}Rn in the water by using a Pulsed Ionization Chamber (PIC). The PIC measures ^{222}Rn via electric pulses, which is generated by the radioactive decay of ^{222}Rn. It detects and amplifies the pulses by using a double probe technique which separates them from noises. The Po daughters, $^{218}Po^{+}$ and $^{214}Po^{+}$, are removed by electrostatic attraction between Po and the counting probe. Therefore, PIC is not influenced by the decay of Rn daughters. In this study, we combined two passive PICs and modified them to an active system which circulates air continuously (~ 1 L min^{-1}). This system has about 4-fold higher efficiency than radon-in-water (RAD7) without the time delay for the ingrowth of daughters (> 15 min). In addition, it is much less costly (> 5 times). We successfully measured ^{222}Rn in coastal seawater samples using this system connected to a water-air gas exchanger.