

Radon Gas Assays for the SNO+ Experiment

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Radon assays are an effective way to determine the amount of radon in a particular area or substance in question, and therefore determine the state of it. The assay technique that is currently being performed has been used for several years, and has further developed and improved to collect data for a large number of vessels past its original application. By performing assays, it allows us to specifically focus on ^{222}Rn , given its abundance in an underground lab that is situated deep in a mine. Due to the necessity for extremely low backgrounds in the experiment, it is critical that the assay system is calibrated for these conditions in order to accurately reflect the state of the experiment. Performing an assay involves trapping the radon atoms in specially designed traps, cryogenically freezing them in order to concentrate the atoms, and heating them in order to encourage them to follow a path which will lead to a Lucas Cell. This Lucas Cell is clear, and is coated in ZnS, so that when the radon atoms are fully trapped and placed into a PMT, it is able to detect alpha particles that have decayed, thereby detecting the amount of radon in a known amount of gas. These assays are often repeated several times in order to reflect accurate results and determine if the amount of radon satisfies the limits that have been put in place. There were a number of very important assays that have been performed such as UI assays, UI assays connected to the Radon Monitor, and assays that were done on the newly built LN₂ plant.

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