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# Analysis of Radioxenon Samples as a Support of the IMS Network

Certified laboratories are an essential component of the IMS network. One of their duties is to perform in-depth analysis of anomalous radionuclide samples collected in the field. FRL08 laboratory is candidate to noble gas certification. Radioxenon analysis is far more challenging than analysis of particulate filters: samples are gaseous which makes them prone to leaks and memory effect, procedures have to accommodate three significantly different types of archive bottles, preparation of the gas mixture is needed prior to measurement, half-lives of radionuclides are short... The sample measurement procedure developed at FRL08 consists of three main steps. The first one comprises sample purification using cryo-condensation in order to remove the carrier gas from the xenon. Residual gas is then transferred by an automatized syringe into a double-sided cell fitted with carbon epoxy windows. Relevant radioxenons are detected and quantified by a high efficiency/low background double-crystal HPGe gamma/X spectrometer. Finally stable xenon composition (proportional to sample air equivalent volume) is assessed using an automated gas phase chromatograph. These optimized tools allow meeting present certification criteria. In some specific cases, laboratory sensitivity is so high that it can encompass unavoidable decay of the sample during transportation and extend IMS network detection capability.

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