

for Measurement of Low Activity Argon-37

The Khlopin Radium Institute conducts research targeted to creation of highly sensitive low-background installation, capable to satisfy the OSI required range of measuring argon-37 concentration. On the basis of this installation the liquid-scintillation principle of registration of low-energy electrons of argon-37 is used, and condensed argon itself is used as scintillator. Condensed argon represents sample isolated from the subsurface air by means of some processing procedure.

Even minor impurities of nitrogen and oxygen, are inevitably presented in argon samples isolated from the air, causing quenching of scintillations, particularly their slow component. Inclusion of this adverse effect and the determination of amendments to the detection efficiency change are similar to that used in the measurement of tritium by the classic liquid scintillation measurement method - using the detection efficiency depends on the ratio of triple and double coincidence.

Currently assembled prototype of installation, is being evaluated. The preliminary value of the minimum measured argon-37 activity in the sample of the liquid argon of 20 cm³ volume is about 0.1 Bq for a 5-hour exposure. This equivalent to the 2 m³ of processed air, that corresponds to 50 mBq/m³ subsurface argon-37 of measurement sensitivity, that is 20 times more sensitive than MARDS.

Primary author: PAKHOMOV, Sergei (Khlopin Radium Institute of the "Rosatom" State Corp.)

Presenter: PAKHOMOV, Sergei (Khlopin Radium Institute of the "Rosatom" State Corp.)

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