

# Collection and Purification from air in Three Types of Porous Materials

Wednesday, 21 June 2023 11:32 (1 minute)

Radioxenon monitoring systems are a crucial component of the International Monitoring System (IMS) for the verification of the Comprehensive nuclear-Test-Ban Treaty. They monitor the atmosphere for potential xenon releases originating from nuclear tests. The efficient collection and purification of xenon from air is essential for their detection capability. The first systems in the IMS used pre-purification techniques to remove moisture and CO<sub>2</sub> followed by activated carbon columns to collect and further purify Xe. In some new systems, silver-exchanged zeolites have replaced some of the activated carbon columns due to their much higher Xe adsorption capacity at room temperature. Recent studies on a new class of porous materials, namely metal-organic frameworks (MOFs), have demonstrated high Xe selectivity over other gas components although in conditions different than for IMS applications. In the framework of the EU JA VII programme, the potential use of MOFs for Xe collection and purification from air for IMS applications was investigated for the first time. This work has been further expanded over the last two years. The resulting thorough comparison of the Xe collection and purification ability and the underlying material characteristics of two MOFs, two silver-exchanged zeolites and a reference activated carbon will be discussed.

## E-mail

christophe.gueibe@sckcen.be

## Promotional text

A new class of porous material is investigated for the first time for collecting and purifying xenon in conditions relevant for xenon monitoring systems in the International Monitoring System. Its performances are compared to two other types of porous materials used in IMS.

## Oral preference format

in-person

**Primary authors:** MOYAUX, Dominique (IRE, Institute for radioelements); GUEIBE, Christophe (Belgian Nuclear Research Center (SCKCEN))

**Co-authors:** Mr RUTTEN, Jos (Belgian Nuclear Research Center (SCKCEN)); CAMPS, Johan (Belgian Nuclear Research Center (SCKCEN)); HERMANSPAHN, Nikolaus Helmut (CTBTO Preparatory Commission); Prof. SCHROEYERS, Wouter (Hasselt University (UHasselt), CMK, NuTeC, Nuclear Technology – Faculty of Engineering Technology); Mrs MINTA, Daria (Wrocław University of Science and Technology, Department of Process Engineering and Technology of Polymer and Carbon Materials); Prof. SCHREURS, Sonja (Hasselt University (UHasselt), CMK, NuTeC, Nuclear Technology – Faculty of Engineering Technology)

**Presenter:** GUEIBE, Christophe (Belgian Nuclear Research Center (SCKCEN))

**Session Classification:** Lightning talks: P2.2, P3.2, P3.6

**Track Classification:** Theme 3. Monitoring and On-Site Inspection Technologies and Techniques: T3.2 Radionuclide Technologies and Applications