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Iodine-129 deposition from atmosphere in the sample preparation rooms for AMS.

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Through the chemical treatment of samples with high I-129 concentrations, the workspace used to prepare samples tends to become gradually contaminated. Such contamination may lead to overestimated I-129 in accelerator mass spectrometry (AMS) analyses. Environmental contamination monitoring of I-129 from the atmosphere in sample preparation rooms was performed at ten Japanese institutions, including University of Tsukuba. The sampling was carried out in July and August 2022, and February 2023. The ambient level of atmospheric I-129 in each room was estimated from the measured concentrations in the alkali trap solutions that were left for two or three weeks [1]. To check the difference in the I-129 contamination risks from atmosphere between inside and outside the facility, the sampling bottles were left at places outside the seven institutions, where the rainwater never entered the bottles. I-129 contamination risk [atoms cm^{-2} day^{-1}] were calculated from I-129 concentration [atoms g^{-1}]. The experimental procedure was performed according to previously described experimental methods [1], except that we used a different carrier reagent "Old Iodine" with an I-129/I-127 ratio of 2×10^{-14} and performed AMS at Tsukuba University system [2]. In most of the institutions, the amounts of I-129 are on the order of 10^3 or 10^4 atoms cm^{-2} day^{-1} in the rooms, which are one or two orders of magnitude lower than the environmental background level, 3×10^5 atoms cm^{-2} day^{-1} [3]. A clear difference is not found between the I-129 contamination risks from atmosphere inside and outside. This suggests that there is almost no I-129 contamination risk of the samples from atmosphere.

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[2] K. Sasa et al., Nucl. Instrum. Meth. Phys. Res. B 437 (2018) 98-102.
[3] M. Matsumura et al., Geochemical Journal 52 (2018) 155-162.

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