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ASSESSMENT OF THE ^{210}Bi INFLUENCE IN CALCULATION OF ^{210}Po CONCENTRATION IN AIR AEROSOLS. IMPLICATIONS ON RESIDENCE TIME DETERMINATIONS THROUGH ^{210}Po/^{210}Pb ACTIVITY RATIOS

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Abstract

The influence of ^{210}Bi concentration in air onto the activities of ^{210}Po determined in atmospheric filters is still a matter of discussion. Many works in literature determining ^{210}Po in atmospheric filters do not specify if ^{210}Bi concentrations in air are being considered or not. Furthermore, ^{210}Po corrections due to the in-growth of ^{210}Bi from its parent ^{210}Pb, if taken into account, are not indicated. In this work, the influence of the initial ^{210}Bi concentration deposited onto the atmospheric filter in the calculation of ^{210}Po activity concentration has been studied. Besides, the validity of several hypotheses, made about ^{210}Bi activity concentration, that are often done in literature has been examined. As a consequence, an estimation of the deviation in ^{210}Po activities in relation to the true value has been done for different cases between the two limits cases (neglecting the initial ^{210}Bi concentrations, and secondly assuming secular equilibrium ^{210}Bi-^{210}Pb) and also, as a consequence, the differences in residence time estimation have been calculated. The results show that neglecting the value of the initial ^{210}Bi concentration in air can lead to significant differences between the ^{210}Po estimated and its true value. As a consequence, residence time calculated from ^{210}Po/^{210}Pb activity ratios may present valuable deviation from its true value.