A rapid estimation of ^{210}Po and ^{210}Po in rainwater

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A method for determination of ^{210}Po and ^{210}Pb in rainwater samples is described. This method was developed to permit measurement of the radionuclides in rainwater samples collected at short time intervals (2 weeks) on a small area (0.5 m^2) and to give results with the minimum delay. ^{210}Pb was estimated from counts of the daughter ^{210}Bi after allowing 30 days for ingrowth. ^{210}Po was measured directly by alpha-spectrometry. The radionuclides were collected from rainwater samples by co-precipitation with manganese dioxide and dissolution of the precipitate in a small volume of HCl/H_2O_2. ^{210}Po was plated onto silver and counted immediately and stable Bi was added to the solution which was allowed to stand for 30 days. After this time ^{210}Bi was separated from the ^{210}Pb by extraction into 0.2% DDTC in chloroform and precipitated as bismuth oxychloride. The bismuth oxychloride was collected by filtration and the ^{210}Bi counted using a gas-flow proportional counter. ^{210}Pb activity was inferred from the ^{210}Bi activity. This procedure allowed rapid, sensitive and cost effective measurement of ^{210}Bi in rain water with a limit of detection 4.2 mBq and a coefficient of variation of 2% for four replicate analyses at the 1.0 Bq level.