



Contribution ID: 319

Type: Verbal

Excess of Polonium-210 activity in the surface urban atmosphere

Wednesday, May 14, 2014 9:30 AM (15 minutes)

The concentrations of ^{210}Pb , ^{210}Bi and ^{210}Po were measured from February 2010 to May 2010 and from May 2011 to April 2012. The seasonal change of $^{210}\text{Po}/^{210}\text{Pb}$ and $^{210}\text{Bi}/^{210}\text{Pb}$ activity ratios indicate on independent fluctuations of tropospheric ^{210}Pb and its decay products, particularly ^{210}Po . A simple calculation method for the estimation of the excess of ^{210}Po , in relation to its activity formed from ^{210}Pb , during the residence time of the urban aerosols in Lodz city, Central Poland is proposed. Most of ^{210}Po in urban air is not a decay product of ^{222}Rn but is result of input of artificial origins. The highest levels of ^{210}Po were observed in winter period. It suggests that the substantial source of ^{210}Po in this region is an anthropogenic emission from domestic and power plant combustion of coal, rather than other usually suggested sources such as soil resuspension, or stratospheric air intrusion.

The comparison of date with $^{210}\text{Po}/^{210}\text{Pb}$ ratios allows to determinate the excess of the unsupported ^{210}Po activity in the aerosol samples. Additional influx of unsupported ΔAPo , can be calculated.

The main aim of this work was to check the seasonal fluctuations of the $\Delta^{210}\text{Po}$ activity on the base of aerosol residence time determinations in the urban area.

The activity concentration fluctuation during the period of whole year: from 3 548 to 133.5 $\mu\text{Bq}/\text{m}^3$, from 1 025.8 to 54.6 $\mu\text{Bq}/\text{m}^3$ and from 136.9 to 9.44 $\mu\text{Bq}/\text{m}^3$ for ^{210}Pb , ^{210}Bi and ^{210}Po , respectively. In all cases the highest concentration was measured in a winter period. The results of activity ratio were divided for 4 seasons spring (March-May), summer (June-August), autumn (September-November) and winter (December-February).

In urban air ^{210}Po coming from additional source is adsorbed on the surface of particles. Specific activity strongly dependents on the aerodynamic diameter of the solid particles of aerosol. Generally, fine particulate matter carries more ^{210}Po than the coarser fractions.

Anthropogenic source of Polonium is strongly connected with not only heating (power plant and domestic coal burning) typical for winter season but also with electricity generation and technical activity during the whole year. Polonium as more volatile element than Pb or Bi can be emitted with flue gases.

In high temperature processes average about 50% of the total activity of ^{210}Po is discharged in gaseous form or ultra-fine particles to the atmosphere.

Primary author: Dr DŁUGOSZ-LISIECKA, Magdalena (Technical University of Lodz, Faculty of Chemistry)

Presenter: Dr DŁUGOSZ-LISIECKA, Magdalena (Technical University of Lodz, Faculty of Chemistry)

Session Classification: Radionuclides in the Environment, Radioecology 2

Track Classification: Radionuclides in the Environment, Radioecology