

CONCENTRATIONS OF ^{210}Po AND ^{210}Pb IN PLANKTON FROM DIFFERENT ZONES OF AEGEAN SEA

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Abstract

Aquatic organisms are capable of concentrating toxic elements within their tissues. In the study, plankton samples have been evaluated for their bioavailability as biomonitors of ^{210}Po and ^{210}Pb in Aegean Sea. The concentrations of ^{210}Po and ^{210}Pb in plankton samples collected in the period of 2004-2005 have been presented. The samples were collected from four distinct regions (Aliaga, Nemrut, Foça and Izmir Bay). The concentrations of ^{210}Po and ^{210}Pb in plankton samples were determined using alpha spectrometry.

Keywords: *Plankton, Aegean Sea, Monitoring*

^{210}Po and ^{210}Pb are naturally occurring radionuclides within the ^{238}U decay chain, with half-lives of 138.38 days and 22.3 years, respectively. These radionuclides are considered as an important source of internal radiation dose to marine organisms [1]. Planktons can accumulate radionuclides very rapidly and retain them for a long time [2]. ^{210}Po level increases with additional material derived from coastal erosion, particulate matter flux from atmosphere and biogenic activity within the aquatic environment. The main source of ^{210}Po in these study regions is the river run-off (Bakırçay and Gediz) from the catchment areas. Wastes which arise from petrochemical and fertilizer industries at Aliaga region effect the contamination in the regions. In our project supported by IAEA, ^{210}Po concentrations in fish species fed with planktons were determined much higher than the average values [3]. Significant amounts of ^{210}Po may be transferred to humans via diet. For these reasons, there is a need for investigation of the accumulation of ^{210}Po and ^{210}Pb by planktonic organisms. All the sampling stations (Aliaga, Nemrut, Foça and Izmir Bay) are located on the western coast of Turkey and indicated in Figure 1.

$207 \pm 23 \text{ Bq kg}^{-1}(\text{dw})$. According to obtained results, the concentrations of ^{210}Po in industrial regions are higher than other regions. Petrochemical industry on the coast of Aliaga is an agent for high level of natural radionuclide in the region. The relationship between ^{210}Po concentrations and biomass of plankton was found nonlinear.

References

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Fig. 1. The map of sampling location

Plankton species were present in a very wide size range. The cut off sizes used for sample collection in this work ($45 \mu\text{m}$ and $120 \mu\text{m}$) were selected to characterize two size classes. Then the samples were weighed and dried in the oven. After standard addition of polonium tracer, each sample was completely dissolved with HNO_3 , H_2O_2 and HCl . Polonium was spontaneously plated onto a copper disc in 0.5 M HCl in the presence of ascorbic acid to reduce of Fe^{+3} to Fe^{+2} [4,5]. Measurements of ^{210}Po were realized through its 5.30 MeV alpha particle emission, using ^{208}Po ($95 \pm 1.311 \text{ mBq g}^{-1}$) as the internal tracer. After the first deposition of ^{210}Po , the residual 0.5 M HCl was kept to allow ^{210}Po in-growth from the ^{210}Pb contained in the solution to search supported ^{210}Pb in the samples. The sample was re-plated and the ^{210}Po activity was determined. ^{210}Pb (precursor of ^{210}Po) concentrations were determined from ^{210}Po activities measured after attaining the radioactive equilibrium. The range of ^{210}Po concentrations in plankton samples were observed between 10 ± 2 -