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129I in precipitation from Xi'an, China in 2011: influence of the Fukushima nuclear accident

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During the Fukushima nuclear accident in March 2011, large amounts of radionuclides were released into the environment. Some of them were transmitted and dispersed over long distances, e.g. ^{131}I , which is harmful to human. However, ^{131}I has a short half-life (8 days), and if environmental samples are not collected and measured in time after the nuclear accident, it will be difficult to detect ^{131}I since it will decay away after several months of the accident, making it difficult to assess the environmental impact of ^{131}I . Another radioiodine released during the accident, long-lived ^{129}I (with half-life of 15.7 million years) will remain in the environment for a long time. It has the same chemical properties and environmental behavior as ^{131}I . The $^{129}\text{I}/^{131}\text{I}$ ratio of radioiodine released by the accident has been studied. By measuring ^{129}I content in environmental samples after the accident, and compared with the ^{129}I background level before the accident, ^{131}I distribution can be reconstructed. During the period from March to April, 2011, ^{131}I was detected in aerosol samples, precipitation and other environmental samples in China. For example, ^{131}I was detected in the aerosol samples in Xi'an from 23th March to 27th April 2011. Precipitation is the main pathway for iodine transferring from the atmosphere to the land. However, there is no reported data of ^{131}I in precipitation in Xi'an in 2011. Precipitation samples were collected in 2011, which could be used to study the influence of the Fukushima nuclear accident in Xi'an, via measuring the ^{129}I to estimate the ^{131}I level. The ^{129}I concentration and $^{129}\text{I}/^{127}\text{I}$ ratio of precipitation samples collected at Xi'an from February to July 2011 were analyzed by AMS. The concentration of ^{129}I ranged from 1.0×10^7 atoms/L to 81.8×10^7 atoms/L with an average of 10.3×10^7 atoms/L, and the atomic ratio of $^{129}\text{I}/^{127}\text{I}$ ranged from 0.64×10^{-9} to 26.73×10^{-9} with an average of 4.47×10^{-9} . According to the origination of the air mass during precipitation and the concentration of ^{129}I originated from the Fukushima accident in aerosols, which was estimated based on the reported activity of ^{131}I in aerosols in Xi'an in 2011, and compared with the ^{129}I in precipitation in Xi'an before 2011, it was possible that the impact of the Fukushima accident was not strong.

Student Submission

No

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