

## Analysis of Atmospheric $^7\text{Be}$ concentration in Colombo, Sri Lanka

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### Abstract

$^7\text{Be}$  is a naturally occurring radioisotope produced in the upper atmosphere when atmospheric oxygen and nitrogen react with cosmic induced protons and neutrons. This process is called spallation. Measurements of  $^7\text{Be}$  are used to determine the changes in the upper Atmosphere, such as sudden changes in weather, in the considered area. Measuring  $^7\text{Be}$  concentrations in the environment can be used to figure out whether there is an effect from a nuclear release in the area considered. This is the first measurement of  $^7\text{Be}$  since there are no other records to be found about the concentration of  $^7\text{Be}$  in Sri Lanka. Especially since Sri Lanka is located near the equator, it is important to predict the behaviour of  $^7\text{Be}$  around the equator. The radioisotope  $^7\text{Be}$  decays into  $^7\text{Li}$  with a half-life of 53.22 days and emits a characteristic gamma ray of 477 keV.  $^7\text{Be}$  quickly attaches to dust particles in the upper atmosphere and falls to the Earth's surface. The concentration of the isotope can vary due to wind, rain, temperature, and many other environmental factors. This experiment was done to obtain the concentration value of  $^7\text{Be}$  at the University of Colombo, Sri Lanka. The measurement was done using samples of surface air from in-situ gamma spectrometry. The average concentration of  $^7\text{Be}$  using the in-situ gamma spectrometry method was  $3.1 \pm 0.4 \text{ mBq m}^{-3}$ . The primary purpose of obtaining this measurement was to establish a reference value for  $^7\text{Be}$  concentration in Sri Lanka. This reference value will serve as a basis for conducting further studies that utilize  $^7\text{Be}$  as a naturally occurring tracer in various research applications can be done using  $^7\text{Be}$  as a naturally occurring tracer.

**Keywords:**  $^7\text{Be}$ , In-situ gamma spectrometry,  $^7\text{Be}$  reference value