XVI International School and Symposium
on Synchrotron Radiation in Natural Science
Poland, 25-30 May 2025

PM10 Under the X-ray: Elemental Composition and Seasonal Variability in the Air in Krakow, Poland

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The research aims to elemental analysis of aerosols samples (PM10). The samples come from two air quality monitoring stations in Krakow, namely Aleje Krasińskiego station and Złoty Róg station. The Aleje Krasińskiego station is a communication station that is located near the road and conducts measurements due to traffic impacts. The Złoty Róg measurement station is an urban background station that is located so that the measurements are representative of the area of several km^2. The research focused on elemental analysis and observation of seasonal variability of elements. The studied samples come from the summer and winter 2020. The measurements were performed on M4 TORNADO Plus, BRUKER spectrometer, which use the X-ray fluorescence method. The concentrations of the following elements: Na, Mg, Al, P, S, Cl, K, Ca, Ti, Cr, Mn, Fe, Cu, Zn were determined. The Figure 1 below shows the spectrum of identified elements from one of the analyzed PM10 samples. The correlations between concentrations of each elemenets were calculated. All average concentrations of elements that were above the detection limit in the summer and winter seasons are higher for the Aleje Krasińskiego than for Złoty Róg station. This is due to the location of both stations. Particular seasonal variability was observed for S, Cl, Fe. The Enrichment Factor (EF) was calculated, which allows for a preliminary determination of the origin of the element, whether it is of natural or anthropogenic origin.

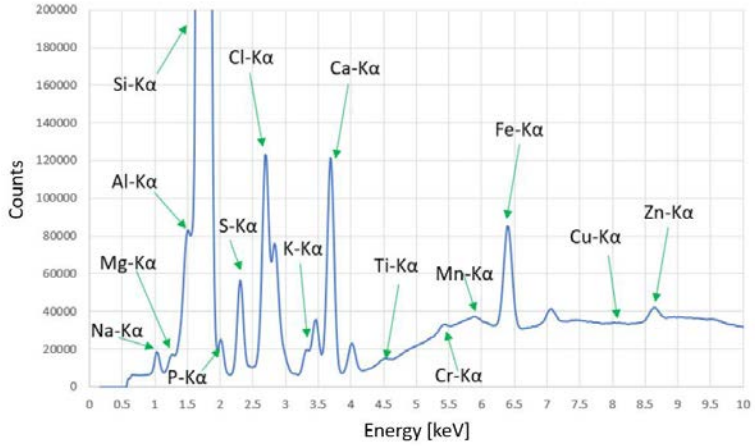

Figure 1. Identified elements in the PM_{10} sample

Acknowledgements:
The subsidy of the Ministry of Science and Higher Education, grant number 16.16.220.842 partially supported this work. This research project was also supported/partly supported by the program "Excellence initiative—research university" for the University of Science and Technology.