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## Chemical composition of PM<sub>1</sub> and PM<sub>10</sub> fraction collected in urban atmosphere of Krakow, southern Poland during 2018-2019 period

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Two fractions of suspended particulate matter (PM<sub>1</sub> and PM<sub>10</sub>) were collected on daily basis in the urban atmosphere of Krakow, southern Poland, during one-year period (April 2018 - April 2019). The following compounds were examined: elemental carbon (EC), organic carbon (OC), carbohydrates (among them levoglucosan – a recognized biomass tracer), as well as ions (Li<sup>+</sup>, Na<sup>+</sup>, NH<sub>4</sub><sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>, F<sup>-</sup>, Cl<sup>-</sup>, NO<sub>2</sub><sup>-</sup>, Br<sup>-</sup>, NO<sub>3</sub><sup>2-</sup>, PO<sub>4</sub><sup>3-</sup>, SO<sub>4</sub><sup>2-</sup>). Thermal-optical analysis with a Sunset carbon analyzer, (Sunset Lab. Inc.) was used to obtain information about organic and elemental carbon concentration, while HPAE-PAD Dionex ICS 3000 system was employed to determine the concentration of 14 carbohydrates. Concentration of ions was analysed using isocratic ion chromatography on an ICS-1100 instrument (Thermo Scientific).

Distinct seasonality of chemical composition of PM<sub>1</sub> and PM<sub>10</sub> fraction was observed. Levoglucosan concentration ranged from 0.01 ug/m<sup>3</sup> to 0.90 ug/m<sup>3</sup> (PM<sub>1</sub> fraction) and from 0.01 to ug/m<sup>3</sup> to 1.95 ug/m<sup>3</sup> (PM<sub>10</sub> fraction) during the analysed period. Arabitol and Mannitol were detected only in PM<sub>10</sub> fraction and ranged from 0.01 ug/m<sup>3</sup> and 0.02 ug/m<sup>3</sup>, during winter season and to 0.15 ug/m<sup>3</sup> and 0.10 ug/m<sup>3</sup>, respectively, during summer season. Significant seasonal differences were also found for ion concentrations: from 0.49 µg/m<sup>3</sup> (SO<sub>4</sub><sup>2-</sup>), 0.15 µg/m<sup>3</sup> (NO<sub>3</sub><sup>-</sup>) and 0.05 µg/m<sup>3</sup> (NH<sub>4</sub><sup>+</sup>) during summer season, to be compared with 11.16 µg/m<sup>3</sup> (SO<sub>4</sub><sup>2-</sup>), 9.30 µg/m<sup>3</sup> (NO<sub>3</sub><sup>-</sup>), 9.25 µg/m<sup>3</sup> (NH<sub>4</sub><sup>+</sup>) for winter season. The concentration of organic and elemental carbon in PM<sub>10</sub> fraction ranged from 2.0 µg/m<sup>3</sup> to 48.9 µg/m<sup>3</sup> (OC) and from 0.3 µg/m<sup>3</sup> to 10.0 µg/m<sup>3</sup> (EC), to be compared with 1.4 µg/m<sup>3</sup> to 18.1 µg/m<sup>3</sup> (OC) and 0.2 µg/m<sup>3</sup> to 4.4 µg/m<sup>3</sup> (EC) for PM<sub>1</sub> fraction.

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