Allergic and Respiratory Health effects of combustion aerosols

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Health effects of combustion aerosols from 3 different aerosols will be dealt with, namely: 1) traffic-related aerosols, 2) indoor combustion aerosol and 3) wildfire aerosol.

1) Traffic-related PM was assessed in the French 6C Study at specific addresses *in situ* ($PM_{2.5}$) and through a dispersion model (PM_{10}) and related to allergic and respiratory health of children living close to the addresses. After adjustment for confounders and NO_2 as a potential modifier, in the 5338 school children of the survey the odds of suffering from EIB and flexural dermatitis at the period of the survey, past year atopic asthma and SPT positivity to indoor allergens were significantly increased in residential settings with $PM_{2.5}$ concentrations exceeding 10 microg/m^3 (WHO air quality limit values). For the 4,907 children who had resided at their current address for the past 3 yrs, asthma (exercise induced, past year and lifetime) was significantly positively associated with $PM_{10.}$ In the same children, PM_{10} were significantly positively associated with eczema (lifetime and past year), lifetime allergic rhinitis and sensitisation to pollens. Among the 2,213 children residing at their current address since birth, the associations persisted for lifetime asthma (1.4 (1.0-2.0)) and for sensitisation to pollens (1.2 (1.0-1.9)).

2) After adjusting for confounders, an increased prevalence of past year asthma was found in the classrooms with high levels of $PM_{2.5}$ (OR 1.21; 95% CI 1.05 to 1.39), compared with others. The relationship was observed mostly for allergic asthma. A significant positive correlation was found between EIA and the levels of $PM_{2.5}$ in the same week.

3) Wildfire combustion aerosols emissions between 2006 and 2010 have been modeled for Europe and will be related to health outcomes.

Determination of REE in carbonaceous geological samples by inductively coupled plasma mass spectrometry

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The results of laboratory research on the optimization of sample preparation of carbonaceous rocks are presented. Research were carry out using reference materials of black shales SLG-1, SChS-1, metamorphic shale SSL-1 (Russia), cody shale SCo-1, green river shale SGR-1b, coal CLB-1(USA).

In order to explain the dependence between amount of carbonaceous substances in geological samples and degree of extraction of rare earth elements (REE) precipitates were analyzed after each steps of acid digestion using scanning electron microscope TESCAN Vega LMU with energy-dispersive spectrometer Oxford Instruments INCA Energy 350. The research of element-structural changes in precipitates at each steps of acid digestion was monitored by atomic emission spectrometry Grand and FT-IR stectrometry «Nicolet 6700». The necessity of removal of carbonaceous substances was shown. For determining the temperature range of pre-firing carbonaceous substances was used Simultaneous Thermal Analysis by STA 409 PC Luxx. Following conditions: 800 ºC during 8 hours in ceramic crucibles into muffle furnace were chosen as optimal for pre-firing. Using the oxidative addition ($LiNO_3$) at the stage of pre-firing was suggested as alternative conditions. This step allows to reduce the temperature down to 550 ºC and time to 2 hours.

Optimal conditions for the acid decomposition of carbonaceous rocks with subsequent determination of trace elements by ICP-MS were found. The scheme includes pre-firing with $LiNO_3$, open beaker heating with HF, microwave-digestion program with mixture of HF and HNO_3, open beaker procedure of consecutive evaporation with HCl and HNO_3 sequentially. In was added at a concentration of 10 μg L^{-1} to act as internal standard for correction of matrix effect, signal drift and instrumental instability. Geological reference materials USGS BCR-2, BHVO-2 was analyzed for quality control. All measurements were performed on an Agilent 7500 cx (Agilent Technologies Inc., USA). The results are consistent with published data.

This study was funded by the Russian Ministry of Education and Science (projects 5.3143.2011, 14.B37.21.0686, 14.B37.21.1257).

DOI:10.1180/minmag.2013.077.5.1