Assessment of trace elements compositions of atmospheric aerosol in Central India

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Trace elements contribute a large fraction of PM_{10} aerosol particles. In the present investigation the mass distribution, variations and source pattern of 23 trace elements in the ambient coarse particulate matters (PM_{10}) and fine particulate matters ($PM_{2.5}$) in huge coal burning site of central India, Raipur city (capital of Chhattisgarh state) is described. The coarse and fine aerosol particulate elements were collected for 16 months (i.e. June, 2005 - September, 2006 at residential site of Raipur city by using Partisol Model 2300 sequential speciation air sampler over teflon paper at height of 10-m from the ground level. The elemental composition of PM was analyzed by using non-destructive analytical technique: proton induced X-ray emission spectroscopy (PIXE). Twenty-three elements (i.e. Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, As, Se, Br, Sr, Zr and Pb) in coarse and fine particulates were characterized. The annual ambient concentration of PM_{10} and $PM_{2.5}$ were ranged from 37.0 -501 and 27.0 - 293 μg m^{-3}, respectively. Their annual, seasonal, spatial and temporal variations, enrichment factor, correlation coefficient and sources are discussed. Their ambient concentrations are found to be higher than in other parts of the country and the World.

Mercury speciation in the sulfide waste ablation zone

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Mercury speciations are very toxic and methylmercury (CH_3Hg^+) is most dangerous for environment and biota. The purpose of this study is to understand the distribution of mercury speciations (Hg^{2+}, CH_3Hg^+, HgS) in diffuse halation high-sulfide waste of piles at the Ursk massive sulfide ore deposits were mined since 1940x. To determine mercury speciation the method of thermal analysis with atomic absorption spectrometry as detector was applied. A Lumex RA-915+ mercury analyzer (St.Petersburg, Russia) equipped with pyrolytic attachment RP-91C was used.

Au was extracted using the cyanide technique. The waste material was stored at the native ravine where the plants were destroyed due to the acid main drainage AMD (pH<2). Granulometric and gravitation fractionation is clearly seen within the ablation zone. The part adjacent to the waste piles is enriched by the sand fraction and sulfide the opposite part is predominantly composed of silt.

It was established that the waste material contains up to 420 μg/g mercury. Its concentration in AMD varies from 16 up to 47 μg/L. Total mercury and its species content and distribution depends on the composition and granulometric of the investigated material. The fine sand and organic substance interstatified with silt contains all three species: methylmercury, mercury (II) and HgS. A vertical migration of mercury in the buried peat material was observed with a presence of CH_3Hg^+ as predominant form at the level of 4 μg/g which is 20 times higher than background content (0.20 μg/g).

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