

## **PHASE COMPOSITION OF ATMOSPHERIC DUST COLLECTED AT DIFFERENT HEIGHTS**

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Samples of suspended and fallen dust were collected in two cities (Katowice and Sosnowiec) in the industrial region of Upper Silesia (Poland), at the heights of 2.5, 60 and 90 m above ground level (a.g.l.). Samples were collected monthly from December 1994 to June 1997.

Dust particles were analysed by X-ray powder diffraction (XRD), scanning electron microscopy (SEM), electron probe microanalysis (EPMA) and transmission electron microscopy (TEM).

Regardless of the collection height, all the samples contained the same major phases: quartz, aluminosilicates (with different amounts of K, Fe, Na, Mg, Ti, Mn, Zn), calcium sulphates (gypsum, bassanite), iron oxides (hematite, magnetite, wüstite), coke and soot. Some of them were reported earlier (MANECKI et al., 1984; RIETMEIJER & JANECEK, 1997; ZELECHOWER et al., 1998).

However, the samples had significantly different minor phase compositions. Minor phases were particularly abundant in fallen dust collected at 60 and 90 m a.g.l. and in suspended dust at 2.5 m a.g.l. Minor phases include: feldspars, calcite, lead sulphide, lead chloride, barite, halite, sylvite, magnesium sulphate and ilmenite. Lead oxide, TiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> were only observed at 2.5 m a.g.l. Sulphur, olivine, spinels and ankerite were identified solely at 60 and 90 m a.g.l.

Size and shape have strong impact on the residence time of those particles. Particles larger than 10 µm fall to the ground very fast. Smaller particles in the form of spheres also reach the ground faster, because their air resistance is relatively small. Studies of natural dust in the lower stratosphere describe non-spherical particles which are a few nm in size, reside in the air long, and are also influenced by long distance transport (RIETMEIJER, 1987, 1993).

Samples collected at 60 and 90 m a.g.l. were enriched in respirable particles. They commonly contained rare phases with heavy metals. Due to their small size and irregular shape, respirable particles reside in the air for a long time and can be transported far away from their source of origin.

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