THE WASH-OUT OF EMISSIONS FROM THE ATMOSPHERE BY PRECIPITATION

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ABSTRACT

We investigated the mechanism and dynamics of solid particles, emissions, and the concentrations of sulphur dioxide as integral components of the contamination of atmosphere. The only way of decontamination is the wash-out by precipitation (solid - snow, liquid - rain). We started from the items of information acquired during the studies of snow acidity in mountain regions heavily polluted by industrial exhalations (NOVÁKOVÁ and TOLLINGER 1971). It was necessary to choose a quite new methodical process, as required and enabled by the existing conditions of our investigation. The investigations of analogous character, carried out mainly in Scandinavia (e.g., BARRETT et al. 1955, ERIKSSON 1955, etc.), approached to the solving of involved problematics from another point of view.

We investigated the separated samples of diurnal precipitation, collected in two sites, the first of which was situated in the centre of an industrial agglomeration in the open landscape, the second one in a wooded mountain valley at a distance of 10 km to the northwest with an elevation of 250 m in relation to the sources of emission.

We found that in the mountain valley the concentrations of SO_2 achieved in 63% of all cases the values up to 0.08 mg/m^3, but the hydrogen-ion-concentrations (pH) in precipitation showed distinctly more acid reaction than in the centre of industrial agglomeration, immediately in the vicinity of emissions source. Here almost 60% of all samples exceeded the concentration of 0.15 mg/m^3 SO_2 in the atmosphere, but the pH values were distinctly shifted to the right (54% of pH values were between 4.5 and 6.0, where as in the remote wooded valley 66% of pH values lay between 3.5 and 5.0).

The differences are, basing on the number of cases investigated, statistically significant. Therefore, it is necessary to define the potential carrier of acidity. There is confirmed the so-called "aerosol theory" (HANUSKA 1971, HRUBÝ 1973, HANUSKA and NOVAKOVA 1975), viz. that the increase of acidity of precipitation is caused mainly by fine particles of maximally 5 μm size.