Atmospheric Chemistry: Recent findings in Gas Phase, Aerosol and Multiphase Studies

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An overview on recent findings in atmospheric chemistry will be given. In gas phase chemistry the formation of very highly oxidized organic compounds which are very efficiently formed in autoxidation reaction sequence is discussed. The gas phase formation of such compounds has profound consequences for tropospheric aerosol particle composition. Key results on the formation of these ‚ELVOCs – extremely low volatility organic compounds' or ‚HOMs – highly oxidized organic molecules' obtained in flow tube or aerosol chamber studies will be presented and discussed.

Recent findings from selected heterogeneous chemistry laboratory studies will be discussed. These processes are suggested to occur at the interfaces of particles and often involve photochemical conversions. Photosensitized reaction which can be driven by visible light are of high interest here.

Atmospheric aqueous aerosol bulk chemistry is another chapter of importance in atmospheric chemistry. Our current understanding of aqueous chemistry relevant for deliquescent aerosol particles, and fog and cloud droplet will be outlined. Here, systematic investigations on radical chemistry have been performed which are since recently complemented with studies of organic accretion reaction suggested to contribute to organic mass in the mentioned systems.

Field measurements are key to check hypothesis in atmospheric chemistry against state-of-the-art observations. One such experiment focussing on the chemical interaction of aerosols with clouds, the ‚Hill-cap cloud Thuringia 2010' experiment will be described.

Finally, models are indispensable tools to enable predictive capability in atmospheric chemistry as well as in other branches of the environmental sciences. Model construction for a selection of the discussed aqueous phase processes will be described and the impacts of this discussed. The current level of implementation of such processes in higher-scale models is debated.

A summary and outlook of the discussed current developments in atmospheric chemistry will be given.