

Preface

The NATO Advanced Research Work “Disposal of Dangerous Chemicals in Urban Areas and Mega Cities” took place in Gdańsk, Poland, 9–13 October 2011 and was attended by 39 participants from ten countries. The major aim of the workshop was to look at the present state of knowledge on the role of oxides and acids of nitrogen in oxidant radical formation and cycling and consequently the oxidation capacity of the atmosphere in general and urban areas and mega cities in particular.

Oxides and acids of nitrogen play an important role in regulating the atmospheric levels of the OH radical which is the main imitator of the degradation of chemicals in the atmosphere. The workshop gave a comprehensive overview on the methods used to measure nitrogen (NO_2) and nitrous acid (HONO) in the troposphere and difficulties associated with certain techniques were highlighted. Reports from recent field measurements using very sensitive HONO instruments served to show the growing recognition among the scientific community that photolysis of HONO is a much more important daytime OH radical than previously thought. Presentations on the state of the art in OH and HO_2 radical atmospheric measurement methods were an important topic of the workshop and recently recognised difficulties, in particular with HO_2 radicals, were highlighted.

Our present understanding of the gas, aqueous and particulate/aerosol phase atmospheric degradation chemistry of chemicals under different NO_x environments was presented and discussed in great detail. The potential importance of photo-enhanced reactions on surfaces and particles was highlighted at the meeting through the presentation of recent research. This is an area that is currently finding many applications for the removal of chemicals from the atmosphere, e.g. through photocatalytic remediation processes.

Examples of measurements of NO_x and chemicals in the atmosphere were presented for rural and urban environments and also megacities such as Cairo in conjunction with modelling studies which attempt to simulate the field observations using state-of-the art knowledge on the chemistry and radical levels. These examples helped to highlight some of the more important gaps in our knowledge on the degradation of chemicals in the atmosphere, e.g. large uncertainties in different steps of the degradation routes, missing sources for the important OH radical

precursor HONO, and very importantly an inadequate knowledge of OH/HO₂ radical recycling in the degradation of chemicals. Modelling the impact of megacities on air quality and climate is associated with many difficulties and unknowns. These were concisely presented at the workshop along with new approaches to this immense problem which are being applied within, for example, the EU FP7 project MEGAPOLI.

The workshop has played an important role in collecting together most aspects of the current state of knowledge on the role of oxides and acids of nitrogen in the atmospheric degradation of chemicals from the viewpoint of measurement, chemistry and modelling. The manuscripts presented here in the proceedings reflect the presentations given at the workshop. PDFs of the presentations are available online or can be obtained upon request from barnes@uni-wuppertal.de

Ian Barnes, Ali Shakour and Krzysztof Rudzinski (workshop organisers), April 2012.



Group photograph showing most of the participants at the NATO ARW held in the Novotel, Gdańsk, Poland, 9–13 October 2011

Disposal of Dangerous Chemicals in Urban Areas and
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Role of Oxides and Acids of Nitrogen in Atmospheric
Chemistry

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