



On Development and Characterisation of a Mobile and Metrologically Traceable Reference Gas Generator for Ammonia and Other Reactive Species in Ambient Air Levels

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Ammonia NH_3 in the atmosphere is the major precursor for neutralising atmospheric acids and is thus affecting not only the long-range transport of sulphur dioxide and nitrogen oxides but also stabilises secondary particulate matter. These aerosols have negative impacts on air quality and human health. Moreover, they negatively affect terrestrial ecosystems after deposition.

NH_3 has been included in the air quality monitoring networks and emission reduction directives of European nations. Atmospheric concentrations are in the order of 0.5-500 nmol/mol. However, the lowest substance amount fraction of available certified reference material (CRM) is 30 $\mu\text{mol/mol}$.

The EMRP JRP ENV55 Met NH_3 aims at overcoming this discrepancy by assessing and developing novel approaches for the production of CRM and measurement methods.

The Federal Institute of Metrology METAS has developed a mobile and metrologically traceable reference gas generator for reactive gases (ReGaS1). This device is based on the specific temperature dependent permeation of the reference substance through a membrane into a flow of carrier gas and subsequent dynamic dilution to desired amount fractions. The characteristics of individual components lead to the uncertainty estimation for the generated NH_3 gas mixture according to GUM, which is aimed to be <3 %.

Here we present insights into the development of said instrument and results of the first performance tests. Moreover, we include results of the study on adsorption/desorption effects in dry as well as humidified matrix gas into the discussion on the generation of reference gas mixtures.