On the (trans)formation of secondary biomass burning aromatic pollutants in the atmosphere

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Being estimated as the largest anthropogenic contributor to global organic carbon (Bond *et al*, 2004), residential wood combustion influences the local and global environment, the climate, and also poses a considerable hazard to human health. In the last couple of years, biomass burning (BB) emissions have increased in Europe due to the utilization of wood as a heating fuel in domestic stoves and fire places. BB especially contributes to the wintertime levels of ambient particulate matter (PM), which are regularly exceeding the WHO air quality guideline values in many European cities.

BB plumes contain high portions of fine organic aerosol (OA) and volatile organic compounds (VOCs); the latter bear a potential to form secondary organic aerosols (SOA), which often travel long distances and reach remote regions. Wood combustion is also an important source of atmospheric aromatic pollutants, but their fraction remains poorly investigated (Stockwell *et al*, 2015). Due to the increasing hazardous potential with aging (Kroflič *et al*, 2015a), multigeneration products of BB aromatic pollutants and their (trans)formation pathways in the atmosphere are of our special interest. Aqueous-phase nitration of guaiacol, an analogue of the most common aromatic unit in lignin, has already been inspected in detail (Kroflič *et al*, 2015b), whereas we will now focus on its multiphase chemistry, which will be investigated in a LEAK chamber. In the last years, only few laboratory studies have been performed on SOA formation from guaiacol under dry conditions (Chhabra *et al* and Ofner *et al*, 2011; Lauraguais *et al*, 2014).

Our study aims in the assessment of the role of the previously investigated bulk aqueous chemistry of guaiacol, involving nitrous acid/nitrite and sulphuric acid/sulfate, in the real atmosphere. Experiments will be performed at low (<5%) and high (>75%) relative humidity for comparison. The influence of illumination will be closely inspected. Gaseous product formation as well as organic and inorganic composition of seed particles will be followed during the experiments. Preliminary results indicate new aspects of guaiacol aging in the atmosphere, which will be further systematically investigated.

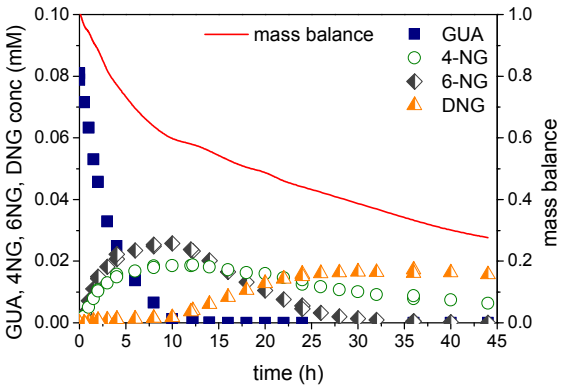

Figure 1. Despite OH radical formation under solar irradiation, guaiacol nitration is selective in nitrite/sulphuric acid aqueous solution (Kroflič *et al*, 2015). Guaiacol (GUA), 4- and 6-nitroguaiacol (4NG and 6NG), and dinitroguaiacol (DNG).

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