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First observation of metal-ligand complexes formation in deliquescent airborne particles: the case of metal-cyanides

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Atmospheric hydrogen cyanide is a ubiquitous pollutant and a biomass burning tracer. It is a reactive gas that can be adsorbed onto aerosol particles where it can react (Kolb et al., 2010). Aqueous phase processing of aerosol can lead to substantial modifications of aerosol chemical and physical properties. In this context a process potentially very important is the formation of metal-ligand complexes in atmospheric aqueous phases, like fog/cloud droplets and deliquescent aerosol (Okochi et al., 2002; Scheinhardt et al., 2013). We measured and speciated cyanides in atmospheric aerosol from an urban environment. Filter samples were collected at an urban background site in the city centre of Padua (Italy), in the Po Valley, extracted and analysed with headspace gas chromatography and nitrogen–phosphorous detection. The results showed that strongly bound cyanides were present in all aerosol samples (Giorio et al., 2017). The concentration of cyanides was strongly correlated with the concentrations of total carbon, metals and aerosol liquid water. The results obtained support the hypothesis that hydrogen cyanide can be adsorbed onto aerosol liquid water and can react with metal ions to form stable metal–cyanide complexes (Giorio et al., 2017). Our investigation has been then extended to study the formation of other metal-organic complexes in deliquescent aerosol and the effect of this mechanism on the solubility of metals in the aerosol.

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