

## Ammonium Salt Experiments with ROSINA/DFMS

N. Hänni, K. Altwegg, and the ROSINA team.

A dust event on September 5 in 2016, shortly before the termination of the ROSETTA mission, led to a substantial increase of the  $\text{NH}_3/\text{H}_2\text{O}$  ratio and the unique observation of the ammonium ion  $\text{NH}_4^+$  in neutral gas mode of the double focusing mass spectrometer DFMS [1], part of the ROSINA sensor package [2]. This is different from the  $\text{NH}_4^+$  ions originating from protonation reactions in the coma and measured in the ion-mode of DFMS [3]. As ions from outside are prohibited by applied bias voltages from entering the ionization chamber of DFMS in the neutral gas mode,  $\text{NH}_4^+$  must enter in a neutral form/compound and become ionized only in the source region. We think this neutral parent could be an ammonium salt sublimating from a cometary dust grain. DFT calculations on ammonium chloride  $\text{NH}_4\text{Cl}$  for instance indicate the existence of a neutral  $\text{NH}_3\cdots\text{HCl}$  complex desorbing from the relaxed crystal surface [4]. Motivated to better understand the sublimation processes and observable (by mass spectrometry) gas phase species originating from ammonium salts, we started experimenting.

Here we present results from extensive laboratory experiments probing sublimating ammonium salts. From collecting mass spectra at different temperatures/pressures, we establish fragmentation patterns that do not exclusively show ammonium and the protonated anion (as expected from the decaying ammonium salts e.g. based on [5]) but in addition little amounts of other gaseous species. How the fingerprint created by these very minor species can be used for the identification of ammonium salts in DFMS space data is discussed by Prof. K. Altwegg.

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