



Ionospheric chemistry in Titan's atmosphere: laboratory studies

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To unravel the chemical complexity of Titan's atmosphere, with special reference to the abundance of heavy ions in its ionosphere, as revealed by the Cassini-Huygens mission, laboratory investigations on the chemical processes occurring under ionospheric conditions are pivotal. It is now well established that ionic reactions play an active role in the formation pathways of complex molecules, but laboratory experiment on key reactions are sparse. We have performed laboratory measurements of kinetic parameters (cross sections, branching ratios and their dependences on collision energy) for the reactions of methyl cations CH_3^+ as well as different isomers of the cyanomethyl cation ($c\text{-C}_2\text{H}_2\text{N}^+$ and CH_2CN^+) with several saturated and unsaturated hydrocarbons (e.g. CH_4 , C_2H_2 , CH_3CCCH_3) using tandem mass spectrometric techniques and RF octupolar trapping of parent and product ions coupled with VUV photoionization of appropriate neutral precursors to ensure the production of state-selected ions and/or isomer selectivity. The principal aim is to infer information on the growth processes of C and N containing molecules via ion-molecule reactions. The most relevant and updated results will be presented at the meeting [1-4]

References

- [1] A. Cernuto et al. *J.Chem.Phys.* 147, 154302 (2017)
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- [4] P. Fathi et al. *Int. J. Mass Spectrom.* 411, 1-13 (2016)