Organics in Comet 67P: Aliphatic and Aromatic Hydrocarbons seen by ROSINA

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I. Abstract

Comets were formed in the outer region of the protoplanetary disk under coldest temperatures. This makes them unique objects of study as they contain well preserved material that formed our solar system. Reports on the composition of comets have been provided from various sides using different technical approaches such as radio telescopes or space missions. Thus we know today that comets consist of refractory material, frozen gases, and various organic compounds. But only the Rosetta mission has revealed the unexpected diversity of the organic compounds: the presence of many different CH-, CHN-, HCS-, CHO2-, and CHNO-bearing saturated and unsaturated species results in a high complexity and diversity of organics in comets. [1][2] The complexity of the study is further increased by the DFMS ionization energy of 45 eV [3], leading to fragmentation of the molecules which significantly varies from databases like NIST. Organic compounds appear to be especially affected by these fragmentation processes, requiring intensive lab work in form of calibration studies together with space data analysis. The here presented study focusses mainly on the pure hydrocarbons as only a profound understanding of the present hydrocarbons allows further analysis of other organic compounds in the coma (e.g. alcohols). Thus, the results of identification and quantification campaign of aliphatic and aromatic hydrocarbons for several mission phases will be shown. In addition we will show new results on the parent of phosphorus and on the possible presence of ammonium salts.

II. References

[1] Le Roy et al.: Inventory of the volatiles on comet 67P/Churyumov-Gerasimenko from Rosetta/ROSINA, A&A 583, A1, 2015.

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[3] Balsiger et al.: Rosina - Rosetta Orbiter Spectrometer for Ion and Neutral Analysis, Space Sci Rev, 128, pp. 745- 801, 2007.