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## Analysis of organic refractory residues coming from the heating of cometary ice analogs: an insight in complex cometary chemistry

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This contribution focuses on one aspect of our work, which relate to the analysis of refractory residues formed from UV irradiation and warming of astrophysical ice analogs, the RAHIIA project. The understanding of the formation of refractory residues, commonly called "Yellow Stuff" is an important step to establish what kind of organic matter could be available within interplanetary objects such as comets or asteroids. We present here the first results obtained by spectrometric analysis with high resolution mass spectroscopy (LT-Orbitrap) of these residues. These analyzes show that these residues are composed of thousands of molecules of high molecular weight (m / z> 4000), and present an average elemental composition H/C= 1.6, N/C= 0.4, O/C= 0.4 for an initial ice containing H2O:CH3OH:NH3 3:1:1. We further develop specific data representation in order to obtain information on the residue composition. These representations allow to define that three different groups of molecules are present in these residues, molecules bearing only CHN, CHO or CHNO atoms. These representations also give important information on the family composition of each molecular group. All these developments will be used for the comparison of various residues as well as for the development of more specific analytical methods such as UHPLC-MS or GC-MS. In conclusion, these results demonstrate that from only three simple molecules CH3OH, H2O and NH3, a complex chemistry occurs when these molecules are subjected to physical processes available in cometary environments.