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## Development of Liquid Chromatography High Resolution Mass Spectrometry Strategies for the Screening of Complex Organic Matter: Application to Astrophysical Simulated Materials.

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### ABSTRACT:

The present work aims at developing two LC-HRMS setups for the screening of organic matter in astrophysical samples. Their analytical development has been demonstrated on a 100-microgram residue coming from the photo-thermo chemical processing of a cometary ice analog produced in laboratory.

The first 1D-LC-HRMS setup combines a serially coupled columns configuration with HRMS detection. It has allowed to discriminate among different chemical families (amino acids, sugars, nucleobases and oligopeptides) in only one chromatographic run without neither a priori acid hydrolysis nor chemical derivatisation. The second setup is a dual-LC configuration which connects a series of trapping columns with analytical reverse-phase columns. By coupling on-line these two distinct LC units with a HRMS detection, high mass compounds ( $350 < m/z < 600$ ) have been efficiently preconcentrated, separated and detected.

Our strategies demonstrate a real interest for the analysis of astrophysical samples coming in minute quantities and allowing only few analytical runs. Besides its relevance for astrobiological studies, this work points out the suitability of these two novel LC-HRMS strategies for untargeted analysis of complex environmental samples.

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