THE ELECTRICAL DISCHARGE PRODUCTS OF MULTI-COMPONENT MIXTURES PROBED BY BROADBAND MILLIMETER-WAVE ROTATIONAL SPECTROSCOPY

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Electrical discharge sources have been used extensively for the generation of molecular ions, radicals, and long chain unsaturated hydrocarbons, which have consequently been discovered to be present in the interstellar medium (ISM) [1]. We have used a discharge source to produce a number of medium-sized, astronomically relevant, neutral organic molecules from multi-component mixtures. The discharge products are characterised with our segmented chirped-pulse Fourier transform millimeter-wave spectrometer, which has been previously applied in our room-temperature studies of cyanides and alcohols [2]. We will concentrate here on the discharge products of mixtures of molecules already detected in the ISM, such as aldehydes in mixture with the nitrogen-containing molecules acetonitrile and ammonia. Any newly-observed species in our spectra can be assigned with rest frequencies and rotational parameters already suitable for interstellar searches with millimeter-wave radio telescopes, such as the Atacama Large Millimeter/submillimeter Array. Results from our experiments will allow us to better consider reaction pathways towards complex organic molecules in extra-terrestrial environments.

References: [1] M. C. McCarthy et al., Astrophys. J. Suppl. Ser. 129 (2000), 611-623. [2] B.E. Arenas et al., Phys. Chem. Chem. Phys. 19 (2017), 1751-1756.