ASTROCHEMISTRY

Complex organics next door

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Credit: AAS/IOP

The astrochemical inventory of our Galaxy is developing steadily, with ~190 molecules having been detected to date, at a rate of four new additions per year in recent years. Roughly one third of these are complex molecules, containing six atoms or more. However, when it comes to other galaxies, the list of detected complex molecules is only ten items long, and there have only been two new detections in the last decade. Recently, Marta Sewilo and collaborators

have added two complex organic molecules to the extragalactic tally by serendipitously detecting dimethyl ether (CH_3OCH_3) and methyl formate (CH_3OCHO) in the Large Magellanic Cloud (LMC).

Using ALMA to study the molecular gas tracer CO in the N 113 star-forming region in the LMC, Sewilo et al. also detected six transitions of methyl formate (pictured, and integrated over all transitions, bottom), a single transition of dimethyl ether (pictured, top), and several methanol lines — a complex organic molecule that has been previously detected in extragalactic settings (including the LMC). In addition, a slew of smaller molecules were detected, including sulfuretted species. It is somewhat surprising to see such large organics and molecules containing high-mass metals in the low-metallicity environment of the LMC, where in general the interstellar UV radiation field is stronger, and thus more harmful to molecules. However, the authors were able to determine that the properties of the hot cores observed in N 113 are very similar (in density and temperature) to known Galactic hot cores, where methyl formate and dimethyl ether are commonly observed species. Scaling for the difference in metallicity, the abundances of these two molecules are broadly similar to Galactic hot core abundances, indicating a similar chemistry at work.

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