DETECTION AND FORMATION OF INTERSTELLAR c-C_3D_2

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Multiply deuterated molecules are unique observational probes for the earliest stages of star formation. Cyclopropenylidene, c-C_3H_2, is an ideal probe for deuterium chemistry. It is one of the most widespread molecules in our Galaxy and it has the possibility of double deuteration. Furthermore, since c-C_3H_2 is an early-type molecule, it is a particular useful tool to investigate early stages of a molecular cloud. This makes observations of its deuterated forms particularly important to test time-dependent chemical codes which include deuteration processes. The centimeter and millimeter wavelength spectra of doubly deuterated cyclopropenylidene have recently been measured in the laboratory[a], allowing for the first time a search for c-C_3D_2 in space. We report the detection of c-C_3D_2 in two starless cores, L1544 and TMC-1C. The deuteration of this small hydrocarbon ring is analysed with a comprehensive gas-grain model, the first including doubly deuterated species. The observed abundances of c-C_3D_2 can be explained solely by gas-phase processes, supporting the idea that c-C_3H_2 is a good indicator of gas-phase deuteration.

[a] S. Spezzano, F. Tamassia, S. Thorwirth, P. Thaddeus, C. A. Gottlieb, and M. C. McCarthy *Astroph. J. Supp. Series* **200**(1), 2012.