

ROTATIONAL SPECTRA AND INTERSTELLAR SEARCH OF MALEONITRILE (CNCHCHCN)

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Maleonitrile ($\text{N}\equiv\text{C}-\text{CH}=\text{CH}-\text{C}\equiv\text{N}$) is a complex organic molecule (COM) isoelectronic to the *trans*-cyanovinylacetylene ($\text{H}-\text{C}\equiv\text{C}-\text{CH}=\text{CH}-\text{C}\equiv\text{N}$), which has been recently detected in the interstellar medium (ISM) towards the dark molecular cloud TMC-1.^a Both structures only differ from the ubiquitous vinyl cyanide ($\text{H}-\text{CH}=\text{CH}-\text{C}\equiv\text{N}$) by replacing one of the terminal hydrogens by a nitrile or acetyl group. The generation of maleonitrile and *trans*-cyanovinylacetylene in the space might follow similar synthetic routes. However, the lack of precise rotational constants for maleonitrile, only studied up to 15GHz,^b hamper its detection in the space. In the present work, our goal is, firstly, to provide a complete and precise set of rotational parameters for maleonitrile and, finally, to search for in the interstellar medium. For its rotational analysis we have employed the broadband millimeterwave spectrometer based on radioastronomical receivers GACELA (GAs CELL for Laboratory Astrophysics) working in the W band (72-116.5 GHz).^c The rotational spectra of maleonitrile have been analyzed for the ground state, and the first vibrational excited states: ν_7 , $2\nu_7$, ν_{10} and ν_{18} . All of them with energy bellow 300cm^{-1} . A total of 537, 318, 55, 64 and 63, respectively, pure rotational transitions have been included in the fit. Maleonitrile was search in the space towards the TMC-1 molecular cloud.

^aLee K.L.K. *et al.*, *ApJL*, 908, L11, **2021**

^bHalter, R.J., *et al.*, *J. Am. Chem. Soc.*, 123, 49, 12353–12363, **2019**

^cCernicharo, J. *et al.* *A&A*, 626, A34 **2019**