

## BROADBAND MICROWAVE SPECTROSCOPY OF TRANS 3-PENTENENITRILE AND ITS PYROLYSIS PRODUCTS

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Titan, a moon of Saturn, has an atmosphere that is similar to prebiotic earth, which is nitrogen rich. Pentenenitriles are of importance as they are potential precursors to hetro-aromatic compounds like pyridine. This talk will describe our broadband microwave studies of *trans* 3-pentenenitrile (*t*-3PN) under jet-cooled conditions. Strong-field coherence breaking (SFCB) was used to selectively modulate the intensities of microwave transitions in a conformer-specific manner, aiding analysis. Two conformers of *t*-3PN were identified and the rotational transitions were assigned. The talk will compare the conformational preferences of 3-pentenenitrile with its isomer, 4-pentenenitrile, previously studied in our laboratory.

The studies of *t*-3PN serve as a necessary foundation for subsequent studies of its pyrolysis over the 300K-850K temperature range, using a modified Chen nozzle followed by supersonic expansion. We combined CP-FTMW instrument with vacuum ultraviolet (VUV) time-of-flight mass spectrometry (TOF-MS) to obtain mass-correlated broadband microwave spectra. The temperature dependence of the mass spectra aid in identifying the carriers of new transitions appearing in the microwave spectrum. The thermal decomposition of *t*-3PN produces a range of products, including those that are both radical and molecular in nature.