

THE ROTATIONAL SPECTRA OF 2-CYANOPYRIMIDINE (C<sub>5</sub>H<sub>3</sub>N<sub>3</sub>) AND 2-CYANOPYRAZINE (C<sub>5</sub>H<sub>3</sub>N<sub>3</sub>): VIBRATIONAL GROUND STATES AND DYAD OF LOWEST-ENERGY VIBRATIONALLY EXCITED STATES

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2-Cyanopyrimidine and 2-cyanopyrazine are heterocyclic analogs of the known interstellar molecule benzonitrile. They are attractive molecules for interstellar detection *via* radioastronomy because they have substantial dipole moments ( $\mu_a = 6.47$  D and  $\mu_a = 4.22$  D, respectively) and could serve as tracer molecules for both pyrimidine and pyrazine. In the present work, we analyzed and assigned the rotational spectra of 2-cyanopyrimidine (C<sub>5</sub>H<sub>3</sub>N<sub>3</sub>) and 2-cyanopyrazine (C<sub>5</sub>H<sub>3</sub>N<sub>3</sub>) for the first time. From 130 – 500 GHz, the vibrational ground state transitions of each molecule have been least-squares fit to partial octic, distorted-rotor Hamiltonian with each fit containing several thousand transitions. The resulting spectroscopic constants are sufficient for radioastronomical searches for these molecules. Further similar to benzonitrile, the two lowest-energy vibrationally excited states form Coriolis coupled dyads for both 2-cyanopyrimidine and 2-cyanopyrazine. Several thousand transitions of each vibrationally excited state have been assigned and analyzed with a partial octic, distorted-rotor Hamiltonian with a- and/or b-axis Coriolis coupling. The complete analysis of these states is expected to yield a highly precise energy separation between these vibrationally excited states and allow for an interesting comparison to the analogous dyads of benzonitrile and the cyanopyridines.