



Reply to Brzeski and Jordan: Potential pyridine tautomers that can form stable dipole-bound anions

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Zhao et al. (1) report the observation of a negative ion $C_5H_5N^-$ in the gas phase when water microdroplets containing dissolved pyridine (C_5H_5N) are sprayed into a mass spectrometer. They name $C_5H_5N^-$ the pyridyl anion (pyridine negative ion), but they state that they do not know its structure and point out how surprising this identification appears to be given that previous work by Nenner and Schultz (2) using electron impact with a variable electron energy source had only found that gas-phase pyridine showed a scattering resonance about 0.6 eV above the ground state. For molecules with negative electron affinities, autodetachment lifetimes of their negative ions are very short, typically less than a picosecond. However, closed-shell molecules with large dipole moments can bind an extra electron, and it has been suggested by Crawford (3) that any real gas-phase molecule or radical with a dipole moment greater than 2.0 D probably can bind an electron, and almost certainly can if the dipole moment is greater than 2.5 D. Pyridine has a dipole moment of about 2.2 D, making it borderline. Brzeski and Jordan (4) suggest a very clever solution to this mystery by proposing that $C_5H_5N^-$ is a negative ion of the ortho, meta, or para tautomer of pyridine (see their figure 1) with calculated dipole moments of 3.8, 5.9, and 6.6 D, respectively, which is more than enough to support a dipole-bound anion. We welcome this

suggestion and look forward to devising experimental tests of this hypothesis.

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The authors declare no competing interest.

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