

MICROWAVE DETECTION OF PROTONATED SO₂ IN TWO ISOMERIC FORMS

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By means of Fabry-Pérot FT microwave spectroscopy, the rotational spectrum of protonated sulfur dioxide in two distinct isomeric forms, a *cis* and a *trans* geometry, is reported. Searches for both isomers were based on theoretical structures obtained at the CCSD(T)/cc-pwCVQZ level of theory corrected for zero-point vibrational effects at the CCSD(T)/cc-pV(T+d)Z level. At a similarly high level of theory, the *cis* isomer is calculated to be the global minimum on the potential energy surface, but the *trans* isomer is predicted to lie only a few kcal/mol higher in energy. The identification of *cis* HOSO⁺ has been confirmed by detection of rotational lines of DOSO⁺ and HO³⁴SO⁺ at precisely the expected frequency shifts. Because sulfur dioxide is a well known interstellar and extragalactic species, and because it possesses a large proton affinity, HOSO⁺ is an excellent candidate for radioastronomical detection.