MICROWAVE SPECTRUM AND STRUCTURE OF HBr-SO_3 AND THE QUADRUPOLE COUPLING CONSTANT OF Ar-$^{33}SO_3$

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We report the microwave spectrum and structure of HBr-SO_3 as determined by pulsed nozzle Fourier transform microwave spectroscopy. Like its previously studied HF and HCl analogs, the complex exhibits a symmetric top spectrum and has a structure in which the halogen approaches the sulfur along the C_3 axis of the SO_3. The S–Br distance is 3.24 A and the HBr subunit forms an angle of approximately 73 deg. (or 107 deg.) with the a-axis of the complex. The structures of the three HX-SO_3 complexes are compared. We also report a measurement of the ^{33}S nuclear quadrupole coupling constant in Ar-$^{33}SO_3$. The value obtained (-15.296(14) MHz) is compared with a recent theoretical calculation of the monomer value and discussed in terms of the angular oscillations of the SO_3 unit.