THE HIGH-RESOLUTION INFRARED ANALYSIS OF BROMOMETHANE BELOW 1800 cm^{-1}

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High Resolution infrared spectra of six isotopomers of bromomethane (CH_3Br, CD_3Br, $^{13}CH_3Br$ – with the ^{79}Br and ^{81}Br isotopes for each isotopomer) have been recorded at the Pacific Northwest National Laboratory. Here, we will present an analysis of fundamental, overtone and combination vibrational states for CH_3Br below 1811 cm^{-1}. Previous high-resolution work in this region for bromomethane focused mainly on obtaining frequency positions and line strengths for atmospheric sensing purposes. However, our work on this molecule focuses on obtaining precise rovibrational parameters that will serve as a foundation for the analysis of higher energy combination and overtone bands involving these states. These precise measurements facilitate the identification of subtle rotational and vibrational interactions that have been theoretically predicted, but have never before been characterized. Specifically, the Fermi resonance between ν_5 (E) and ν_3+ν_6 (E) is identified as well as a weak Coriolis interaction between ν_2 (A_1) and ν_3+ν_6 (E). The $3\nu_3$ vibrational state has been analyzed for the first time, and hyperfine splittings similar to those found in CH_3I for low *K, J* levels have also been observed.