THE ROTATIONAL SPECTRA OF O-17 SUBSTITUTED OXYGEN SINGLET DELTA

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As part of a comprehensive review on molecular oxygen spectroscopy we have measured rotational spectra of isotopic forms of molecular oxygen in its $a^1\Delta_g$ electronic state with high resolution THz spectroscopy. A previously described static discharge cell has been utilized to record spectra of rare isotopologues of excited oxygen[1]. In this work the data set is extended to include all of the ^{17}O substituted isotopologues of O_2 $^1\Delta$. The spectral features were detected in close proximity to predicted positions. Due to the high resolution and good signal to noise ratio, the fundamental hyperfine parameters eQq and C_I are determinable for ^{17}O substituted species for the first time. A refined nuclear spin-orbit coupling constant, $a = -211.9328(283)$ MHz, was determined, and is roughly two orders of magnitude more precise than values determined from near infrared spectroscopy or electron spin resonance studies. Weak signals of vibrationally excited oxygen in the $a^1\Delta_g$ electronic state were also observable for many of the rotational transitions.

[1] H. Gupta, S. Yu, B.J. Drouin, C.E. Miller - RC03, International Symposium on Molecular Spectroscopy, Ohio State University, 2010.