CAVITY RINDDOWN SPECTROSCOPY OF THE $\tilde{A} - \tilde{X}$ ELECTRONIC TRANSITION OF THE $CH_3C(O)O_2$ RADICAL

SERGEY J. ZALYUBOVSKY, BRENT G. GLOVER, TERRY A. MILLER, *Laser Spectroscopy Facility, Department of Chemistry, The Ohio State University, 120 W. 18th Avenue, Columbus OH 43210.*

The acetyl peroxy radical, $CH_3C(O)O_2$, is one of the most abundant organic peroxy radicals in the atmosphere [a]. It plays a significant role in many key atmospheric processes, including the atmospheric ozone balance [b] and the formation of peroxy acetyl nitrate [c], a key component in photochemically generated smog.

Various advantages in spectroscopic and kinetic applications can be gained by studying peroxy radicals via their near IR electronic transition [d,e]. In this talk we report cavity ringdown spectra of the $\widetilde{A}^2A'$ - $\widetilde{X}^2A''$ electronic transition of acetyl peroxy radical and its perdeutero analog. For $CH_3C(O)O_2$, a T_{00} electronic origin is observed at 5582.5(5) cm^{-1}, and several $\tilde{A}$ state vibrational frequencies are measured and assigned. Extensive *ab initio* calculations have been carried out to confirm assignments for the electronic origin and observed vibrational hot bands. The empirical absorption cross section for the origin of $\widetilde{A}^2A'$ - $\widetilde{X}^2A''$ transition has been estimated.

[a] G. S. Tyndall, R. A. Cox, C. Granier, R. Lesclaux, G. K. Moortgat, M. J. Pilling, A. R. Ravishankara and T. J. Wallington, J. Geophys. Research [Atmospheres] **106(D11)**, 12157(2001)

[b] P. D. Lightfoot, R. A. Cox, J. N. Crowley, M. Destriau, G. D. Hayman, M. E. Jenkin, G. K. Moortgat and F. Zabel, Atmos. Environ. A-Gen. **26A**, 1805(1992)

[c] H. J. Beine, D. A. Jaffe, J. A. Herring, J. A. Kelley, T. Krognes and F. Stord, J. Atmos. Chem. **27**, 127(1997)

[d] M. B. Pushkarsky, S. J. Zalyubovsky and T. A. Miller, J. Chem. Phys. **112**, 10695(2000)

[e] S. J. Zalyubovsky, Dongbing Wang and T. A. Miller, Chem. Phys. Lett. **335**, 298(2001)