Rate coefficients for the reaction of the hydroxyl radical with pyrrole

Terry J. Dillon, Katrin Dulitz, Abraham Horowitz, Maria E. Tucceri, and John N. Crowley
Max-Planck-Institut für Chemie, Abteilung Luftchemie, Mainz, Germany (terry.dillon@mpic.de)

The pulsed laser photolysis technique of radical generation, coupled to pulsed laser induced fluorescence detection of OH was used to measure absolute rate coefficients $k_1(P, T)$ for the title reaction, $\text{OH} + \text{C}_4\text{H}_5\text{N} \rightarrow \text{products (R1)}$. Experiments were conducted in conditions of temperature and pressure representative of the Earth’s atmosphere, including for the first time at $T < 298$ K. Such conditions are frequently encountered in the field where (R1) is used to calibrate an instrument measuring OH reactivity. The accuracy of the data obtained was enhanced by on-line optical absorption measurements of $[\text{C}_4\text{H}_5\text{N}]$ using a value of $\sigma_{184.9\text{nm}} = (1.26 \pm 0.02) \times 10^{-17}$ cm$^2$ molecule$^{-1}$, which was determined in this work. Non-Arrhenius behaviour of $k_1(T)$ was observed, in line with results from the literature that were obtained at higher temperatures. Investigations of a possible pressure dependence in $k_1$ are ongoing.