High-resolution oscillator strength measurements for high-v′ bands of the A(v′)-X(0) system of carbon monoxide

Glenn Stark
Physics Department, Wellesley College, Wellesley, MA

Brenton R. Lewis, Stephen T. Gibson, Julian P. England
Research School of Physical Sciences and Engineering, Australian National University, Canberra, ACT, Australia

Band oscillator strengths for six bands of the CO A(v′) - X(v″=0) system with $12 < v' < 22$ have been determined from high-resolution (resolving power = 750,000) absorption spectra recorded with a tunable VUV laser system. The instrumental bandwidth of the system, 0.11 cm^{-1} FWHM, was significantly less than the widths of the Doppler-broadened CO lines (0.20 cm^{-1} FWHM). Integrated cross sections of individual rotational lines were determined by a least-squares fitting routine, taking into account the effects of the finite instrumental resolution on the measured absorption features. Our derived f-values for the A(13)-X(0), A(14)-X(0), and A(16)-X(0) bands are consistent with other recent measurements, with the ab initio electronic transition moment calculations of Kirby and Cooper (1989), and with f-values derived from the ab initio electronic transition moment calculations of Spielfiedel and Feautrier (1997) in Jolly et al. (1997). Our f-values for the A(18)-X(0), A(20)-X(0), and A(21)-X(0) bands, the first directly measured values for these bands, progressively deviate from band oscillator strengths derived from the electronic transition moment function of Kirby and Cooper (1989). In addition, a pressure-broadening coefficient of $(3.1 \pm 0.6) \times 10^{-4}$ cm^{-1}/Torr was determined for room temperature CO-CO collisions.

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