

NEW ASSIGNMENTS IN THE NEAR INFRARED SPECTRUM OF METHYLENE

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Transitions to five previously unobserved levels, have been identified in a newly recorded region ($10\,000\text{ cm}^{-1}$ - $10\,600\text{ cm}^{-1}$) of the near infrared spectrum of the $\tilde{b}^1B_1 \leftarrow \tilde{a}^1A_1$ system of CH_2 . Four states were observed via transitions from the $\tilde{a}(0,0,0)$ state: $K = 1$ $\tilde{a}(0,9,0)$, $K = 2$ $\tilde{b}(0,1,0)$, $K = 2$ $\tilde{a}(1,6,0)$, and $K = 3$ $\tilde{b}(0,1,0)$, and one via hot-band transitions from the $\tilde{a}(0,1,0)$ state: $K = 3$ $\tilde{a}(0,10,0)$. The observation of levels with predominantly \tilde{a} state character is dependent on strong Renner-Teller coupling of the two singlet states which correlate to a $^1\Delta_g$ state at linearity. Hot band transitions to two other states previously identified at shorter wavelengths are observed. Comparison with recent theoretical calculations^{a,b,c} shows good agreement in most cases. These assignments still account for only approximately 20% of the lines observed in this region; speculations on the identity of the unassigned transitions will be discussed.

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