

## LIFETIMES OF THE $\tilde{A}$ STATES OF $C_3$

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Fluorescence lifetimes have been measured for 66  $\Pi_u$  and 16  $\Sigma_u^+$  vibronic levels of the  $\tilde{A}^1\Pi_u$  state of  $C_3$  under nearly collision-free conditions. The vibrational levels studied were  $v_1=0-5$ ,  $v_2=0-22$ , and  $v_3=0-4$ , covering the energy range up to  $6000\text{ cm}^{-1}$ , and for most of them only the R(0) line was investigated. The measurements are estimated to be accurate to better than  $\pm 3$  ns. General features of the lifetimes are as follows: Pure bending levels with  $\Pi_u$ -symmetry have shorter lifetimes (as short as 190 ns). With increasing excitation of the stretching vibrations, the lifetimes increase. Bending excitation generally reduces the lifetimes, though exceptions occur for  $v_1=1$ . Levels with  $v_1+v_3 \geq 3$  or with vibrational energy greater than  $4000\text{ cm}^{-1}$  have lifetimes longer than 300 ns; some of these levels even have a long-lived component with a lifetime of up to several microseconds. This implies that the predicted dark states, ( $\tilde{B}^1\Sigma_u^-$  and  $\tilde{B}'^1\Delta_u$ ), lie at least  $4000\text{ cm}^{-1}$  above the 0 0 0 level of the  $\tilde{A}$  state. It is interesting to note that most of the  $\Sigma_u^+$ -symmetry levels lying above  $4000\text{ cm}^{-1}$  also have lifetimes longer than 300 ns.