VIBRATION TO ELECTRONIC ENERGY TRANSFER IN VIBRATION-VIBRATION PUMPED CARBON MONOXIDE [a]

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In a CO-Ar gas mixture carbon monoxide is excited into low vibrational states v=1,...,10 by absorption of CO laser radiation. Vibration-vibration exchange pumping results in the diffusion of energy into very high vibrational states. Yet states above $v = 40$ have never been observed to be populated. As $v = 40$ is isoenergetic with the $A^1\Pi$ state we believe this effect to be due to vibration to electronic energy transfer. A master equation kinetic model which takes into account vibration-vibration, vibration-translation, vibration-electronic energy transfer processes and radiative decay has been developed and will be compared to measurements of kinetic rates for the vibrational to electronic transfer. The diffusion of energy through the vibrational quantum states is observed by time resolved step-scan FTIR spectroscopy on the $\Delta v = 2$ emission with spectral resolution of 8 cm^{-1} and time resolution of $5\mu s$. Vibrational to electronic energy transfer is monitored using step-scan UV Fourier transform spectroscopy on the 4th positive emission of CO.

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