MASS DEPLETION SPECTROSCOPY OF NO_2 MOLECULE

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A mass spectrometric depletion measurement has been performed for the NO_2 molecule in its bound region as well as above its gas phase dissociation threshold. In the bound region (17700 - 18300 cm^{-1}) that is known to be vibronically chaotic transitions are broadened and blue-shifted relative to their gas-phase counterparts. The spectrum is fitted relatively well by setting all shifts and width equal to 7cm^{-1}. Modest dispersion of these values are consistent with quantum chaos in NO_2. Relaxation is dominated by interaction of NO_2 with its non-superfluid helium nearest neighbors.[a]

In the region above the gas-phase dissociation threshold (25125 - 30000 cm^{-1}) the mass depletion spectrum reveals no fine structure. The fast relaxation due to the interaction with the superfluid helium environment prevents photodecomposition of the NO_2 molecule over the entire range we explored.

[a]E. Polyakova, D.Stolyarov, X Zhang, V.V. Kresin and C. Wittig *Chem. Phys. Lett.* **375** (2003) pp. 253-260