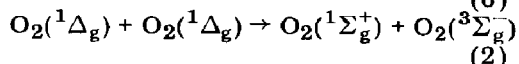
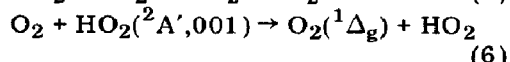
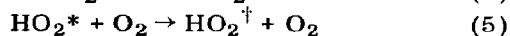
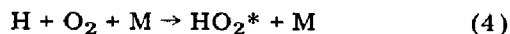


Energy transfer from  $O_2(^1\Delta_g)$  to  $HO_2$  has been reported previously [5]. We now present evidence for the reverse transfer. An  $H_2/Ar$  mixture was passed through a microwave discharge and  $O_2$  added just upstream of an observation port. We observe emission bands at 762 nm and 1.265, 1.43, 1.51  $\mu m$ . Replacement of  $H_2$  by  $D_2$  caused the 1.51  $\mu m$  band to disappear, but all other bands were left unaffected. Thus the 762 nm band seems to be the  $O_2(^1\Sigma_g^- \rightarrow ^3\Sigma_g^-)$  emission rather than the (possible)  $9 \rightarrow 4$  vibrational transition in OH. The other bands are tentatively assigned to the following transitions:  $\lambda = 1.265 \mu m$ ,  $O_2(^1\Delta_g \rightarrow ^3\Sigma_g^-)$  and/or  $HO_2(^2A', 001 \rightarrow ^2A'', 000)$ ;  $\lambda = 1.43 \mu m$ ,  $HO_2(^2A', 000 \rightarrow ^2A'', 000)$ ;  $\lambda = 1.51 \mu m$ ,  $HO_2(^2A'', 200 \rightarrow ^2A'', 000)$ .

The most probable excitation mechanism is



where  $HO_2^*$  signifies some undefined excited state of  $HO_2$ , and  $HO_2^\dagger$  denotes the emitting states ( $^2A', 001$ ;  $^2A', 000$ ;  $^2A'', 200$ ). However, other excitation processes are not excluded, and further experiments are in progress to elucidate the mechanism.

More detailed information on the  $HO_2$  system is published in Chem. Physics Letts., 32 (1975) 586; a description of the  $NO_2$  system will appear in J. Chem. Soc. Faraday Trans.

- 1 T. C. Frankiewicz and R. S. Berry, J. Chem. Phys., 58 (1973) 1787.
- 2 I. T. N. Jones and K. D. Bayes, J. Chem. Phys., 59 (1973) 3119.
- 3 R. J. O'Brien and G. H. Myers, Chem. Phys. Letters, 9 (1971) 544.
- 4 D. T. Stewart, J. Atmos. Terrest. Phys., 10 (1957) 318.
- 5 K. H. Becker, E. H. Fink, P. Langen and U. Schurath, J. Chem. Phys., 60 (1974) 4623; Z. Naturforsch., 28a (1973) 1872.

## G1

### High Resolution Lifetimes in Excited States

E. W. SCHLAG

*Institute for Physical and Theoretical Chemistry, Technical University of Munich, 8 Munich 2 (F.R.G.)*

We will discuss recent results with naphthalene showing the additional information which can be obtained with high resolution laser experiments. We have demonstrated that it is possible to obtain lifetimes of isolated vibronic states at pressures below 1 Torr with a resolution in the picometer range. For this purpose a tunable high resolution laser is doubled into the U.V. It is shown that a single shot suffices for the entire decay curve hence obviating averaging techniques for these experiments. Isotope effects at high resolution will also be discussed. It will be shown that it is now also possible to populate isolated states in the low pressure limit by two-photon absorption. This allows new states to be reached which have hitherto not even been assigned.

## G3

### Polarization Effects on Fluorescence Measurements

E. D. CEHELNIK and K. D. MIELENZ

*Analytical Chemistry Division, Institute for Materials Research, National Bureau of Standards, Washington, D.C. 20234 (U.S.A.)*

Polarization effects on fluorescence measurements are a function of four independent variables, The first is  $F \equiv S^V/S^H$ , the polarization ratio of the exciting light flux  $S$  which reaches the sample. The second is  $r$ , the emission anisotropy of the sample, which is the polarization "response" of the sample to plane polarized exciting light. The third is  $G \equiv T_V/T_H$ , the emission detection system, which is the ratio of the sensitivities of the emission detection system to vertically and horizontally polarized light. The fourth is  $\alpha$ , the viewing angle, which is the angle between the direction of the propagation of the exciting light and the direction from which the emission is being detected.

The equation which defines the overall relative error which can be obtained due to polarization effects is