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UNIV (ENGLAND) PHYSICAL CHEMISTRY LAB G HANCOCK
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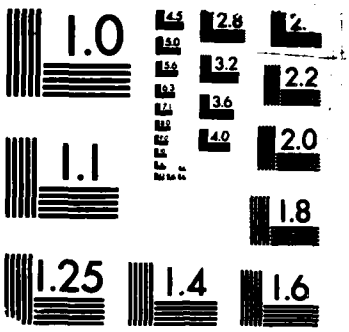

Laser Studies of Gas Phase Radical Reaction

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4th Periodic Report

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Report

1) CF Chemistry

CF has been detected using frequency doubled dye laser radiation (rather than the Raman shifted dye laser radiation reported previously). Radiative lifetime studies have not yet been completed; pulsed production methods of CF have been used to show that conditions can be found under which it will be possible to measure reaction kinetics of the CF + O bimolecular reaction.

2) O + CHF and O + CF_2 reactions

The pulsed Fourier transform infrared emission spectrometer is now complete and is undergoing tests. A dedicated fast transient digitiser is being built and the interface to a microcomputer is complete : this will enable us to take time resolved interferograms of the emission and transform these to obtain time resolved spectra of the ir active components. A graduate student is working full time on this project.

3. Professor J.B. Halpern

As mentioned in the last report, Professor J.B. Halpern from Howard University has been working in the group on the kinetics projects since July 1986 and has been paid expenses of $1,000 per month from July - December 1986. For the remainder of his stay in Oxford (until June 1987) he will receive support from an SERC visiting fellowship. He (together with a student) has completed two projects:

a) measurements of rotationally resolved emission from OH $A\,^2\Sigma^+$ produced in the two photon dissociation of H_2O at 266 nm

b) measurements of Raman scattering from dissociating NO_2 following 355 nm photolysis.

The first of these has shown that OH $A\,^2\Sigma^+$ is produced in the 'coldest' distribution yet observed from H_2O photolysis in this region, and measurements of the polarisation of the radiation are consistent with dissociation taking place from a long lived upper state. The two possibilities ($^1A_1$ or $^1A_2$) cannot be distinguished as the measured polarisation anisotropy is very low and is far removed from the limiting values expected from direct dissociation on these surfaces. The second study (similar in detail to measurements by Kinsey on O_3) shows the symmetry of the upper state and gives a measure of the dissociation lifetime. Both

should lead to publications; Professor Halpern's expertise has helped notably in the success of these projects.

The research plans for the remainder of the contract are substantially as before.

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