V. ELECTRON MAGNETIC RESONANCE*

Academic and Research Staff

Prof. K. W. Bowers

Graduate Students

Nancy H. Kolodny	A. C. Nelson	Y.-M. Wong
C. Mazza	R. S. Sheinson	B. S. Yamanashi
	S. N. Suchard	

RESEARCH OBJECTIVES

Various problems are being attacked by our group.

1. Excited States. We shall study excited triplet states of simple molecules by the combined technique of flash irradiation and electron spin resonance spectroscopy. We have in our laboratory now a spectrometer capable of scanning 100 gauss, or more, in 25 msec, which with a flash discharge (100 to 10,000 joules into a Xenon-filled tube) of comparable duration provides the most powerful method for the study of excited electronic states extant.

2. Collisional Effects. Gas phase relaxation studies of hydrogen atoms with hydrogen molecules (ortho and para separately and together) and other species are being undertaken to learn more about intermolecular interactions. Other atoms in the gas phase will be similarly studied. We are also looking at collisional cross sections of excited alkali atoms (e.g., $^2P_{1/2}$ and/or $^2P_{3/2}$ states) with their ground states.

3. Charge and Energy Transfer. We are studying, via ESR, charge and energy transfer in semiconductorlike materials in solution and in the solid state, to determine the nature of the donor-acceptor complex.

4. Photoionization. Work is being done on the mechanism of photoionization in large molecules in the vacuum ultraviolet.

5. Radicals in the Gas Phase. Work is going forward in the study of the electronic, vibrational, and rotational structure of alkyl radicals (methyl, ethyl, t-butyl, and so forth) in the gas phase from work with gaseous discharges and flash photolysis.

6. Processes Related to Combustion.

7. Structure of Liquids via electron magnetic relaxation in solution.

8. Electronic Structure of Paramagnetic Species from theoretical and experimental approaches.

9. Relaxation Phenomena at the Orbital Point.

K. W. Bowers

*This work is supported by the Joint Services Electronics Programs (U.S. Army, U.S. Navy, and U.S. Air Force) under Contract DA 36-039-AMC-03200(E).