ABSORPTION OF ULTRAVIOLET RADIATION BY MOLECULAR HYDROGEN AND OXYGEN

by

A.J.D. Farmer B.Sc.(Hons).

Department of Physics

A Thesis submitted for the degree of

Doctor of Philosophy

in the

University of Adelaide

April, 1969.

CONTENTS

SUMMARY

This thesis describes experiments carried out to measure absorption coefficients for molecular hydrogen and molecular oxygen in the vacuum-ultraviolet region of the spectrum.

The first four bands of the Lyman system in hydrogen (1060-1130Å) were investigated using a 1 metre, near-normal incidence monochromator having a best resolution of 0·1Å. This instrument was fitted with an argon discharge lamp and photoelectric detection methods were used. The digital data-handling system developed for the experiment is described in detail.

An equivalent width method of analysis was used and from the measured absorption coefficients, absolute values of cross-sections for the rotational lines in the bands were obtained.

Absorption cross-sections for the Schumann-Runge band system in molecular oxygen [(2-0) to (20-0) bands covering the wavelength region 1700-2000Å] were measured using a similar experimental arrangement to that described above. Modifications made to the data handling system to improve the accuracy of the raw data are described. The light source used was an A.C. discharge in hydrogen and

photoelectric detectors were again employed.

Oscillator strengths for the bands were calculated from the measured integrated absorption coefficients and are compared with those obtained by other authors. A comparison is also made between Franck-Condon factors obtained from the derived oscillator strengths in this thesis and various theoretical calculations.