

THE REACTION OF ATOMIC HYDROGEN WITH ETHYLENE.

- by -

Mrs. W. P. B. Pereira.

Girton College, Cambridge.

30
7

A thesis submitted for the degree of Doctor of Philosophy
at the University of Cambridge.

115895



SUMMARY

THE REACTION OF ATOMIC HYDROGEN WITH ETHYLENE

By Mrs. M. P. D. Perera,

Girton College, Cambridge, and the University
of Ceylon.

The mercury photosensitized hydrogenation of ethylene was studied in a flow system to investigate the possible role of hot radicals on the reaction mechanism. Experiments were also carried out to determine the rate constant for the reaction of atomic hydrogen with oxygen; the rate constant for the later reaction is known.

A low pressure mercury lamp was used as the source of resonance radiation and the products were analysed by gas chromatography. Reactions in mixtures of ethylene and hydrogen were studied and the main products were butane, ethane and propane. Their rates of formation were determined and the variation of the ethane to butane ratio was examined under a wide variety of conditions. At very low ethylene pressures the amounts of propane formed were comparable with the ethane and very small quantities of acetone were produced under these conditions. The formation of propane and acetone show that the reaction of atomic hydrogen with ethyl radicals is an important reaction under these conditions and that the increase in the ethane to butane ratio is not due to hot radical effects as had been previously suggested but to the atomic cracking process. The effects of added nitrogen, argon and water vapour on the reaction were studied. Some of these experiments showed evidence for hot radical effects. Variations in the ethane to butane ratio with intensity of light absorbed provided