

SOME PROBLEMS OF THE KINETICS OF DISCHARGE REACTIONS

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This essay is concerned with the kinetics of reactions in electrical discharges through gases that are either effected by, or initiated by, the charged particles present in the gas.

The principal experimental investigations on the kinetics of such reactions which have led to the development of the statistical theory of discharge reaction are recalled briefly before stating some elaborations of the formal analysis that are now seen to be pertinent and which have not been summarized hitherto.

The present state of the theory is then illuminated by outlining some examples of:

- (1) the achievements of the theory in providing a detailed and quantitative interpretation of the values found from experiment for the empirical reaction rate coefficients considered as functions of the discharge parameters,
- (2) the apparent inadequacy of the theory to account for the results of experiment in two gases, and
- (3) the lacunae in the experimental data hitherto available that impede the interpretation of the data in terms of statistical theory: the recognition of these lacunae may pave the way to the better design of experiment and to a more precise understanding of the mechanism of discharge reaction and of the usefulness of electrical discharges in chemical and in electrical engineering.