

developed, in many respects more powerful and of wider application, called "pulse radiolysis." This book is important to chemistry in that it provides the first coherent, systematic description of this technique and of the results it has produced in its first few years.

In pulse radiolysis, a sample of material is exposed to a very short burst (typically a microsecond) of electrons having enough energy to penetrate the specimen (a few million volts) and enough intensity to build up detectable concentrations of reaction products (0.1 amp or more). Light meanwhile passes through the sample to a detector which through fast electronics can follow growth and decay of a light-absorbing species over times which may be as short as a small fraction of a microsecond.

The first third of the book contains a detailed account of the methodology of pulse radiolysis. The remainder, which should appeal to a considerably broader chemical public, is an account of the results obtained by the method up to the beginning of 1968.

A wealth of new information has been obtained on the properties of free radicals of all kinds. In the organic category are many aliphatic radicals too reactive to have been studied by other methods, as well as aromatic types. In the inorganic category, besides the important radicals derived from water, a particularly interesting group is the unstable metallic ions of low valence, such as monovalent zinc, cadmium, and iron.

The study of transient solvated electrons in water, alcohols, and many other solvents is the most surprising achievement of pulse radiolysis. The well-known solvated electron in liquid ammonia may remain in a metastable state for days, but in oxygen-containing solvents it lasts only for microseconds; in the latter case it disappears by reaction with another solvated electron to form a molecule of hydrogen.

A subject not mentioned in the book is the high cost of pulse radiolysis equipment, which has confined it to a relatively few laboratories. However, high-voltage machines of the field emission type are less expensive by an order of magnitude than the more elaborate accelerators originally used. It is the reviewer's hope that further development in high-voltage machinery during the next decade will bring pulse radiolysis within the reach of every well-equipped chemical laboratory.

This book should impel many chemists to take another look at the influence such exotic subjects as radiolysis, fast electronics, and high-voltage machines may have on the chemical laboratory practice of the future.

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