AEC-NASA TECH BRIEF

Production of Solvated Electrons

Current research, both theoretical and experimental, relating to the production and kinetics of interactions of solvated electrons is reviewed (*1*). Particular attention is focused on solvated electrons generated by ionizing radiation in water, alcohols, and organic systems.

The blue color, paramagnetism, and electrical conductivity of solutions of alkali metals in liquid ammonia have long been known. The most satisfactory explanation of the properties of these solutions is in terms of ionization of the metal to its ion and an electron, and subsequent solvation of the ions. The increased electrical conductivity and magnetic properties all support this conclusion, and the concept of a solvated electron can account satisfactorily for the blue color of these solutions.

Early in the 1950's the concept of a solvated electron in aqueous systems, by analogy with ammonia, was introduced in order to explain the properties of the reducing species produced during radiolysis of water. The term "hydrated electron" has gained much favor for the solvated electron in water. During the last decade, considerable data have accumulated to illustrate the validity of the original concept of solvated electrons in the radiolysis processes of polar liquids and possibly of nonpolar liquids also. In the case of the hydrated electron, kinetic data have been most prolific and have stimulated some interesting postulates on kinetics.

Although so much emphasis is placed on solvated electrons in radiation chemistry, they are produced in other chemical processes also. Some of the more important methods of production of solvated electrons, such as from alkali metals in liquid ammonia, water, or alcohols, and their photolytic production are described. The properties and the rate processes of solvated electrons are also described.

Reference:

1. J. K. Thomas, *Methods of Production of Solvated Electrons and Their Chemical and Physical Properties* (Argonne National Laboratory, July 1967).

Notes:

1. Physical, organic, and kinetics chemists will be interested. The effects of radiation-induced reaction may interest the medical and biological professions; they may help understanding of the mechanisms by which genetic transformations and tissue damage are accomplished.
2. Inquiries concerning this innovation may be directed to:

Office of Industrial Cooperation
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
Reference: B69-10430

Source: J. K. Thomas
Chemistry Division
(ARG-10416)

Patent status:

Inquiries concerning rights for commercial use of this innovation may be made to:

Mr. George H. Lee, Chief
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U.S. Atomic Energy Commission
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