2537 Å. For wave lengths as short as 2537 Å., acrylonitrile has been used to detect free-radicals in protein photolysis.[3] However, at concentrations where this molecule successfully traps free-radicals, subsequent polymerization proceeds to such an extent as to change the properties of the solution seriously, and therefore we have, found it unsuitable for quantitative studies.

We wish to report the use of allyl alcohol, water soluble and transparent at 2537 Å., as a scavenger for free radicals formed in the photolysis of hydrogen peroxide and acetone in aqueous solutions. Allyl alcohol proved to be efficient in capturing free-radicals and polymerization was limited to low molecular weight water soluble products which did not appreciably change the properties of the system.

The quantum yield for the decomposition of hydrogen peroxide at 2537 Å. in water solution at high intensity and low concentration, limiting or non-chain conditions, is reported in recent studies as 0.98^4 and $1.00.^5$ In the presence of a free-radical scavenger, the generally accepted mechanism gives a quantum yield which is just half that found in the absence of the scavenger. We have determined the quantum yield at concentrations of H_2O_2 in the range 0.002–0.02 mole per liter at intensities in the range 8–50×10^{-18} quanta per liter per second. At 25° the quantum yield in the absence of allyl alcohol is 0.94 ± 0.06. The quantum yields decreased as the concentration of allyl alcohol increased until a minimum value was obtained for an allyl alcohol concentration of about

(3) E. K. Rideal and R. Roberts, Proc. Roy. Soc. (London), A205, 391 (1951).

(4) J. P. Hunt and H. Taube, THIS JOURNAL, 74, 5999 (1952).

(5) J. H. Baxendale and J. A. Wilson, Trans. Faraday Soc., 53, 344 (1957).

0.001 M. From 0.001 to 1 M alcohol, the highest concentration used, there was no change in the rate of peroxide decomposition. The quantum yield obtained was 0.54 ± 0.05. Evidence that the principal reaction products were three isomeric forms of tetrahydroxyhexane was obtained. This indicates that the mechanism is the addition of hydroxyl radicals to allyl alcohol in either the 2 or 3 position with subsequent association of the resultant diol free-radicals. In fact this process appears promising as a synthetic method for the tetrahydroxyhexanes.

For aqueous acetone systems, knowledge of the photochemistry is much less complete, and the system is more complex. The effect of allyl alcohol on the gaseous products and on the acetic acid formed in solution at 25° are shown in Table I. Irradiation time and intensity were kept

TABLE I

PHOTOLYSIS OF 0.1 M AQUEOUS ACETONE AT 2537 Å.

Allyl alcohol, m./l.	Methane	Ethane	Moles of product $\times 10^4$ Carbon monoxide	Acetic acid
0	1.04	0.26	0.031	0.45
0.06	0.27	.02	.023	.23
0.12	0.13	.01	.013	.03

constant. These results show that allyl alcohol can act as a free-radical scavenger also in this system.

Further work on these systems is continuing and will be reported in a detailed paper.

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RECEIVED DECEMBER 22, 1958

BOOK REVIEWS

Electromagnetic Isotope Separators and Applications of Electromagnetically Enriched Isotopes. By J. KOCH (Editor), University of Copenhagen, R. H. V. M. DAWTON and M. L. SMITH, Atomic Energy Research Establishment, Harwell, and W. WALCHER, University of Marburg/Lahn. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y., 1958. xi + 314 pp. 15.5 × 23 cm. Price, $7.50.

With the increasing interest among nuclear chemistry and physics laboratories in pure isotopic species for critical research applications, the appearance of the above book is both timely and informative. It is not an exhaustive treatise on the engineering details of isotope separator construction, but does contain an account from well-qualified authors on the construction, operation, technique, and research applications of medium size separators as well as chapters pertaining to the large separators at both Oak Ridge and Harwell.

The presentation of the subject matter is well organized. The authors have essentially divided the book into three main headings. The first section is on the history of early equipment and experiments in both natural and radioactive isotope separation, which culminates with a chapter on details of the instruments located in Marburg, Copenhagen, Stockholm, Uppsala, Saclay and Gothenburg. The second section is devoted to large separators in the United States and in Britain and also includes the equipment located at Amsterdam. In this section is a chapter on operational experience in the separation of over sixty of the elements. The chapter on enriched isotope applications is particularly good. Since the literature on applications is prolific, the authors have chosen to expand on a few selected examples such as energy level and scattering studies, neutron cross section work, carrier-free radioactive tracers, and the broad applications to various optical and microwave spectroscopic research. The third section gives a very readable discussion of sector fields and their focusing properties, high current ion source construction, and space charge problems associated with the design of isotope separators.

The book is highly recommended to the potential worker contemplating efforts in this field and to the specialists for the excellent general coverage and a rather complete reference to existing literature.

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