AUTHORS AND PAPERS

The highly condensed summaries of papers and technical notes (below) are intended to assist the busy reader in determining the order in which to read the technical material. Biographical comments are for human interest.

RADIATION AND CHEMONUCLEAR PROCESSES

A survey of chemonuclear and radiation chemical processes, their present state of development, and the factors that affect their potential commercial status, includes suggestions of areas for future research.

Meyer Steinberg (MSChE, Polytechnic Institute of Brooklyn, 1949) is supervisor of the radiation processing section of Brookhaven's Applied Science Department. He has written extensively and holds a number of patents in the fields of chemonuclear reactors, applied radiation chemistry, and fission product waste disposal.

TWO-REGION IRRADIATION CALCULATIONS

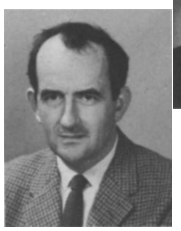
Calculations, using transfer functions, yield the spatially dependent energy spectrum of charged particles entering a process fluid from an adjacent solid-fuel region. Ionization-excitation rates for various fluid-fuel combinations and from differing particles were determined by use of nondimensional plots.

George H. Miley (right) (PhD, University of Michigan) is Professor of nuclear and electrical engineering at the University of Illinois. He is actively engaged in research involving nuclear radiation energy conversion and nuclear reactor kinetics and is the author of a forthcoming ANS monograph on radiation energy conversion. Paul E. Thiess is a research assistant in nuclear engineering at Illinois, completing a PhD thesis on the optical spectra from gases irradiated by alpha particles (equipment in foreground).

SOLVING DIFFUSION-KINETIC EQUATIONS

A simplified technique for solving diffusion-kinetic equations predicts the yields in radiation chemistry reactions. Comparison with experiment demonstrates the usefulness of this technique for both single- and multi-radical models.

F. E. Haskin (left) is a graduate student working toward the PhD degree in nuclear engineering at Kansas State University where he completed his undergraduate studies in 1966. R. E. Faw is Professor of nuclear engineering at Kansas State University. His BS (University of Cincinnati) and PhD (University of Minnesota) are both in chemical engineering.



IONIC AND FREE RADICAL CHAIN REACTIONS

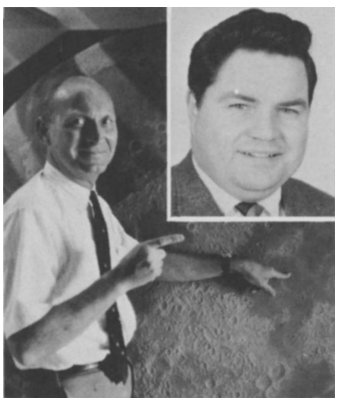
A general kinetic treatment, applicable to ionic and free radical reactions in the radiation chemistry of liquids, permits calculation of the propagation rate constant for ionic polymerization and prediction of the maximum rates and *G*-values obtainable as a function of dose rate.

Donald H. Martin (upper left), presently with Monsanto in Pensacola, Florida, obtained his PhD degree at the University of Tennessee in 1966. R. B. Taylor (right) is now a lieutenant in the US Marine Corps, having left in December 1968 for a tour of active duty in South Viet Nam after obtaining his MS degree from the University of Tennessee. Both wrote theses on radiation-induced reactions. Ffrancon Williams (PhD, University of London) is Professor of chemistry at the University of Tennessee, where he has been since 1961, except for a year's leave as NSF Visiting Scientist to Kyoto University, Japan; his research includes radiation chemistry, photochemistry, and polymer chemistry.

LASER-INDUCED CHEMICAL REACTIONS

Lasers, because of their high peak power, coherence, high degree of monochromaticity, and extremely short pulse, are useful tools in the study of chemical kinetics, photochemistry, and spectroscopy.

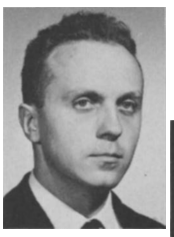
James F. Verdieck, a staff member at the University of Michigan chemistry department, conducts research in photochemistry, including laser-induced chemical reactions, and in hyper-Raman and double-photon absorption spectroscopy. He received his BA at Willamette University and PhD from the University of Wisconsin.



RADIOLYSIS OF CARBON TETRAFLUORIDE

Radiolysis of CF_4 yielded mainly C_2F_4, with N_2, Xe, and C serving as efficient scavengers of fluorine during fission fragment irradiation, while charcoal was the only useful scavenger during gamma irradiation.

Richard N. Gurley (inset), a senior chemical engineer at Babock & Wilcox, is currently involved with nuclear-fuel applications. Material for this paper was gathered while completing his PhD requirements (1967) at the University of Florida where John A. Wethington, Jr. (PhD, Northwestern University) is Professor of Nuclear Engineering. Professor Wethington's nuclear career began in 1943 at the Oak Ridge thermal-diffusion plant.



IRRADIATION OF N_2-O_2-SO_2

The yield of fixed nitrogen was not increased, as hoped, by adding SO_2 to N_2 - O_2 mixtures prior to irradiation at pressures between 10 and 30 atm. Resulting *G*-values were small, seldom exceeding unity.

G. Liuti (upper left) is a professor in the chemistry department of the University of Perugia, Italy, and S. Dondes (lower left) is a senior research associate in chemistry at Rensselaer Polytechnic Institute, where P. Harteck is Distinguished Research Professor of physical chemistry. All hold the PhD degree.

FLUIDIZED BED IRRADIATION OF POWDERS

Electron beam irradiation of powdered methyl cellulose in a fluidized bed resulted in uniform exposure and more efficient beam utilization, since this method required less than half the radiation for the equivalent exposure using conventional thin layer processing.

Bruce W. Wilkinson (left) (PhD, Ohio State University) is associate professor of chemical engineering at Michigan State University and is in charge of the Nuclear Reactor Laboratory. Wayne H. Clifford is a PhD candidate in chemical engineering.

PRODUCTION OF GRAFT COPOLYMERS OF STARCH

Pilot plant studies show economic promise for full-scale production of graft copolymers of acrylamide and acrylic acid to electron preirradiated starch. The product has applications for industrial adhesives, or paper and textile adhesives.

Zoila Reyes (right) a senior organic chemist at the Stanford Research Institute, has worked extensively on photochemistry, chemical- and radiation-induced grafting of vinyl monomers to natural and synthetic polymers, photopolymerization, ultraviolet-, gamma-, and electron-radiation-induced crosslinking of polymers, and radiation effects on polymers; her PhD is from Johns Hopkins University. Carroll F. Clark (center), a chemical enginner at SRI with a BS from Northwestern University, is experienced in process development, fluid dynamics, heat transfer, fire retardants, food processing, desalination of water, and corrosion. Marie Comas (upper left), an SRI organic chemist whose BS is from Iowa State University, has worked on photographic emulsions, photopolymerization, and chemical- and radiation-induced grafting of vinyl monomers to starch. C. R. Russell (lower left), Head of nonstarch products investigations in the USDA's Cereal Products Laboratory at Peoria, is the recipient of a USDA Superior Service Award for "highly creative' fundamental research on . . . chemicals and polymers derived from cereal grains"; his PhD is from the University of Indiana. C. E. Rist (lower right), Chief of the CPL at Peoria and one of the original members of USDA's Northern Laboratory, also received a Superior Service Award for a new process for producing starch and gluten and was a key member of a team that received another such award.