

## BOOK REVIEWS

N. G. GAYLORD, Editor

**Problems in Wood Chemistry.** United Nations Food and Agriculture Organization, Technical Panel on Wood Chemistry, Proceedings of the Seventh Session held in cooperation with the Institute for Fibres and Forest Products Research, Israeli Ministry of Agriculture, April 8-13, 1956, Jerusalem-Haifa, Israel. The Weizmann Science Press of Israel, Jerusalem, 1957. 136 pp., \$6.75. Distributed in the Western Hemisphere by Interscience, New York.

These are the published papers of a seven member panel which is outstanding in special phases of wood chemistry which are still little known or in a general state of flux. The basic plan for the discussions centered around two aspects of the problem of bonding cellulosic materials.

The first is concerned with the nature and location of lignin in wood and woody fibers and also with the problem of the way in which lignin bonds cellulosic cell walls. There are three discussions in this group: H. W. Giertz, "Chemistry, Morphology and Mechanical Properties of the Compound Middle Lamella"; M. Lewin, "The Middle Lamella of the Bast Fibres"; and K. Freudenberg, "The Problem of Carbohydrate Lignin Bonding in Wood." These are especially valuable in light of the little which has been done with lignin in the cell complex, its profound effect on the mechanical and chemical behavior of wood as a solid, and the dependence of mechanical pulping on lignin. Giertz can be commended for the lucid picture he has drawn. The Reviewer's opinion is that it will remain a model explanation for some time to come. Lewin, on the other hand, in discussing a group of natural fibers (flax, jute, ramie, hemp), has been faced with the problem of synthesizing a general picture from dissimilar materials. The heterogeneous experiments discussed and the rather poor botanical explanation cause this paper to suffer in comparison with the one by Giertz. Freudenberg presents a most stimulating concept of the mechanism of the formation of lignin *in situ*. His statement that lignin is apparently deposited alongside the cellulosic components of the wall with only a small fraction combined is only tentative, but most other statements with as much evidence would be more positive.

The second group of papers concerns means for bonding cellulose and the principles of adhesion in wood. The most interesting of these is by H. Mark, "Radiation Chemistry and Wood." This new approach to wood bonding and modification is outlined with an extensive bibliography. The grafting techniques he discusses are of immense interest since, theoretically at least, any regenerated cellulose with low chain length could be improved and the degradation of wood cellulose caused by treatment could be reversed. The second discussion by Mark, "A Few Principles of Adhesion," prepares the way to an understanding of the applications of materials used to adhere cellulose surfaces. The two papers:

E. C. Jahn, "Expanding Wood Utilization Through the use of Resins"; and E. Ott and C. A. Heiberger, "New Developments in Synthetic Resin for Wood Adhesives," are very useful presentations of rapidly changing commercial practice. The twenty-three page abstract review of recent literature on synthetic adhesives for wood, appended to the latter paper, forms a valuable reference.

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**The Effects of Ionizing Radiation on Natural and Synthetic High Polymers** (*Polymer Reviews, Vol. I*).

FRANK A. BOVEY. Interscience, New York-London, 1958. xiii + 278 pp. \$8.00.

Dr. Bovey has undertaken the task of writing the first volume in a new series of textbooks on Polymer Reviews. The result is an excellent, critical review of the radiation chemistry of high polymers. The author has made no attempt to prepare an exhaustive monograph or literature compilation which can be found elsewhere but rather to present an integrated and coherent summation of the more significant research accomplished in this new field. The present state of knowledge is presented with clarity and brevity, and the many gaps that exist in our knowledge of the subject are made conspicuous to the reader.

Following two opening chapters on the properties of ionizing radiation and chemical effects produced by ionizing radiation, a general discussion is presented on radiation chemistry of polymers including effects of oxygen and various chemical agents on changes in physical, chemical, and electrical properties of polymers. The subject of scission and crosslinking occurring under ionizing radiation is treated in a separate chapter followed by six chapters on radiation effects in various classes of polymers; viz., polyhydrocarbons, acrylics, fluorinated polymers, rubbers, condensation polymers, and, lastly, natural occurring high polymers and their derivatives. The largest chapter in the book is devoted to the natural polymers, including carbohydrates, proteins, nucleic acids, and viruses, and should be of considerable value to many readers since there is so little organized literature on this subject from the polymer chemist's point of view.

The textbook should serve at least a twofold purpose, being for the polymer chemist a source of unifying concepts in a difficult and new field and for those interested in radiation chemistry in general, a straightforward presentation of effects observed in macromolecular systems which must have some relation to the radiation chemistry of small molecules.

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