

FIFTH ALL-UNION CONFERENCE ON THE CHEMISTRY
OF LIGNIN

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The Fifth All-Union Conference on the Chemistry of Lignin, organized by the Division of General and Technical Chemistry of the Academy of Sciences of the USSR, the Scientific Council on the Problem of the Chemistry of Wood and Its Main Components, the Institute of Wood Chemistry of the Academy of Sciences of the Latvian SSR, and the D. I. Mendeleev All-Union Chemical Society was held in Riga on October 27-29, 1971.

More than 300 scientific workers from 53 scientific-research institutes and colleges (from 29 towns) of the Soviet Union took part in the work of the conference. There were 80 lectures on the results of investigations on individual questions of the chemistry and technology of lignin.

The conference was opened with a lecture by S. M. Manskaya on the lignin of the cell wall in the evolution of a number of plants. The lecturer observed that in the investigation of mineralized fossil plant residues and also of some representatives of the algae, mosses, club-mosses, Filicales, and coniferous plants a change in the structure of the lignin macromolecules in the evolutionary process had been found.

Academician of the Academy of Sciences of the Latvian SSR V. N. Sergeeva and Z. N. Kreitsberg reported that the biolignins of the middle lamella of coniferous and broad-leaved trees have higher molecular weights than the lignins of the secondary wall.

Several lectures (those of N. N. Shorygina, G. V. Davydov, and T. S. Sdykov, the Institute of Organic Chemistry of the Academy of Sciences of the USSR, and of B. D. Bogomolov of the V. V. Kuibyshev Archangel Institute of Wood Technology) were devoted to questions of the isolation and study of lignin and lignin-carbohydrate complexes and to an investigation of the chemical bonds of lignin with carbohydrates. These workers have synthesized a number of phenol gluco- and xylopyranosides with aglycones modelling the structural unit of lignin. It has been found that the phenol glycosidic bond is less stable in the case of the xylopyranoses than the glucopyranoses.

Kh. A. Abduazimov and his colleagues (Institute of the Chemistry of Plant Substances of the Academy of Sciences of the Uzbek SSR, Tashkent), on studying the dynamics of the accumulation of lignin in the cotton plant in relation to the vegetation periods, have established that with the growth of the cotton plant the amount of lignin increases and it becomes more highly methoxylated.

Some lectures gave the results of studies of the physicochemical properties of lignin using modern methods of investigation (IR, UV, NMR, ESR, and mass spectroscopy). A number of workers have used the method of the gel filtration of the lignins on Sephadexes. As a result, low-molecular-weight lignins have been obtained. These methods, in association with classical organic chemistry, have made it possible to understand lignin more widely.

Great interest is presented by the investigations performed under the direction of V. M. Nikitin, Yu. N. Nepenin (S. M. Kirov Leningrad Institute of Wood Technology), B. D. Bogomolov, and others on questions of the delignification of wood in alkaline and sulfate cooks as a function of the temperature, the influence of the cooking time, ultrasonic irradiation, the reagents, and other factors.

Translated from *Khimiya Prirodnykh Soedinenii*, No. 1, pp. 140-141, January-February, 1972.

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The lecture by V. M. Reznikov (S. M. Kirov Belorussian Technological Institute, Minsk) on nucleophilic substitution at the α -carbon atom of guaicylglycerol structural units of lignin caused a lively discussion. M. I. Chudakov and his colleagues (Leningrad) reported that the quinone nitropolycarboxylic acids obtained in the nitric-acid oxidation of hydrolysis lignin are effective plant growth stimulators.

N. P. Mikhailov (Institute of Organic Chemistry of the Academy of Sciences of the USSR), studying the products of the decomposition of spruce lignin by sodium in liquid ammonia has used gas-liquid chromatography with success. This has enabled him to show the presence in them of, in addition to phenols previously identified, a considerable amount of derivatives of p-hydroxyphenylpropane and about 10 other monomeric compounds.

More than 20 monomeric phenolic compounds have also been identified by gas-liquid chromatography in the products of the thermal decomposition of broad-leaved and coniferous lignins (I. Z. Krishbaum et al., Institute of Wood Chemistry of the Academy of Sciences of the Latvian SSR).

The use of new constructional materials based on technical lignin and their wide use in agricultural building was discussed by V. M. Selivanov (Siberian Technological Institute). A lecture on the production of fodder biomass from hydrolysis lignin was given by M. I. Chudakov et al. The use of the coke obtained from hydrolysis lignin in the metallurgical industry has been proposed. The use of phosphorylated and sulfochlorinated lignins as flotation reagents with a selective action on nonferrous and rare metals was suggested by L. A. Pershina (Tomsk Polytechnic Institute). Pilot-scale industrial tests of the use of sulfate lignin in the production of tyres and technical articles from rubber have been performed (V. D. Bogomolov). L. N. Mozheiko, V. R. Yaunzems, and others have synthesized a number of new nitrogen-containing derivatives of lignin and have studied the possibility of their use as adhesives and ion-exchangers.

The lectures delivered at the conference caused great interest. The results of the discussions of the lectures showed that investigations directed to the most urgent problem of understanding the structure of lignin and its practical use are being performed in academic institutes, some college departments, and in sectors of scientific-research institutes.

In the concluding part of the conference, Academician of the Academy of Sciences of the Latvian SSR A. I. Kalnin'sh wished the participants in the conference further success in the discovery of the secrets of the biosynthesis and structure of lignin in order to achieve its effective utilization. A resolution was passed at the conference to hold the Sixth Conference on Lignin Chemistry in Riga in 1975.