

OTS: 60-31,687

JPRS: 3729

18 August 1960

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FIRST ALL-UNION CONFERENCE OF INSTITUTIONS OF HIGHER LEARNING  
ON THE CHEMISTRY OF FURAN COMPOUNDS

- USSR -

by G. Z. Yakovenko

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205 EAST 42nd STREET, SUITE 300  
NEW YORK 17, N. Y.

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JPRS: 3729

CSO: 4009-D

FIRST ALL-UNION CONFERENCE OF INSTITUTIONS OF HIGHER LEARNING  
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[Following is a translation of an article by G. Z. Yakovenko in the Russian-language periodical Gidroliznaya i Lesokhimicheskaya Promyshlennost' (Hydrolysis and Wood Chemistry Industry), Moscow, No. 1, 1960, p. 30]

The first All-Union Conference of Institutions of Higher Learning on the Chemistry of Furan Compounds was held in Saratov at the end of October, 1959.

The conference was organized by the Chernyshevskiy State University in Saratov and commemorated the 50th anniversary of the university.

The conference enjoyed the participation of more than 100 delegates from different educational institutions, research institutes and agencies of Moscow, Leningrad, Saratov, Riga, Kharkov, Tashkent, Minsk, Tiflis, Kishinev, Krasnodar, Dnepropetrovsk and Ternopol'. The delegates represented more than 25 institutions dealing with problems related to the study and processing of raw material containing pentosan and to the production of furfural and its derivatives.

N. I. Kuybina (NIIGS) (Research Institute of the Hydrolysis and Sulfite Liquor Industry) reported on results of studying raw material containing pentosan. An analysis was made of 50 samples of birch wood grown in different areas of the USSR. In addition a study was made of the composition of tanning waste, cotton stalks, reed stems (Kuban'), rice hulls, ground poppy heads and anabasis. All these plant wastes were suitable for commercial production of furfural.

Reports on the processing of raw material containing pentosan to produce furfural were given by V. G. Panasyuk and V. P. Repka (Dnepropetrovsk Agricultural Institute). Using a thermal method at a pilot installation operating at the Dnepropetrovsk Oil and Fat Combine, they produced furfural as well as acetic acid, methanol, acetone, phenol and activated charcoal from agricultural waste.

L. L. Shil'nikova (NIIGS) talked about a new method for the compound processing of raw material for the production of furfural.

A study was made of the rate of decomposition of carbohydrate components containing furfural and resistant to hydrolysis. It was determined that in order to preserve the cellolignin the maximum

permissible decomposition of the substances forming furfural must not exceed 85% of the total amount. In pentose-hexose hydrolysis the raw material is soaked in a 2-8% solution of sulfuric acid with a 0.3:1 coefficient and a processing temperature of 160-190 degrees. Hydrolysis of the cellolignin takes place with a coefficient of 11, temperature 170-190 degrees, sulfuric acid concentration of 0.5-0.7% and percolation period of 180 minutes. The table shows data obtained under pilot plant conditions.

Type of raw material	Furfural yield per ton of abs. dry raw material in %	Furfural concentration in condensate, in %	RV yield per ton of abs. dry raw material in %	Consumption of H <sub>2</sub> SO <sub>4</sub> per kg of furfural, in kgs	Consumption of steam per ton of furfural, in tons
Sunflower seed hulls	7.0	2.5	21	0.34	} 23 - 28
Corn cobs	14.0	3.2	28	0.13	
Birch wood	8.5	2.8	26	0.07	

A. A. Shcherbakov (Ternopol' Medical Institute) reported on the effect of the degree of swelling of the plant waste on the furfural yield.

Plant waste was ground and acted on by solvents. The greatest degree of swelling of raw material was caused by: 10% solution of sulfuric acid (from 50 to 110.8%), water (from 38 to 104.6%), ethylene glycol (from 25.8 to 65.5%). Experiments have shown that raw material swollen in advance gives a greater furfural yield than ordinary material. While in control experiments (without swelling) the furfural yield was 13.94% preliminary swelling in water in hydrolysis in a 10% solution of sulfuric acid, for example, raised it to 17.28%. A. A. Shcherbakov determined that in addition certain additives to the furfural retard its oxidation (inhibitors have been found). Least subject to oxidation were samples of furfural with an addition of 0.01% of its quantity of any of the following substances: paraaminophenol, ascorbic acid or hydroquinone.

V. I. Tikhonova (Saratov Medical Institute) reported on the use of furfural in studying the reactive capacity of carbonyl compounds by colorimetric and chronometric methods.

A study was made of the relative activity of methyl ketones in condensation with furfural. It was found that a change in the ketone concentration (with a constant aldehyde concentration) has no effect on the length of the reaction but only varies the intensity of the coloring; the length of the reaction is inversely proportional to the concentration of the aldehyde and the catalyst.

S. I. Spiridonova (Saratov Veterinary Institute) reported on the use of furfural as a turbidity indicator in quantitative analysis. Quantitative determinations can be made in acid, alkaline or neutral media of multicomponent systems. If there is titration with water with a turbidity indicator (furfural) to the determined maximal limit of concentration of the component being analyzed we have a linear dependence between the volumes of the water added to the limit of turbidity and the concentration of the substance being determined.

The greatest number of reports dealt with problems in the chemistry of furan and the synthesis of new compounds on the basis of furfural derivatives. The reports mentioned the production of amino and oxy acids through furan derivatives, the synthesis and conversion of mono- and diaminomethyl furans, the synthesis of nitro-furan derivatives, etc. These works are of both practical and theoretical interest for the production of plasticizers and emulsifiers. It was reported, in particular, that 4,5-furan oxide with maleic anhydride can be a more powerful defoliant than endothal.

A. A. Ponomarev, M. D. Lipanova and others presented from Saratov University 8 reports devoted to problems in synthesis: of saturated furan ketones from unsaturated by hydrogenation, potentially biologically active substances, ethyl ether and certain derivatives of acetaminopyromucic acid, electrolytic alkoxylation of furans with a functional group in the side chain, etc.

A great number of reports on the production of therapeutic preparations from furan and its derivatives were presented by personnel from the Institute of Organic Synthesis of the Latvian Academy of Sciences.

Many scientists reported on their work in using furfural to produce plastics, glues, film-forming polymers, resins for different purposes, etc.

The conference adopted a resolution approving research in the development of a theory of furan compounds and their commercial use. The resolution stated that for purposes of better coordination of research and the most rapid incorporation of results into industry it would be practical for all work done to be headed by the State Committee on Chemistry of the Council of Ministers of the USSR while the direction of hydrolysis plants producing furfural would be under the administration of the chemical industry of the economic councils.