

BRIEF COMMUNICATIONS

CARBOHYDRATES OF *Aerva lanata*

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The biennial plant *Aerva lanata* Juss., family Amaranthaceae, grows mainly in the tropics and subtropics. It is used in the East as a diuretic and antihelminthic agent [1].

This plant does not grow in the Soviet Union but work on introducing it into cultivation is proceeding. The flavonoids from the herbage of *A. lanata* have been studied [1], and β -sitosterol, α -amyrin, and β -sitosteryl palmitate have been obtained [12].

In the present communication we give the results of a study of the carbohydrates of *A. lanata* growing in the introduction section of the F. N. Rusanov Botanical Garden of the Uzbek SSR Academy of Sciences and collected in the flowering-incipient fruit-bearing phase.

The air-dry comminuted raw material (leaves and flower heads) was extracted with 96% ethanol. The carbohydrates were isolated by fractional extraction successively with water, a mixture of oxalic acid and ammonium oxalate, and alkalis with different concentrations [3]. To determine their monosaccharide compositions, the polysaccharides (PSs) were subjected to complete acid hydrolysis (2 N H_2SO_4 , 100°C, 10-24 h) with subsequent identification of the monosaccharides by paper chromatography and gas-liquid chromatography in the form of aldononitrile acetates [3] using authentic monosaccharides as standards. The results obtained are given in Table 1.

The polysaccharides isolated in the acid medium were present in large amount in comparison with the water-soluble polysaccharides. These fractions gave a blue coloration with iodine, indicating the presence in them of a glucan of the starch type. Its hydrolysate consisted of galacturonic acid and neutral sugars.

The alkali-soluble polysaccharides [hemicelluloses (HMCs)] were present in considerably smaller amounts than the other polysaccharides. The fractions isolated by 7 and 15% solutions of NaOH differed by their quantitative contents of monosaccharides. Glucose was their main component, while in the HMCs it was xylose.

Thus, fractionation showed that the carbohydrate contents of the epigeal part of *A. lanata* includes water-soluble polysaccharides, an acid polysaccharide, starch, and hemicelluloses.

TABLE 1

Extractant	Monomeric composition of the carbohydrate, % on the total PSs						
	yield of PSs, %	galactose	glucose	mannose	xylose	arabinose	rhamnose
Water	1.5	21.75	25.44	19.73	Tr.	11.89	21.16
0.5% solution of $C_2H_2O_4$ + $(NH_4)_2C_2O_4$, 70°C	3.8*	51.42	20.0	10.7	Tr.	7.14	10.7
7% NaOH							
HMC-A	2.0	8.44	83.56	1.85	2.22	3.89	Tr.
HMC-B	3.2	3.86	17.4	8.7	67.69	2.32	Tr.
15% NaOH							
HMC-A ₁	2.3	7.05	75.50	6.77	9.02	1.55	Tr.
HMC-B ₁	1.4	16.79	48.09	10.68	7.63	16.79	Tr.

*Without taking the uronic acid into account.

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ACTIVITY OF MODIFIED CATALYSTS IN HYDROGENATION OF XYLOSE TO XYLITOL

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Xylitol and its derivatives are widely used in many branches of industry. One of the methods of obtaining xylitol is the catalytic hydrogenation of the xylose present in the hydrolysates of agricultural wastes.

In laboratory practice and also in the chemical industry, the skeletal alloy catalysts developed by Raney and by A. A. Bagg [1, 2] have come into wide use. In numerous publications, catalysts for the hydrogenation of monosaccharides and, especially, glucose and xylose are described in which to Raney nickel are added alloying components - chromium, titanium, molybdenum, magnesium, cobalt, palladium, etc. - which frequently not only raise the activity and selectivity of the catalyst but also make it more resistant to poisoning by various impurities and to changes in the parameters of the process [3, 4].

We have investigated the influence of modifying additives on the activity of a nickel-aluminum catalyst. A number of laboratory modified catalysts have been prepared. Leaching out was carried out with 10% solution of caustic soda at $95 \pm 3^\circ\text{C}$, the degree of elimination of aluminum being 40%.

The catalysts were tested in a 0.25-liter Bergius autoclave. A 15.6% aqueous solution of xylose was subjected to hydrogenation. The ratio of catalyst to xylose solution was 1:25. Hydrogenation was performed at 100°C and a pressure of hydrogen of 10 MPa, and the process was considered complete when there was no further absorption of hydrogen for an hour. The results obtained are given below; an industrial nickel-titanium catalyst was tested beforehand as standard:

Catalyst	Time of hydrogenation, h	Dry matter, %	Reducing substances, %	pH
Al-Ni-Ti (ind.)	8	15.2	0.21	5.5
Al-Ni-Cd	3	15.2	0.08	5.8
Al-Ni-Mo	3	15.2	0.06	6.1
Al-Ni-Ce	2	15.4	0.04	5.9
Al-Ni-La	2	15.2	0.09	5.6
Al-Ni-Mn	3	15.5	0.09	5.8
Al-Ni-Cr	5	15.6	0.12	5.6
Al-Ni-Mo-Cd	4	15.6	0.10	5.4

In the hydrogenation of xylose in the Bergius autoclave the industrial nickel-titanium catalyst did not exhibit a high activity. The inclusion of modifying additives in it led to a rise in activity and the residual amount of reducing substances (determined by the Makken-Shoorlya method) fell, which indicated a fairly high hydrogenating capacity of the modified catalysts. Simultaneously, the hydrogenation time was shortened from 8 to 2-5 h.

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