THE CHEMICAL COMPOSITION OF THE BARK OF LARIX SIBIRICA

N. D. Barabash and É. D. Levin

Khimiya Prirodnykh Soedinenii, Vol. 6, No. 3, pp. 386–387, 1970

UDC 634.0.38

In order to study the chemical composition of the bark of Larix sibirica Ldb. (Siberian larch), we ground 150 kg of the bark and took 2-kg samples, which were analyzed by known methods [1–2]. The content of ash materials, including sulfur and phosphorus, was determined by combustion, nitrogen by the Dumas method, and tannides, resins, and fats by aqueous ethanolic extraction. The content of all the other components was determined in the raw material freed from resins, fats, and tannides. The amount of hexosans was determined by fermentation of the hexose sugars, the amount of cellulose by Kürschner and Hoffer's method, and the pentosans by Tollens' method. The content of pentasons was calculated with a correction for the furfural formed from the uronic acids, and the uronic acids were determined by decarboxylation with 19% HCl. The total amount of methoxy groups was found by the Zeisel method as modified by Vieböck, that of acetyl groups by Artsibasheva and Favorskii's method, and that of readily and difficultly hydrolyzable polysaccharides by the method of Kizel' and Semiganovskii [1, 2]. The content of lignin was determined by Koenig's method with 72% H_2SO_4. One of the difficulties encountered in the isolation of the lignin from the bark was that in the usual determination of it with 72% H_2SO_4 the residue contained not only lignin but a certain amount of other substances: suberin (a complex of hydroxy acids) and high-molecular-weight phenolic acids [3] whose content in the bark is fairly high. To eliminate these errors and achieve an independent determination, the suberin was previously extracted from the bark. It was readily saponified by a 3% ethanolic solution of KOH with the dissolution of the saponification products in hot ethanol. The phenolic acids were extracted by repeated treatment of the bark residue with 1% NaOH at 90° C. The amount of lignin in the residue was determined by Koenig's method. Each determination was carried out not less than three times. When similar results were obtained, the mean value was calculated; the differences between duplicate analyses did not exceed 0.9% rel.

Below we give the chemical composition of the bark of Larix sibirica (% based on the initial absolutely dry bark) taking into account the factor for aqueous ethanolic extraction,

Components of the bark	Content, %	Components of the bark	Content, %
Total ash	2,42	Pentosans in the cellulose	2,40
Including		Hexosans	6,05
sulfur	0,19	Uronic acids	7,60
phosphorus	0,03	Pentosans (without uronic acids)	4,50
nitrogen	0,90	Suberin	7,16
Substances extractable by water	11,80	Phenolic acid	13,30
Tannin substances in the extract	8,24	Methoxy groups in phenolic acids	2,56
Ash in the extract	0,99	Lignin	21,20
Substances extractable by ethanol	8,30	Methoxy groups in the lignin	12,20
Methoxyl groups	6,40	Readily hydrolyzable polysaccharides	7,60
Volatile acids	0,99	Difficultly hydrolyzable polysaccharides	23,72
Cellulose	22,90		

Thus, the bark is a complex combination of chemical substances of different characteristics. In addition to the components present in the wood, the bark contains extractive substances (43% tannides), suberin, and phenolic acids. Consequently, the bark can be used in a number of branches of industry. Thus, it is apparently desirable to extract the suberin and tannides and to subject the tan waste to pyrogenic treatment. Preliminary experiments on the pyrolysis of the tan waste has shown that it is possible to obtain from it the same products as from the bark with some change in their yields [4].

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22 June 1969

Siberian Technological Institute