

24. Arabinoxylan – basic polysaccharide of flax (*Linum Usitatissimum L.*) seeds

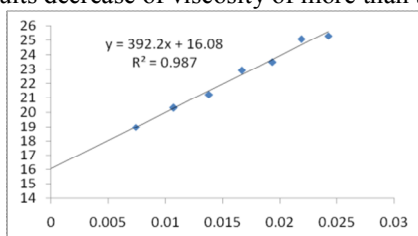
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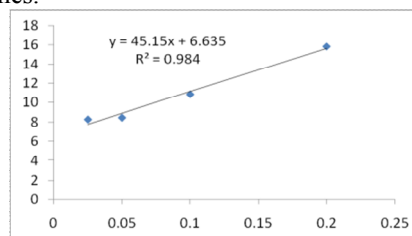
Introduction. The main polysaccharide of flax (*Linum Usitatissimum L.*) seeds is arabinoxylan. The unique natural structure of the grafted arabinose and xylose copolymer provides it with water-retaining and mucus-forming properties that are valuable for the food industry. Arabinoxylan is interesting for obtaining dietary, functional or lean products [1]. The aim of the study was to isolate preparations of pure arabinoxylan in order to study the effect of this unusual polysaccharide on various food systems.

Materials and methods. Flax seeds with a relative humidity $H_R = 3.6 \pm 0.6\%$ were extracted with a mixture of solvents. Polysaccharide was precipitated from extract in the form of fibers, which were dried in air for 3-5 days. Electrophoresis of 1.0...3.0% solutions of arabinoxylan was carried out in a U-shaped tube at a field strength of 100V/m. The molar weights of the arabinoxylan preparations were determined viscosimetrically.

Results and discussion. Diluted extracts of arabinoxylan, obtained from whole flax seeds, have a very high viscosity. The grinding of the fibers to the state of a fine powder results decrease of viscosity of more than two times.



a. Viscosity (y) of AX-solutions (x, %) from native fibers



b. Viscosity (y) of AX-solutions (x, %) from mechanically crushed fibers

This proves that when the fibers of natural arabinoxylan are crushed, chemical destruction of the macromolecules constituting them takes place. Arabinoxylan is not a charged polysaccharide. Therefore, the activity of the extract of arabinoxylan in the electrophoretic field was unexpected. The solution divided into a liquid and a solid phase near the anode. The calculation by the Helmholtz-Smoluchowski equation shows a significant deviation of the sliding potential from zero: $\zeta = -83.0 \pm 1.2\text{mV}$. We assume that this is an apparent zeta potential, showing the negative charge of adsorbed impurities.

Conclusions. Natural arabinoxylan is isolated from whole flax seeds in the form of long fibers, much larger than the seeds themselves. A promising method of purifying arabinoxylan is electrophoresis. The molecular weight of the natural polymer is over 600kD. Decrease of viscosimetric molecular weight in 2.0...3.0 times take place at mechanical grinding. Crushed AX-fibers manifest high water-retention properties.

References

1. W. Li, H. Hu, Q. Wang, Ch.S. Brennan. Molecular Features of Wheat Endosperm Arabinoxylan Inclusion in Functional Bread. 2013, *Foods*, 2, pp. 225-237.