

## Synthesis of minor derivatives of lactose

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Physical and chemical and biotechnological properties of lactose allow to transform its molecule into very different derivatives as well as to consider it as the sugar of life for the components of the functional products and medical drugs.

The innovative biochemical technologies for production of fucose containing carbohydrate complex and tagatose containing sweetener from the secondary milk raw material lactose are developed. The qualitative and quantitative composition of the obtained concentrates containing minor carbohydrates is determined with the application of HPLC method on different stages of the lactose directed transformation process.

The flavor profile of tagatose is nearly similar to the one of saccharose and fructose. Its sweetness accounts for 0.92 rate of SES, calorific value is 1.5 kkal/g, glycaemic index is 3%.

Fucose as an active food component has major influence on human physiological functions. The prebiotic effect is manifested by the selective growth stimulation, and by the increase of the metabolic activity of one or several groups of intestinal bacteria. Moreover, fucose provides some immunostimulatory effect, suppressing allergenic factors at the same time and it is characterized for low caloric value – 1.6 kkal/g.

The glucose oxidase method discovered the kinetic parameters of lactose hydrolysis process: the maximum speed and the order of the chemical reaction. The optimal parameters of lactose hydrolysis in the ultrafiltrate of sweet whey by the enzyme instrument of  $\beta$ -galactosidase Lactozym -6500 L HP-G: temperature 37°C, pH 6,2 were calculated.

As a result of lactose hydrolysis, the received galactose was modified into tagatose and fucose. Tagatose is obtained by isomerisation of D-galactose in a hydrolysed reverse osmotic concentrate in presence of 25% calcium hydroxide solution (a chloride calcium catalyst) for two hours. In the initial phase of transformation of D-galactose molecule under the influence of the base an intermediate unstable enol form, turning into enolate-anion is formed.

For fucose synthesis, D-galactose obtained as a result of enzyme hydrolysis of lactose was exposed to interaction with tosylhydrazide in ethyl alcohol with the formation of tosylhydrazone-D-galactose complex that was restored in the presence of sodium borohydride up to its initial fucitol alcohol. The precipitation formed was filtered. Fucitol was exposed to enzyme changing by flavin adenine dinucleotide (FAD) with fucose production.

## Biography

Sabukhi Niftaliev has completed his PhD at the age of 27 years and Doctor of Science at the age of 36. He is the head of department of inorganic chemistry and chemical technology Voronezh State University of Engineering Technology. He has published more than 70 papers in reputed journals and 20 patents for inventions.

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