THE STUDY OF MECHANOChemistry PROCESSES DURING THE DEVELOPMENT OF CRYOGENIC TECHNOLOGY OF NANOPowders FROM TOPINAMBOUR WITH PREBIOTIC PROPERTIES

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The processes of mechanochemistry are studied during the development of cryogenic technology of obtaining additives in the form of Nano powders from topinambour with prebiotic properties.

The cryogenic technology differs from traditional technologies by the absence of steam-treatment and is based on deep processing of herbal raw materials. The technology includes cryogenic "shock" freezing, cryomechanodestruction and sublimation drying. It is shown that the complex effect of these processes leads to the destruction of biopolymers to monomers (45...55%) and to a more complete extraction of biologically active substances (1,8–2,3 times) from raw materials.

It is determined that Nano powders of topinambour exceed the world-known analogues by chemical composition, the record content of biologically active substances and dispersed sizes. In addition, a significant portion of the substances (biologically active substances and biopolymers) is in nanoscale form. It is shown that insoluble biopolymers of topinambour (proteins, inulin, cellulose, etc.) are transformed into the soluble form (45...55%) to the separated monomers (fructose, α-amino acids, glucose) in nanoscale form (molecules of α-amino acids, fructose and glucose with the dimensions of 0,8...1,0 nm).

It is determined that the influence regularities and mechanisms of fine-dispersed grinding on transformation of the tied amino acids in protein to free soluble form due to mechanolysis of protein molecules (45...55% to the separated α-amino acids). It is discovered that mechanism of mechanodestruction of protein molecules and its Nano associates or Nano complexes with other biopolymers and biologically active substances is connected with mechanocracking.

Keywords: mechanochemistry, cryomechanodestruction, Nano powders, topinambour, cryogenic "shock" freezing, probiotics.