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Технологія кріосублімаційного фракціонування у виробництві біологічно активних лікувально-столових вод

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Technology of Cryosublimation Fractionation in Production of Biologically Active Curative-Table Waters

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The technology of cryosublimation fractionation for biological raw materials, developed for the first time at the Institute for Problems of Cryobiology and Cryomedicine of the NAS of Ukraine (IPC&C of NAS of Ukraine), was used to obtain a completely new type of curative-table waters. The experiments were performed in Jerusalem artichoke, carrot roots and feijoa fruits, fresh-frozen and cryo-crushed in liquid nitrogen vapors at –80°C. Cryogenic grinding was performed with a cryomill, described in [Osetsky, 2008]. For further cryosublimation fractionation we used the device designed at the IPC&C of the NAS of Ukraine [Osetsky, 2020] with cascade desublimators.

The aqueous fractions of Jerusalem artichoke with different inulin content, aqueous fractions of feijoa with different iodine content and those of carrots with different β-carotene one were isolated during alternating desublimation of low molecular weight streams.

The inulin, iodine and β-carotene contents in the studied samples were determined spectrophotometrically. For this purpose, 1 cm^3 of the test solution was supplemented with 7.0 cm^3 of 77% sulfuric acid solution, cooled with ice 10 min later, supplemented with 0.1 cm^3 of 10% thymol solution in ethyl alcohol, introduced with 0.9 cm^3 of water and warmed for 20 min at 100°C. The solution was cooled with ice. Twenty-five minutes later, the optical density of the resulting solution was measured with SF-46 spectrophotometer at a wavelength of 513 nm, using cuvettes with a layer thickness of 10^{-2} m. Each analysis was performed in five replicates. To determine the inulin content in the powder, a weighed sample of 0.5 g was taken with an accuracy of 0.001 g, added with 500 cm^3, and kept for 10 min in a water bath. The solution was filtered and used to measure the inulin content according to the described above procedure.

As a result of research, the inulin content in sublimated objects was determined to be (0.124 ± 0.004) g/l and (4.43 ± 0.13) g/100 g for aqueous fraction and powder, respectively.

At the same time, the experiments were carried out to determine the shelf life for both isolated aqueous fractions and their compositions with filtered mineral water 'Berezivska' in 1/2, 1/5, 1/10 ratio within temperature range of 20…25ºC. The experiments showed a high stability of tested samples within 12 months, *i. e.* neither fermentation signs, nor precipitation were observed.

These findings are the basis to develop and produce the curative-table waters of a new type. Such waters may be used for preventive and maintenance therapies in various diseases.