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DESCRIPTION OF THE TECHNOLOGICAL PROCESS BIOLOGICALLY ACTIVE FOOD SUPPLEMENTS (BAA) "LIK" VEGETABLE OILS

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Abstract

This technological instruction applies to biologically active food supplements (BAA) “LIK” vegetable oils, produced from oils obtained by cold pressing, preserving the nutritional and biological value, released in soft gelatin capsule form, intended for sale through special sections of grocery stores and over-the-counter sections of pharmacies as a biologically active food supplement (hereinafter referred to as BAA).

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Introduction

A soft gelatin capsule is a dosage form with a sealed, elastic gelatin shell containing a liquid or semi-liquid filler. This modern form for medications, dietary supplements, and cosmetics ensures protection of the active ingredient, improved bioavailability, and masking of unpleasant tastes and odors. Features: Composition - The shell is made of gelatin, plasticizers (e.g., glycerin), and water. Filling - The capsule contains liquid or semi-liquid substances, such as oils, vitamins (D, E), suspensions, or solutions.

Benefits: Bioavailability - Increases the rate of absorption and bioavailability of active ingredients. Convenience - Easier to swallow than tablets due to the soft texture. Protection: The sealed shell protects the contents from the external environment, including ultraviolet light. Masking - Conceals the unpleasant taste and odor of the active ingredients. Typical shapes - Most often oval or oblong, less commonly round.

SGC) technology involves forming, filling, and hermetically sealing a flexible gelatin shell, typically containing liquid or semi-solid substances. The primary method is rotary molding , where two gelatin ribbons, made from molten gelatin, simultaneously pass through rotating dies, where half-shells are formed , which are then filled with the active substance and sealed. The capsules are then washed, dried, and packaged. Production steps: Gelatin mass preparation - A mixture of gelatin, water, and plasticizers (e.g., glycerin) is prepared. Gelatin ribbon production - The molten gelatin mass is fed to cooled rollers, where two parallel, strong, and flexible gelatin ribbons are formed.

Forming and filling: The capsules pass through rotary dies, which form the capsule halves into hollows. Simultaneously, a wedge-shaped device doses the capsule contents into these halves. Sealing and cutting: The two halves are aligned, and the die hermetically seals the capsule while simultaneously cutting

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it along the contour. Drying: The capsules are cooled and then dried in special chambers with circulating air to remove moisture. Polishing and packaging: After drying, the capsules can be polished with Vaseline oil, washed, and packaged in airtight blisters or jars.

Key Features: Flexible Shell - A shell containing gelatin and plasticizers provides flexibility and strength to the capsule, making it easier to swallow than tablets. Solid Shell - MLCs have a solid shell that is formed and filled simultaneously. Suitable for Liquids - This technology is ideal for encapsulating liquid and semi-solid substances, such as oils, suspensions, and emulsions.

Materials and Methods

Before processing, vegetable oils are stored in barrels or special containers in a dry, dark place at a temperature no higher than 20°C. Calcium carbonate, magnesium oxide, and zinc oxide are used as additives in appropriate packaging and labeled according to GOST and stored in a dry place. Distilled water is added to the reactor, the temperature is brought to 70°C, then the antiseptic and glycerin are added with stirring in the quantities specified in the recipe. During the cooking process, a vacuum pump is attached to the reactor to remove air from the mass. Turn on the encapsulator. The gelatin base temperature should be between 60 and 63°C; the optimal oil temperature is between 18 and 20°C.

Results and Discussion

The technological process of production must comply with the sanitary requirements of SanPiN of the Republic of Uzbekistan No. 0338 “Hygienic requirements for the production and circulation of biologically active food supplements (BAA)” and consists of the following stages:

Raw material intake. The raw materials used to produce the LI K Vegetable Oils dietary supplement are cold-pressed vegetable oils (pumpkin, sesame, and black

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cumin) obtained from kernels, seeds, and nuts.

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Filler preparation. Vegetable oils are mixed with additives sifted through a 0.5 mm sieve, according to the recipe, mixed, filtered through a mesh filter into a container and before starting the encapsulation, kept for 10 to 15 minutes for air removal. After the aging process is complete, the oil is sent to encapsulated containers.

Preparing the gelatin mass for the shell. Weigh out all the necessary ingredients according to the recipe. Before starting, weigh the gelatin and glycerin in clean containers, and the antiseptic in a beaker. The gelatin mass is prepared in a reactor, which is a vessel with a water jacket and a stirrer. Before starting, check that the bottom drain valve is closed and the stirrer is running idle. The inside of the vessel must be dry and clean. Distilled water is added to the reactor, the temperature is brought to 70°C, then the antiseptic and glycerin are added with stirring in the quantities prescribed by the recipe. The reactor lid is closed, the temperature of the contents is raised to 70°C, and the mixture is dissolved with the stirrer running. The temperature is raised to 75°C, gelatin is added, and the reactor contents are stirred until the gelatin is completely dissolved at a temperature of 78-80°C. The mixture is held with constant stirring for 2 hours.

During the cooking process, a vacuum pump is attached to the reactor to remove air from the mass. The suction is applied carefully at first, periodically turning the reactor valve on and off to prevent excessive foaming of the mass. During the last few minutes, the vacuum pump's swivel valve is fully opened. This process lasts 10-15 minutes, then the vacuum pump is turned off and air is introduced into the reactor by opening the reactor's swivel valve. The mass quickly settles to the bottom of the reactor. The process engineer determines the readiness of the gelatin

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mass. During the gelatin mass preparation process, do not open the reactor lid unless absolutely necessary to avoid moisture loss, which significantly affects the viscosity of the gelatin mass. The finished mass is poured into a special thermostat and left for aerating (to completely remove air bubbles) at 55°C for 6-12 hours. After the gelatin mass has drained , the reactor walls and stirrer surface are rinsed with hot water and then air-dried with the lid open.

Encapsulated. Before starting work, set up the encapsulator for capsule release. Check the amount of Vaseline oil in the encapsulator system

Turn on the capsule machine. The temperature of the gelatin base should be between 60 and 63°C, and the optimal oil temperature is between 18 and 20°C. Check the thickness of the raw shell: it should be 0.6 to 1.0 mm, and the weight of the raw capsule should be between 0.84 and 0.90 g . Check the mass of the filler and the weight of the capsules.

Begin encapsulation . The shell weight of the resulting capsules should be at least 15% of the finished product weight. The accuracy of capsule dosing depends on the precise operation of the dosing pump. Capsule drying is carried out in a drying unit equipped with rotating drums with cells smaller than the capsule diameter and a screw conveyor system. The air temperature during drying should not exceed 24°C. The optimal air temperature is 20 to 24°C with a humidity of 60 to 65%. In cases of high humidity and low air temperature, it is recommended to warm and dry the air by feeding it through a heater. The capsule drying time is 12 to 24 hours. The dried capsules are washed.

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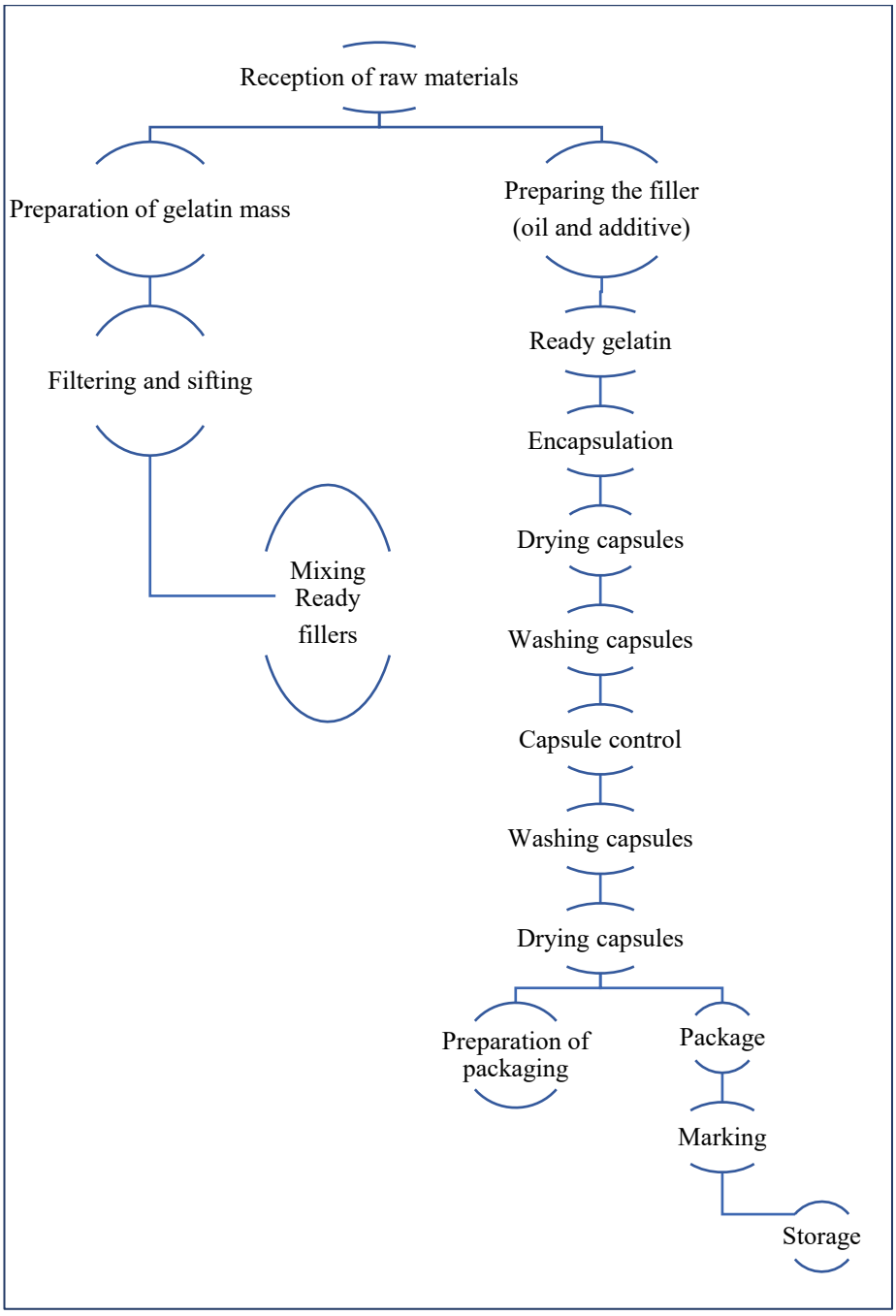

Figure 1. Technological process diagram

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Capsule washing. Capsules are washed with a 96% ethyl alcohol solution. Containers and mesh screens are used for washing. After washing, the capsules are left to remove the alcohol and then sorted in mesh screens with openings smaller than the capsule diameter, mounted on mobile carts.

Capsule inspection. Capsules are inspected visually and manually on the inspection table. Empty, deformed, or air-bubbled capsules are rejected. Capsules are washed with a 96% ethyl alcohol solution. Containers and mesh screens are used for washing.

Drying the capsules. After washing, the capsules are stored on trays with holes smaller than the capsule diameter, mounted on mobile carts, to remove the alcohol. After drying, they are packaged in 1 kg polyethylene bags.

Secondary capsule washing. Secondary capsule washing is performed with a 96% ethyl alcohol solution immediately before packaging. Containers and mesh screens are used for washing. After washing, the capsules are stored on trays with smaller holes than the capsule diameter, mounted on mobile carts, to remove the alcohol. After this storage, they are sent for packaging.

Conclusion

The technology for producing the biologically active supplement "LIK Vegetable Oils" in capsule form is scientifically substantiated and complies with sanitary, hygienic, and pharmaceutical requirements. The data presented in the article demonstrate the product's high biological activity, its production using natural raw materials, and its safety for human health. By precisely defining the technological parameters of the production process—temperature, humidity, vacuum level, and the physicochemical properties of the capsule mass—this work provides a ready-made scientific basis for its practical implementation. Thus, the study reflects an innovative approach to pharmaceutical production and enables the creation of competitive biologically active food supplements based on local raw materials in Uzbekistan.

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