



EXTRACTION OF MEDICINAL MELANIN FROM CHESTNUT SHELLS

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Currently, a significant portion of drugs used in medical practice around the world are based on biologically active compounds isolated from plants. Because herbal medicines and biologically active food supplements give positive results even with long-term use, without having a negative impact on the body. In particular, secondary raw materials generated during the production of medicines and biologically active supplements are of great importance in improving the quality and biological value of food products.

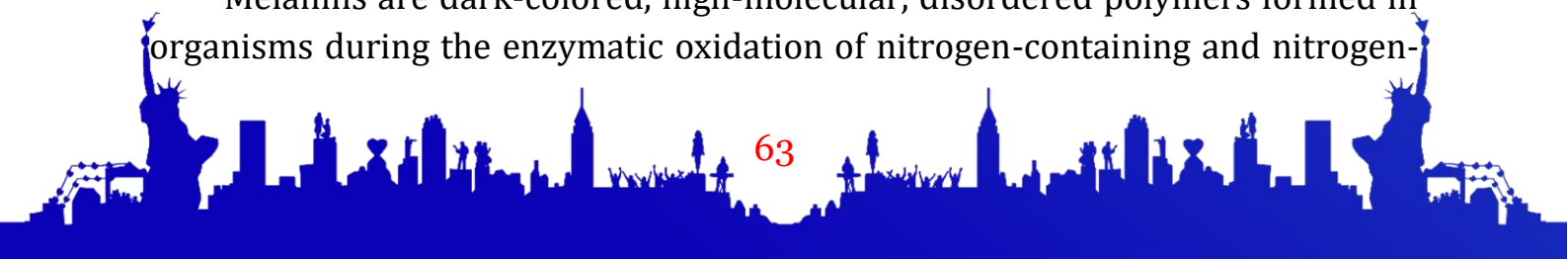
Conducting scientific research to improve the technological indicators of bakery products, which form the basis of the world diet, based on additives of plant origin, increasing consumer safety, biological value, rheological properties of dough and bread quality, rational use of environmentally friendly raw materials, reducing the cost of production and their implementation in practice.

All parts of the plant, such as seeds, roots, leaves, fruits, skin, branches or even the entire plant, can be used to prepare plant extracts for various purposes. These plants (or fractions), rich in biologically active compounds, can be used as drugs due to their direct or indirect therapeutic effect. These compounds contained in plant materials generally act synergistically, preventing certain diseases, increasing mobility or even making a significant contribution to the treatment of certain diseases.

Chestnut (*Aesculus hippocastanum* L.) is a large-leaved tree, widespread throughout the world. The common name comes from the name of the evergreen plant *Aesculus* (Latin *yesca* - food) and is so named because of its edible trees and fruits [1].

Chestnuts have long been widely used in folk medicine, and at present they are beginning to be officially studied. In our republic, only the components of the fruits of this tree have been studied as medicinal raw materials. Currently, chestnuts are actively studied from the point of view of creating food additives from their above-ground parts [2].

Melanins are dark-colored, high-molecular, disordered polymers formed in organisms during the enzymatic oxidation of nitrogen-containing and nitrogen-





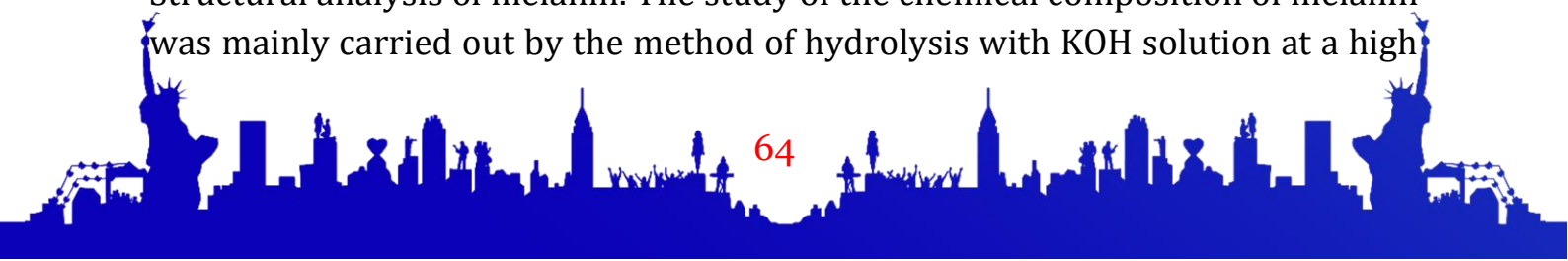
free polyphenols. They have radioprotective and antioxidant properties, are sorbents of radionuclides and heavy metals, and effectively protect living organisms from ultraviolet radiation. Melanins are used in medicine, pharmacology, agriculture and other fields. Melanins are obtained by chemical synthesis technology, oxidation of the amino acid tyrosine and its derivatives, extraction from animal and plant raw materials, and microbial synthesis using microorganisms. Due to the variety of chemical methods for extracting melanin from biological materials that are raw materials for its production, there is no single standard method for their separation and purification separately [3].

The aim of this study was to isolate the medicinal substance melanin from chestnut peel in pure form using an effective method and conduct its qualitative analysis.

Melanin separation method. Water-soluble melanin with high antioxidant activity was obtained from non-traditional raw materials using a biotechnological method; crushed chestnut kernel peel was used as raw material. A method for obtaining water-soluble melanin was developed by carrying out a three-stage extraction of crushed chestnut kernel peel and water in a weight ratio of 1:20, with an extraction duration of 12 hours at each stage. The extracts obtained in three stages were combined and filtered (the volume of the extract was 15 l). The resulting extract was evaporated until a volume of 3 liters remained. A 0.5 N NaOH solution was added to the aqueous extract until the pH reached 12.

The resulting transparent mixture was acidified to a pH of 1.5. The resulting mixture of precipitated melanin was extracted with ethyl acetate in a weight ratio of 1:2 in three stages. The aqueous portion, i.e. the organic extract, was separated from the mixture. The melanin that formed a precipitate in the aqueous phase was separated by filtration. The melanin precipitate was dissolved in a 12% ammonia solution until the melanin was completely dissolved. After evaporation of the residual ammonia and water in a rotary evaporator, the melanin solution was dried in a sublimation drying unit. At the final stage of separation, column chromatography (6×70 cm) was used, the flow rate of the melanin dissolved in the solvent from top to bottom was 0.028 cm/s, the washing process was carried out in the eluate mode, the pure substance fraction was isolated. At the next stage of the study, a chemical analysis of the isolated melanin substance was carried out by alkaline hydrolysis.

Structural analysis of melanin. The study of the chemical composition of melanin was mainly carried out by the method of hydrolysis with KOH solution at a high





pressure of 1.5 atm and a high temperature of 180 °C in various concentrations, which makes the analysis of the composition of melanin somewhat more effective. This is the main issue that must be taken into account in the separation and analysis of melanin, and the choice of relatively flexible reagents is of great importance in the separation. Successive extraction of melanin present in the aqueous extract of the culture with increasingly polar organic solvents is effective: petroleum ether, ethyl acetate, chloroform and a mixture of chloroform and ethanol.

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