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PROCESS OF OBTAINING AND TECHNOLOGICAL ANALYSIS OF DRY EXTRACT OF CARDIOTONIC ACTION

ТЕХНОЛОГІЯ ОТРИМАННЯ ТА АНАЛІЗ СУХОГО ЕКСТРАКТУ КАРДІОТОНІЧНОЇ ДІЇ

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Abstract. *The article describes the technology of obtaining a dry extract of cardiotonic action through the stage of percolation of plant material, filtration, condensation and drying. The technological parameters, such as bulk density and tap-density, fluidity, angle of repose, moisture content of resulting dry extract have been analyzed. According to the obtained data, it was concluded of the maximum allowable fluidity, which requires the use of auxiliary substances in the manufacture of ready-made dosage forms to improve the processing characteristics of the dry extract.*

Keywords. *Dry extract, percolation, technological parameters, cardiotonic action.*

Introduction

In modern medical practice, herbal medicines play an important role in the treatment of cardiac diseases due to high therapeutic activity, absence of side effects, low toxicity and, accordingly, possibility of long-term use. Herbal preparations have a "mild" effect on the human body and their use is most justified in long-term use as a maintenance therapy for a patient.

Due to the active substances that are part of the phytopreparation developed by us under the conditional name "Cardiosten" (combined extract of hawthorn fruits, hop cones, herbs of melissa and motherwort), namely polyphenolic compounds and flavonoids, this medicinal product is recommended to use at a combined therapy for angina pectoris, dystonia of the neuro-circulatory type, as well as with neuroses [1].

The analysis of the pharmaceutical market of Ukraine for the dosage forms of combined cardiological preparations has established that the vast majority of the assortment form the products in the form of tablets (42,67%) and capsules (21,33%) [2], which is conditioned, first of all, by the convenience of taking these dosage forms. Taking into account currently available technologies of solid dosage forms obtaining, it is optimal to use dry extracts of plant materials [3, 4].

Therefore, the purpose of our work was to obtain a dry complex extract of cardiotonic action and to study its technological characteristics for the further development of dosage forms.

Main text

Obtaining of liquid extract was carried out by the method of percolation of a mixture of plant raw materials taken in equal proportions. As an extractant used 70% ethyl alcohol. The process of percolation included a soaking stage (6 hours in a

hermetically sealed tank in the ratio of extractant: raw material as 1:1), the infusion stage (the raw material was placed on the perforated bottom of the percolator and poured to the "mirror" with extractant followed by 24 hour infusion) and the percolation stage from a rate of 1/24 from the volume of the laboratory percolator per hour, taking into account the ratio of DER 1: 3 [1].

The resulting liquid extract was settled for 2 days at a temperature of 5-8 ° C., filtered and evaporated on a rotary evaporator RE-205 (manufactured by Shanghai Kankun Instrument Equipment Co., Ltd., China) at a temperature of 55 ± 1 ° C and a vacuum of 700 ± 10 mm Hg. The resulting dense brown extract was dried in a vacuum drying cabinet SV-30 (manufactured by LLC "RIVA-STAL", Kiev) at a temperature of 50 ± 1 ° C.

The obtained dry extract was investigated according to the State Pharmacopoeia of Ukraine for such technological characteristics as fluidity, bulk- and tap-density, angle of repose, moisture content. The research was carried out in 5 series of the dry extract obtained.

Bulk density and tap-density of powders were determined by the method of SPU 2.0 p. 2.9.34. In the course of the study, a cylinder of 250 ml and a sample of 100 g were used.

Flowability of powders was determined by the method of SPU 2.0 p.2.9.36 [5].

The moisture content was determined using a Sartorius MA150C (Germany) moisture analyzer. The device operates under a standard program (temperature - 105 ° C, drying end detection mode - Auto). Weight of sample was about 3,0 ± 0,2 g. The sample is distributed throughout the cup surface, on which drying occurs. The drying process begins automatically after the lid is closed. The drying of the sample is carried out using a ceramic infra-red heater at a set temperature (105 ° C) to a constant weight.

Upon completion, the instrument generates an audible signal and the final value of the moisture content of the sample appears on the screen. After that the lid of the thermocamera has to be opened and the sample cup extracted with tweezers.

Data on conducted studies to determine the technological characteristics are given in Table 1.

According to the data obtained, the dry extract of cardiotonic action under the conditional name "Cardiosten" has an initial bulk density of 553 ± 7 kg / m ^{3} , which during the tapping test increases to 728 ± 8 kg / m ^{3} .Calculated on the basis of density data, the index of compressibility and the Haussner ratio are within the limits of the parameters that correspond to the admissible flowability of powders: 21-25 and 1.26-1.34, respectively.

According to the State Pharmacopoeia of Ukraine [5], these indices are not characteristic for powders, because they depend on the method of research applied. The slope angle analysis has confirmed the permissible fluidity of the extract powder. According to the obtained data, the angle of repose corresponds to an interval of 41-45 degrees and according to the table data of the SPU is related to permeable flowability, characterized as – "Material may stuck. Sometimes auxiliary equipment is needed".

It should be noted that all the studied parameters (the index of compressibility,

the Haussner ratio and the angle of repose) are on the margin of "permissible" flowability and during storage of extracts, they can change in the direction of "unsatisfactory" flowability. Thus, it can be argued about the need to add auxiliary substances that will improve the technological performance of the extract in the manufacture of finished dosage forms.

Table 1

Pharmacological and technological parameters of the combined dry extract of cardiotonic action

Series	Bulk density , ρ_1 , kg/m^3	Tap-density ρ_2, kg/m^3	Compression rate	Hausner ratio	Flowability	Angle of repose, deg
1	550	730	24.7	1.33	permissible	44
2	555	725	23.5	1.31	permissible	43
3	548	720	23.9	1.31	permissible	44
4	552	728	24.2	1.32	permissible	45
5	560	735	23.8	1.31	permissible	44

Authoring

Data on moisture content in dry extracts are given in Table 2.

The conducted researches on determination of moisture content in dry extracts showed the conformity to the general article of SPU - no more than 5% moisture. According to the data, the moisture content was 4.80 ± 0.12%.

Table 2

Moisture content in dry extracts

Series	Moisture content, %
1	4,82
2	4,59
3	4,90
4	4,92
5	4,75

Authoring

Conclusions. According to the conducted researches, the main technological parameters of the dry extract of cardiotonic action have been determined - the index of compressibility, the Haussner ratio, the angle of repose, moisture content. According to the obtained data, the conclusion has been made of the maximum permissible flowability of the dry extract, which involves the use of auxiliary substances in the manufacture of finished dosage forms to improve the processability of the dry extract.

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Анотація. *В статті приводиться опис технології отримання сухого екстракту кардіотонічної дії через проведення стадії перколяції рослинної сировини, фільтрації, згущення та сушки. Отриманий сухий екстракт було проаналізовано за технологічними показниками, такими як густина до та після усадки, плинність, кут укосу, вологовміст. Згідно отриманих даних зроблено висновок про граничну допустиму плинність, яка передбачає використання допоміжних речовин при виробництві готових лікарських форм для підвищення технологічності сухого екстракту.*

Ключові слова. *Сухий екстракт, перколяція, технологічні показники, кардіологічна дія.*