

Evaluation of Technological Properties and Powder Characteristics of Dry Ginger (*Zingiber Officinale*) Extract

Tursunova Solikha Zafar kizi

Basic Doctoral Student, Chemistry - Pharmaceutical Science Research Institute, Uzbekistan

Tashmukhamedova Shokhista Sobirovna

National University of Uzbekistan named after M. Ulugbek, 4 Universitet str., Tashkent, 100174, Uzbekistan

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Abstract: This in the article from the ginger plant (*Zingiber officinale*) taken dry extract main technological properties studied. Research during extract external appearance, particle size, fraction composition, dispersion, density and residue humidity identified, their pharmaceutical in technology application for importance evaluated. Obtained results dry extract good technological to properties has that showed.

Keywords: *Zingiber officinale*, ginger extract, dry extract, granulometric analysis, particle size, fraction content, dispersibility, Carr index, remainder humidity, pharmaceutical technology, powder properties, tableting, encapsulation.

Introduction: Current on the day pharmaceuticals in the industry medicinal plants based on created to drugs the demand is significant. at the level increasing This is happening. main reasons as their relatively less side effect to the effect ownership, biological compatibility and complex pharmacological activity is considered [1,2]. From this perspective from the perspective of medicine from plants taken dry extracts modern medicine tools working in the release important place occupies [5,6].

Ginger (*Zingiber officinale*) world on a scale wide widespread and long-ago people in medicine using bride from plants one is considered. Its rhizome in the composition gingerols, shogaols, ether oils, flavonoids and other biological active substances there is are, they are in the body to inflammation anti-inflammatory, antioxidant, immunomodulator and antimicrobial impact shows [1,3]. Therefore, ginger based on drugs not only preventive, maybe therapeutic wide in terms

of purposes is being used [2].

Pharmaceutical in technology plant extracts dry to form transfer separately importance has. Dry extracts liquid or dark to extracts relatively high stability, long preservation deadline, transportation and dosage convenience with separated [5]. Especially their powder in the case of to be tablet, capsule and granules working in the release wide opportunity creates [6].

However dry extracts practical application they're not only chemical to the composition, but technological directly to its properties is related to. In particular, the particle size, granulometric composition, dispersibility, density, hygroscopicity and residue humidity such as indicators working release process to the efficiency noticeable impact [6,9] shows. For example, the particles one kind to size has to be mixture homogeneity provides, scattering and dispensers through continuous the flow guarantees [10]. Also, excessive humidity of the product preservation stability

reduces possible [7,8].

Literature analysis this shows that ginger pharmacological properties wide studied although, its dry extract technological features enough at the level complex research [1,2]. In particular, granulometric content and physicist properties medicine forms in creation importance deep requires learning.

Research purpose: This research your work main purpose — from the plant *Zingiber officinale* taken dry extract technological properties complex study and their pharmaceutical in practice importance from evaluation consists of.

METHODS

Research object as from the rhizome of *Zingiber officinale* taken dry extract sample used. Sample laboratory under the circumstances dried, standard under the circumstances saved.

Research Methods: 1. External appearance detection (visual evaluation)

Dry extract external appearance pharmacopoeia requirements appropriate visual in a

way evaluated. This includes color, smell, taste and physicist the state (powder, hygroscopicity) of the sample is determined. white background on, natural in the light was investigated [17].

2. Particle size to determine (to sift) method)

Particle size sieves package using determined. Standard sieves (2000, 1000, 500, 250, 125 μm) in sequence placed, 100 g sample 10–15 minutes during mechanic vibration through announced. Every in a sieve remaining faction weighed, general to the mass relatively percent on account of is determined [16], [18].

3. Fraction the content determination (granulometric analysis)

Granulometric content sift method results based on was calculated. Each faction based on the following formula is defined as:

$$X = \frac{m_i}{m} \times 100$$

this on the ground:

m_i – fraction mass, g

m – general sample mass, g

Results as a percentage (%) is expressed [16].

4. Dispersibility determination

Scattering pharmacopoeia requirements appropriate funnel in the way was determined. In this case, 100 g of sample standard from the funnel free will be lowered and time is measured.

Scattering by the following formula is:

$$F = \frac{m}{t}$$

this on the ground:

F – dispersion (kg/s)

m – mass (kg)

t – time (s)

This method powders technological stream features assessment opportunity gives [16], [20].

5. Scattered density determination (bulk density)

Bulk density to the cylinder free filling method with is determined. Before weighed to the cylinder known in quantity powder is inserted and size is measured.

Calculation formula:

$$\rho = \frac{m}{V}$$

this where: ρ – density (kg/m^3), m – mass (kg), V – volume (m^3).

This indicator powder density feature in evaluation important [16], [19].

6. Density indicator determination (Carr index / compressibility)

Density indicator based on the following formula is defined as:

$$K = \frac{\rho_{\text{tap}} - \rho_{\text{bulk}}}{\rho_{\text{tap}}} \times 100$$

this on the ground: ρ_{bulk} – free density, ρ_{tap} – shaken next density

This parameter powder compressibility and pilling properties evaluates [16].

7. Residue humidity determination. Residue humidity drying method with the sample is heated to 105°C continuously. to the mass dried.

Calculation formula:

$$W = \frac{m_1 - m_2}{m_1} \times 100$$

this on the ground: m_1 – from drying previous mass, m_2 – after drying next mass

Result expressed as a percentage (%) [17], [18].

RESULTS AND DISCUSSION

External Appearance: Analysis as a result dry extract:

hungry yellow colorful, to oneself typical smelly, bitter tasty, hygroscopic powder that determined.

These indicators ginger to extract typical is, its good quality received indicates.

Particle size determination also for sifting process done increased this for standard sieves set (0.5 mm, 0.315 mm, 0.25 mm, 0.2 mm, 0.125 mm) taken and dry 100g of extract received. Next in stages and Sieves from the big one small looking at placed: 0.5 mm → 0.315 mm → 0.25 mm → 0.2 mm → 0.125 mm and measure 100g taken dry our extract step stage every one 10 minutes in a sieve time during announced and every one sieve extracts separately separately gathered analytical on the scales when measured 0.18 – 0.42 mm results received.

Fraction Ingredients: Dry extract particles size according to distribution standard sieves 2000 → 1000

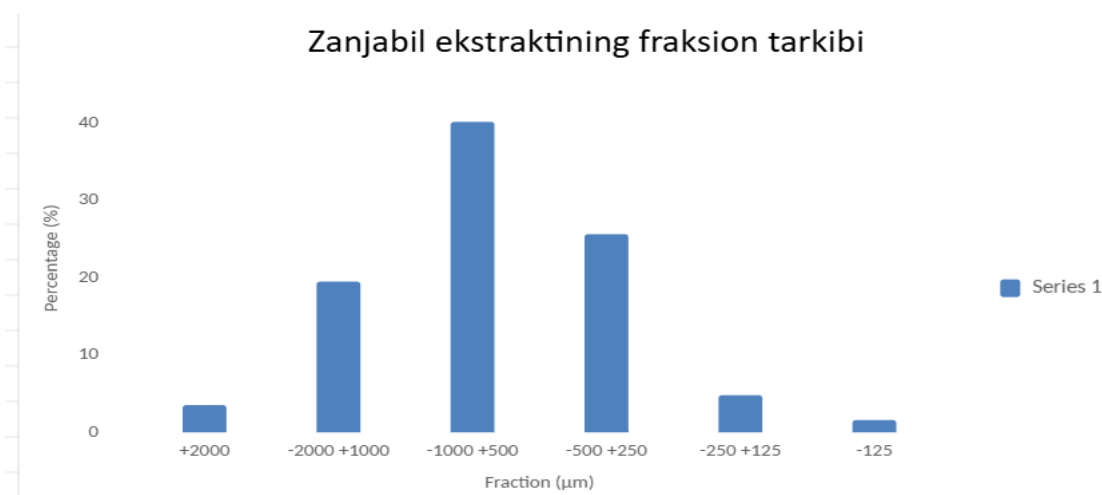
→ 500 → 250 → 125 μm using determined and analyzed before sample constant at 105°C to the mass dried. Drying in the process sample mass from 100 g to 98 g decreased, this and humidity amount about 2 % organization to reach shows. This is the case in advance drying stage the necessity confirms.

Elash results this showed that the particles main part middle dimensional to factions right comes. The biggest fraction 1000–500 μm true to fraction (40.91%) come and get it next 500–250 μm fraction (26.11%) occupies. This extract in the composition mainly middle dispersed particles column that Also, 2000–1000 μm fraction (19.87%) is also significant to share has is, this some particles complete not crushed or partially aggregated to show possible.

Each faction percent amount with the following formula is defined as:

$$X = \frac{m_i}{m} \times 100$$

this on the ground: X – faction share (%), m_i – fraction mass (g), m – total mass (g). Results graphic in the form as follows we bring possible.



Dispersibility Definition: This for dry 100g of extract is obtained and in advance stopwatch collector container and scumbag firmly prepared 100g extract is added to the varonka will be placed at that time scumbag below closed in case will be scumbag down collector container placed stopwatch the varonka opening with will be lit and the results with the formula below our determination possible.

Scattering by the following formula is defined as:

$$F = m/t$$

this on the ground: F – scattering rate (kg/s), m – mass (kg), t – time (s)

we have $t = 31\text{s}$, $m = 100\text{g}$

$$F = \frac{0.1\text{kg}}{31\text{s}} = 3.22 \times 10^{-3} \text{ kg/s}$$

Scattered density determination for to us Measurement cylinder (100 ml or 250 ml), analytical Scale (± 0.01 g accuracy), funnel (optional, one kind

filling for), spatula need will be. Cylinder clean and dry to be need empty cylinder mass m_0 is determined

Dry extract to the cylinder It is inserted freely (without pressing), the cylinder shake or pressing possible not, surface flattened (without squeezing) then in the cylinder powder size is determined then and cylinder with powder together is weighed and denoted by m_1 is placed. Pure powder mass: $m = m_1 - m_0$ using Density by the following formula is defined as:

$$\rho = \frac{m}{V}$$

this on the ground: ρ – Scattering density (kg/m^3), m – mass (kg), V – volume (m^3)

$$m = 0.0362 \text{ kg (36.2 g)}$$

$$V = 0.0001 (\text{m}^3) (100 \text{ ml})$$

$$\rho = \frac{0.0362 \text{ kg}}{0.0001 (\text{m}^3)} = 362.32 \text{ kg/m}^3$$

Determined scattered Density 362.32 kg/m^3 organization dry extract average to density has that shows.

Density indicator determination for Measurement cylinder (100 ml or 250 ml), analytical scales, tap density apparatus (or at hand shake (shake), funnel need will be. Then cylinder weighed m_0 , powder freely (without squeezing) , volume is determined by V_0 , mass is determined m then cylinder to the apparatus connects and 500–1250 times hit (tap) volume decreases V_t new density is considered

$$\rho_{\{tap\}} = \frac{m}{V_t}$$

By the formula below calculating we will find.

Density indicator calculation this on: CI – Carr index (%) ρ is free density, ρ_{tap} – dense density ρ_{bulk} = 362 kg/m^3

$$\rho_{tap} \approx 377 \text{ kg/m}^3$$

$$K = \frac{\rho_{tap} - \rho_{bulk}}{\rho_{tap}} \times 100C$$

$$K = \frac{377 - 362}{377} \times 100 = 3.98$$

Density index is between 3.98 is, this dry extract high at the level compressible and good stream to the feature has that shows.

Remainder humidity Definition : This for drying oven ($105 \pm 2^\circ\text{C}$), analytical Scale ($\pm 0.001 \text{ g}$ accuracy), drying

desiccator (refrigerator) for) spatula need will be empty big drying 10-15 minutes in the closet during dried cooled and mass m_0 is determined , then up to 2-4 grams per box dry extract is inserted and together weighed m_1 and drying 2-3 hours in the closet during dried and cooled then mass measured in m_2 This is determined by process 5 times repeated and average result is taken

$$m_0 = 50,000 \text{ g}, m_1 = 53,000 \text{ g}, m_2 = 52,871 \text{ g}.$$

$$W = \frac{50.000 - 52.871}{53.000 - 50.000} \times 100 = 4.3\%$$

Determined residue humidity 4.3 % organization this is dry extract hygroscopic to the characteristics despite, pharmaceutical requirements within that shows.

CONCLUSIONS

This research from the plant *Zingiber officinale* in his work taken dry extract main technological properties complex accordingly studied and evaluated. Obtained results extract pharmaceutical technology requirements suitable to come showed.

Granulometric analysis to the results according to, extract particles main part middle to the fraction (500–1000 μm) come, this its optimal dispersion to the level has that confirms. Particle Size range 0.18–0.42 mm to be and of intervention improvement, dosage accuracy and pilling process efficiency provides.

Scattering The index is $3.22 \times 10^{-3} \text{ kg/s}$. organization of powder good stream to the feature has that This is extract working release processes, in particular, automated dosage in systems application opportunity increases.

Scattered density is 362.32 kg/m^3 is the extract average to density has that This indicator indicates his/her encapsulation and pilling in the processes effective use provides. Density indicator (Carr index) 3.98 % organization of powder high at the level compressible and good technological to properties has that shows.

Remainder humidity the amount is 4.3%, which is value pharmaceutical standards within also, the extract microbiological stability and preservation of the term enough at the level that confirms.

In general received, received results ginger dry extract high technological to properties has that and him/her tablet, capsule and other hard medicine forms working

in the release directly application possible The study showed results in the future ginger based on effective and good quality pharmaceutical drugs in creation scientific basis become service does.

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