NATIONAL UNIVERSITY OF PHARMACY

TECHNOLOGY OF DRUGS DEPARTMENT

Discipline "Pharmacy-based technology of drugs"

The topic of the lecture :

"Infusions and decoctions from medicinal plant raw materials"

a lecture for English students of 3rd course
in the speciality "Pharmacy" for foreign students

Lecturer: associate professor Yuryeva A.B.

THE PLAN OF THE LECTURE

1. Definition of infusions and decoctions
2. Theoretical basis of extracting process of medicinal plant raw material
3. The factors affecting the completeness and velocity of extraction of the active substances
4. Standards of the raw material (quantity of active substances)
5. Histologic structure of the raw material
6. Formulation of aqueous extractions from plant raw material
7. The peculiarities of the formulation of infusions from the raw material

QUESTIONS FOR SELF WORK

1. Theoretical basis of extraction process, desorption, dissolution, leaching, diffusion, osmosis.
2. Use the main provisions of the theory of molecular and convective diffusion in the process of extraction;
3. Factors affecting the quality of water extracts.

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2. Tikhonov A.I., Yuryeva A.B., Zuykina S.S. Chemist's technology of drugs. Infusions and decoctions. A lecture for English students of the 3-rd year, speciality "Pharmacy": a handbook for out-of-class work of students / Edited by acad. A.I. Tikhonov. - Kh.: PH of NUPh, 2009. – 28 p.
3. Dry, liquid and soft medicinal forms. A textbook for English students in speciality "Pharmacy" / A.I. Tikhonov, T.G. Yarnykh, A.B. Yuryeva, L.N. Podorozhna, S.S. Zuykina; Ed. by A.I. Tikhonov. – Kharkiv: NUPh; Original, 2011. – 208 p.
4. Tikhonov A.I., Yarnykh T.G., Yuryeva A.B., Podorozhna L.N., Zuykina S.S. Biopharmaceutics. Lectures for English students on the speciality "Pharmacy": a handbook for the out-of-class work of students/ edited by acad. A.I. Tikhonov. – Kharkiv: NUPh, Original, 2011. – 140 p.

1. Definition of infusions and decoctions

Infusions and decoctions are liquid medicinal forms representing water extractions from medicinal plant raw material, as well as aqueous solutions of dry or liquid extracts-concentrates

The composition of aqueous extractions

Pharmacologically active substances	Auxiliary substances or substances without effect
–alkaloids, –glycosides, –essential (volatile) oils –tannins, etc.	–sugar, –starch, –pectin, –pigments, –resins, etc.

1. Definition of infusions and decoctions

The ratio of the amount of the plant raw material and extraction agent

1:10	All plants, except strong-effective ones
1:20	Althaea root
1:30	Valeriana, Adonis, Claviceps purpurea, Convallaria, Saponaria officinalis, Polemonium coeruleum, Polygala vulgaris
1:400	Strong-effective plants (Thermopsis, Digitalis, etc.)

2. THEORETICAL BASES OF EXTRACTING PROCESS OF MEDICINAL PLANT RAW MATERIAL

The **process of extraction** of the active substances from plant raw material consists of some stages:

1) **swelling**, 2) **the primary juice formation inside cells**, 3) **mass exchange**.

Rp.: Infusi herbae Hyperici ex 10.0 - 200 ml
Da. Signa. For rinsing of the mouth's cavity.

According to the given formula it is necessary to prepare 200 ml of the infusion from 10 weight parts of herb.

Rp.: Infusi herbae Leonuri 200 ml
Da. Signa. Per 1 table spoon 3 times a day.

In this case it is necessary to prepare 200 volumetric parts of the infusion from 20 weight parts of Leonuri herb. (ratio is 1:10)

1.0 ---- 10 ml
x ------ 200 ml ; x = 20.0

The ratio between plant raw material and water is not indicated, so we used a standard ratio (previous slide)

3. THE FACTORS AFFECTING THE COMPLETENESS AND VELOCITY OF EXTRACTION OF THE ACTIVE SUBSTANCES

The amount of the water absorbed depends on:

- the histological structure;
- and degree of the raw material powdering;
- the kind of the raw material (granules, briquettes, plant).

Therefore, it is necessary to use individual coefficients of water absorption for the plant raw material

Water-absorption coefficient (C_{wa}) shows the amount of liquid, which will be absorbed by 1.0 g of the plant raw material after infusion

3. THE FACTORS AFFECTING THE COMPLETENESS AND VELOCITY OF EXTRACTION OF THE ACTIVE SUBSTANCES

If the index of Cwa is not founded (p. 32-33) we can use the following:

for roots – 1.5;
for bark, flowers and herbs – 2.0;
for seeds – 3.0.

the quantity of water should be:

200 ml + (20.0 × 2.0) = 240 ml

Raw material	Coefficient
Herba Leonuri *Motherwort herb*	2.0

4. STANDARDS OF THE RAW MATERIAL

The raw material is called standard if the quantity of active substances corresponds the quantity of the same substances in the State Pharmacopoeia Article or other documentations.

Only the standard raw material or the raw material with a great amount of the active substances (increased biological activity) can be used for obtaining of aqueous extracts:

$$X = \frac{A \times B}{C},$$

X - the amount of the raw material with the increased content of the active substances, g;

A - the amount of the raw material written out in the prescription, g;

C - the real amount of the active substances in the raw material expressed in % or number of Action Units (AU) in 1.0 g of the raw material;

B - the standard content of the active substances in the same units.

Example: Standard is 1.5 % of alkaloids.
We have 0.5 g of plant which contains 1.8 % of alkaloids.
So the amount of plant will be less than 0.5 g:
X = (0.5 x 1.5 %) / 1.8 % = **0.42 g**

5. THE HISTOLOGICAL STRUCTURE OF THE RAW MATERIAL

Usually infusions are prepared from the loose raw material (flowers, leaves, herb), decoctions are prepared from solid raw material (roots, rhizomes).

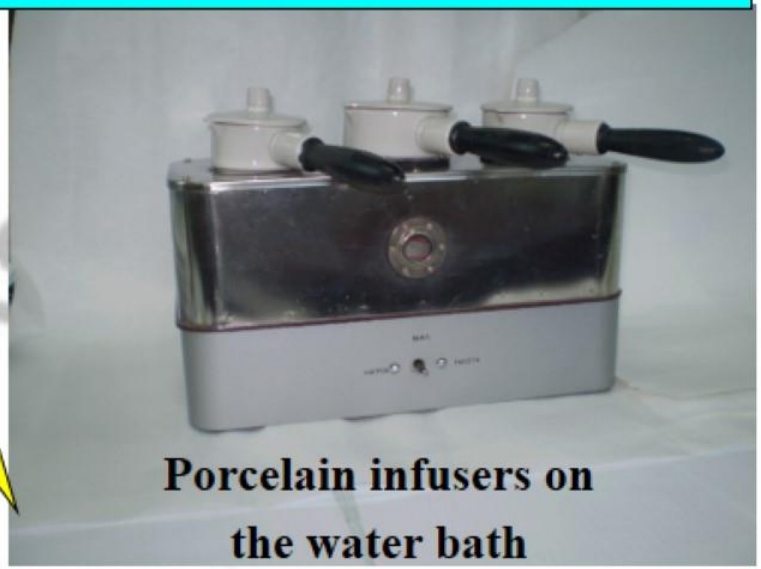
Exceptions are Valerian roots and rhizomes (the infusion is prepared) and leaves of Bearberry, Senna and Red bilberries (decoctions are prepared).

Aqueous extraction	Time of infusing (water bath t°)	Time of cooling (the room temperature)
Infusion (up to 1 litre)	15 min.	45 min.
From 1 up to 3 litres	25 min.	45 min.
Decoction (up to 1 litre)	30 min.	10 min.
From 1 up to 3 litres	40 min.	10 min.
Infusions and decoctions with the indication "Cito!" in the prescriptions	25 min.	Artificially

6. FORMULATION OF AQUEOUS EXTRACTIONS FROM PLANT RAW MATERIAL

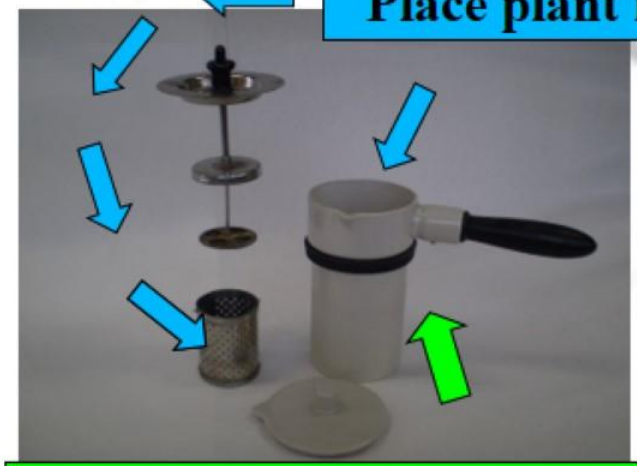
Devices for preparation of infusions and decoctions

To heat infuser on the water bath during 15 min



Porcelain infusers on the water bath

Place plant raw material



Add purified water (calculated) of room temperature

Infuse a porcelain infuser on the water bath (for infusions – 15 min; for decoctions – 30 min)

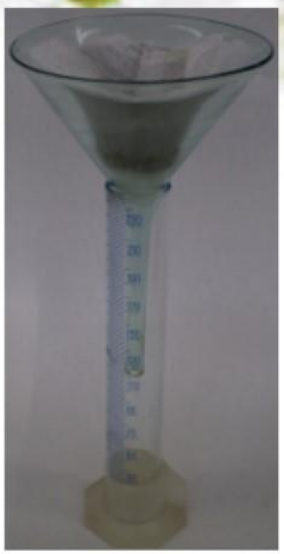
6. FORMULATION OF AQUEOUS EXTRACTIONS FROM PRM

After infusion on the water bath:


Porcelain infusers

I. Cooling the infuser at the room temperature during (45 min – for infusions; 10 min – for decoctions)

II. Straining in the cylinder for measuring Through metal presser, cotton and 2 layers of gauze



IV. Dissolving a dry medicinal substances: list A, list B, general

V. Strain in the bottle for dispensing

III. Transfer the obtained liquid in auxiliary bottle

7. THE PECULIARITIES OF THE FORMULATION OF INFUSIONS FROM THE RAW MATERIAL

containing cardiac glycosides

(Digitalis leaves, Adonis herb, Marine onion, etc.)

- PH of the medium should be neutral because in the acid and alkaline medium the cardiac glycosides are hydrolyzed until genines.
- Observance of the established degree of plant raw material powdering.
- A strict observance of the temperature and duration of infusing.

containing volatile oils

(Valerian roots and rhizomes, Ment leaves, Origanum herb, Camomile flowers etc.)

- The process of extraction is conducted in infusers, closed by covers.
- Filter after complete cooling only.

7. THE PECULIARITIES OF THE FORMULATION OF INFUSIONS FROM THE RAW MATERIAL

containing saponins

(Ceruleum root, Polemonium root, Glycyrrhisa root etc.)

- Saponins are extracted most completely with the presence of sodium hydrocarbonate, which is added 1.0 g per 10.0 g of the plant raw material, but only if it is prescribed in the formula.

containing antraglycosides

(Rhubarb roots, Buck thorn bark, Senna leaves etc.)

- Decoctions from Rhubarb root and Buck thorn bark strain immediately after removal of the infuser from water bath.
- It is allowed to use Buck thorn bark after a one year of storage.
- Strain decoctions from Senna leaves after complete cooling (not less than in 3-4 hours).

7. THE PECULIARITIES OF THE FORMULATION OF INFUSIONS FROM THE RAW MATERIAL

containing tannins

(Oak bark, Potentilla rhizome, Sangusorba root and rhizome, Vaccinium fruits, Bearbery leaves, Red bilberries leaves)

These decoctions should be immediately strained after removal the infuser from the water bath, because tannins are readily dissolved in hot water, and while cooling they are a flocky precipitate.

containing alkaloids

(Thermopsis herb, Belladonna herb, Selaginis herb, Ipecacuanha root, Chinchona bark, etc)

The raw material is extracted by water acidified with the hydrochloric acid in the concentration of 0.83% (the quantity of the acid should be the same as the amount of alkaloids in the plant raw material).

Conclusions

1. Definition of infusions and decoctions has been generalized.
2. Theoretical basis of extracting process of medicinal plant raw material has been studied.
3. The factors affecting the completeness and velocity of extraction of the active substances have been analyzed.
4. Standards of the raw material (quantity of active substances) have been considerated.
5. Histologic structure of the raw material has been generalized.
6. Formulation of aqueous extractions from plant raw material has been studied and fixed.
7. The peculiarities of the formulation of infusions from the raw material have been reviewed

Thank you for attention!