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WORKBOOK

for preparation to the licensed examination “CROCK-2” in pharmacy-based technology of drugs

MINISTRY OF PUBLIC HEALTH OF UKRAINE
NATIONAL UNIVERSITY OF PHARMACY
TECHNOLOGY OF DRUGS DEPARTMENT

WORKBOOK

for preparation to the licensed examination “CROCK-2” in pharmacy-based technology of drugs

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UDC: 615.014 (03)

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Workbook contains the main topics of pharmacy-based technology of drugs according to the approved program. It is designed for individual work of English-speaking applicants of higher education, includes theoretical material and test questions from booklets for preparation to the licensed examination “CROCK-2”.

UDC 615.014 (03)

WORKBOOK

for preparation to the licensed

examination “CROCK-2”

in pharmacy-based technology of drugs

of the applicant of higher education_____

(surname, name)

group _____

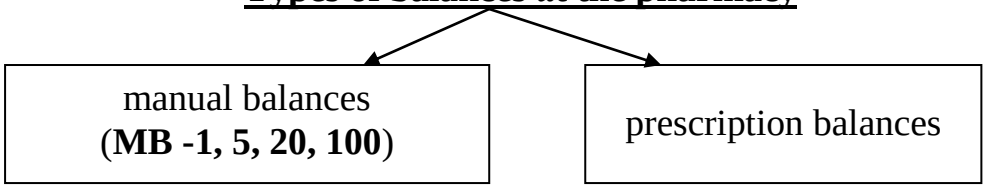
Topic 1: PREPARATION OF SIMPLE AND COMPLEX POWDERS

The objective: to learn to prepare simple and complex powders, to learn the ways of introduction of medicinal substances with different physical and chemical properties into the powders.

Educational tasks

I. Study informational material according to the given topic

Types of balances at the pharmacy

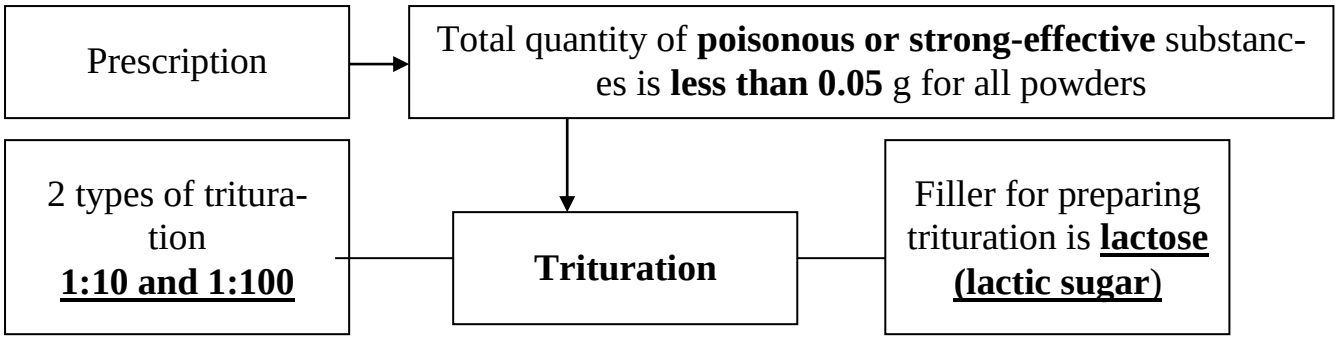


! **Minimal** weight of *poisonous or narcotic* substances – **0.05**;
of *general* substances – **0.02**.

Main rule of powder preparation: After rubbing the pores of a mortar substances are putting in it from smallest amount to the biggest.

The *homogeneity* of a powder mixture is reached when components are prescribed in the ratio **1:1** (for poisonous and strong-effective substances) to **1:5** (for substances of the general list).

Properties	Substances	Way of introduction
Amorphous	Bismuth basic nitrate	Without grinding
Amorphous, spraying	magnesium oxide, starch, talc	Without grinding, at the last turn
Dying	Etacridine lactate (Rivanol), riboflavin, methylene dark blue	Method of 3 layers (between 2 uncolored substances), pack in parchment or gelatin capsules
Colored	Copper sulfate (blue color), dermatol, sulfur	By the general rules
Poorly powdered	Phenylsalicylate, sodium tetraborate, streptocide	Grind with ethyl alcohol (95 %) or diethyl ether
Poorly powdered, aromatic	Camphor, menthol	At the last turn, grind with ethyl alcohol (95 %) or diethyl ether; pack in parchment capsules only
Poisonous	Atropine sulfate, ephedrine hydrochloride, osarsol, platiphyllin hydrotartrate, scopolamine hydrobromide	In the rubbed out mortar, less than 0.05 - use trituration
Extracts	Extract of Belladonna (dense)	Use as a dry extract (1:2) in the double amount



II. Answer the tests, give explanations

№	Test	Explanation
1.	During production of powders in a pharmacy physiochemical properties of certain ingredients should be taken into consideration. What pharmaceutical substance can be incorporated into the powder mass without additional grinding? Starch Camphor Menthol Salicylic acid Streptocide	
2.	Schedule of sanitation actions in pharmacies is regulated by the relevant regulatory acts. Cleaning day at a pharmacy must be scheduled for atleast1time: In a month In a week In 3days In 10days In 5days	
3.	A schedule of sanitation actions in pharmacies is regulated by the relevant normative documents. Cleaning day at a pharmacy must be scheduled at least 1 time: In a month In a week In 3 days In 10 days In 5 days	
4.	A pharmacy produces compounded drugs. What kinds of internal control of drugs production are required? Written, organoleptic, sell control Written, interrogatory, sell control Written, qualitative and quantitative analysis Written, physics and chemical Written and sell control	

№	Test	Explanation
5.	Powders make up an important group among the extemporal medicinal preparations. Which of the following components can be incorporated into a powder without being preliminarily ground? Basic Bismuth nitrate Ascorbic acid Camphor Xeroform Calcium gluconate	
6.	A pharmacy received a prescription: *Rp.: Dibazoli 0,05 Papaverini hydrochloridi 0,15 Sacchari 2,5 M. fiat pulv. Divide in partes aequales №10*. Specify the weight of a single powder dose: 0.27 2.7 0.25 0.26 0.30	
7.	Powders that quickly enter into a reaction in presence of water and emit carbon relate to the following group: Effervescent powder Soluble powder Powders for oral use Nasal powders Powders for external use	
8.	A pharmaceutist prepares powders with papaverine hydrochloride. What hand scales should be used for weighing out 0,05 g of substance? MB 1.0 MB 5.0 MB 20.0 MB 10.0 MB 2.0	
9.	A pharmaceutist is preparing powders according to the following formulation: *Rp.: Scopolamini hydrobromidi 0,0003 Ephedrini hydrochlorodi 0,05 Sachari 0,15 M.f. pulvis D.t.d. № 10 S. 1 powder thrice a day.* Calculate the mass of 1 powder providing that the trituration (1:100) is used: 0.20 0.15 0.23 0.17 0.203	

№	Test	Explanation
10.	A pharmacy prepares drugs. How often should the floors be mopped down in the prescription department? Once in a shift Once in a week Every10 days Every 5 days Every 3 days	
11.	A pharmacy prepares atropine sulfate trituration. What adjuvant should be used to prepare this trituration? A. Lactose B. Saccharose C. Glucose D. Starch E. Talcum	
12.	A pharmacy received the following prescription: 0,0002 g of scopolamine hydrobromide per 1 powder. How much of 1:100 trituration is required for the preparation of 10 powders? 0.2 0.04 4.0 0.4 2.0	
13.	Specify the type of capsules which are used for dispensing camphor powders: Parchment Cellophane Paraffin Waxed Common paper	
14.	A pharmaceutist made 10 powders containing atropine sulfate - 0,00005 pro dose. What trituration did he use? 1:100 1:10 1:1000 1:50 1:20	
15.	A pharmaceutist prepares trituration of atropine sulfate. What adjuvant should be used for this purpose? Lactose Saccharose Glucose Starch Talc	

№	Test	Explanation
16.	Calculate the quantity of dried belladonna extract (1:2) required for preparing the following drug formulation: *Extracti Belladonnae 0,015 Magnesii oxydi 0,5 Natrii hydrocarbonatis 0,2 Misce ut fiat pulvis Da tales doses №10 Signa. 1 powder thrice a day.* 0.3 0.15 0.4 0.6 0.015	
17.	A patient has been administered powders containing menthol. What is the best way to achieve the required extent of menthol comminution? To triturate it with alcohol or ether To triturate it with glycerine or chloroform To triturate it with purified water To triturate it with other components of the formulation To triturate it thoroughly with sugar	
18.	A pharmacist prepares powders with a substance hard to comminute. What substance should be comminuted with a volatile liquid? Camphor Magnesium oxide Zinc sulfate Copper sulfate Glucose	
19.	Pharmacies prepare triturations of toxic and superpotent substances. They can be prepared in a following ratio: 1:10 and 1:100 1:10 only 1:1000 1:500 1:100 only	
20.	A pharmacy received a prescription for a topical powder including a substance that is hard to disperse. Which of the listed fluids may be used for dispersing the substance? Diethyl ether Purified water Water for injections Dimexid Isopropyl alcohol	

№	Test	Explanation
21.	A pharmaceutist is preparing powders by the way of triturating one of the components with ethyl alcohol. Such technology of preparation is typical for the following substance: Streptocid Starch Talc Zinc oxide Bolus alba	
22.	A pharmaceutist prepared some powders whose composition includes camphor. What capsules are required for their packaging? Parchment Paper Waxed Paraffin Cellophane	
23.	Apharmacy received prescriptions for compound powders containing colouring agent. Which of powder components given below is a colouring agent? Ethacridine lactate (Rivanol) Camphor Sulfanilamide Bismuth nitrate Silver proteinate (Protargol)	
24.	This substance is of blue colour but unlike the colouring substances it doesn't leave any stain. The powders prepared out of it are made according to the general rules.What substance is it? Copper sulfate Ethacridine lactate Riboflavin Acrichine Furacilin	
25.	A pharmacy received a prescription for external use powder containing a substance difficult to pulverize. What liquid can be used by a pharmacist to disperse this substance? Ethyl alcohol Purified water Water for injections Dimethyl sulfoxide Isopropyl alcohol	

№	Test	Explanation
26.	A pharmaceutist prepared powders including extract of belladonna in the amount of 0,015 per dose. For ten doses he had to take the following amount of dry extract: 0.3 g 0.15 g 1.5 g 0.03 g 0.015 g	
27.	A powder containing a substance with specific weight has been prepared in a pharmacy. Name this substance: Basic bismuth nitrate Talcum Sugar Sodium bicarbonate Bolus alba	
28.	A powder with a hard to disintegrate substance has been made in a pharmacy. Specify this substance: Camphor **A.** Sodium chlorides Talcum Sugar Osarsolum (Acetarsol)	

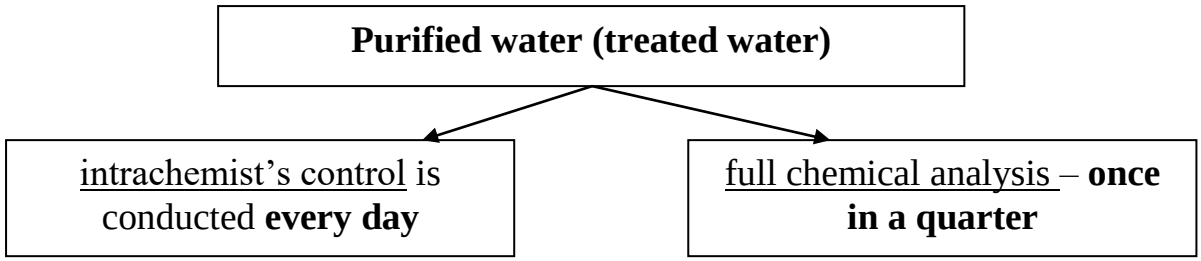
Notes

Topic 2: PREPARATION OF HOMOGENEOUS LIQUID MEDICINAL FORMS

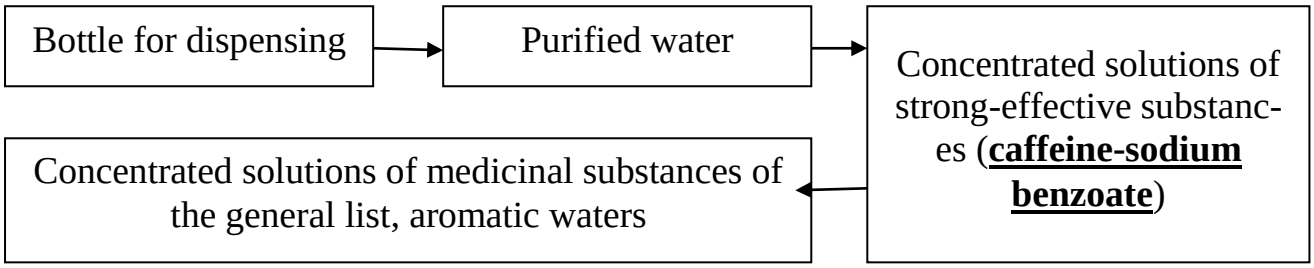
The objective: to learn to prepare homogeneous liquid medicinal forms, to learn the ways of introduction of medicinal substances with different physical and chemical properties into the homogeneous liquid medicinal forms.

Educational tasks

I. Study informational material according to the given topic



! The main difference between purified water and water for injections is ***apyrogenicity***.



! Volume increase factor (CVI) and concentrated solutions are used ***only*** when the solvent is purified (treated) water. They ***cannot*** be used when the solvent is aromatic water.

Special cases of water solutions preparation

Name of substances	Way of introduction
Ethacridine lactate	Dissolve in hot water
Boric acid, camphor	Dissolve in 70 % alcohol
Iodine	Dissolve in saturated solution of potassium bromide (forming complex)
Osarsol	Dissolve in alkali medium
Copper sulfate	Grind in mortar with water
Calcium gluconate	Dissolve in a hot solvent or heat to complete dissolution

! When preparing alcoholic solutions, if the solvent is not specified, use **90 %** ethyl alcohol.

! Camphor + menthol + chloral hydrate = **eutectic alloy** (liquid)

II. Answer the tests, give explanations

№	Test	Explanation
1.	Which of the liquids given below should be measured by volume in making liquid dosage forms? 20 % solution of sodium bromide Vaseline oil Diethyl ether Eucalyptus oil Glycerin	
2.	Concentrated solutions CAN NOT be used in mixture making if: Aromatic water is solvent Purified water is solvent Mixture contains a potent agent Mixture contains syrups Mixture contains tinctures	
3.	A pharmaceutist prepared solution of ethacrydine lactate. What is the peculiarity of this substance dissolving? Dissolving in hot water Dissolving in freshly distilled water Dissolving in cold water Grinding in a mortar with water Dissolving in potassium iodide solution	
4.	Liquid dosage forms are prepared with concentrated solutions of pharmaceutical substances or under consideration of volume increase factor during substance dissolution when the following substance is used as a solvent: Treated water Aromatic water Glycerol Ethanol (ethyl alcohol) Polyethylene glycol-400	
5.	What technology should be chosen by a pharmacist to make a liquid dosage form, if it contains calcium gluconate? Dissolve it in hot solvent or heat it up to full dissolution First grind it to powder when it is dry or with small amount of solvent added Dissolve in water free of redox subsatances Add equal amount of sodium chloride Dissolve in alkaline medium	

№	Test	Explanation
6.	A pharmaceutist prepared the 2% aqueous solution by dissolving the drug substance triturated in a mortar. What substance is this technology typical for? Potassium permanganate Calcium gluconate Osarsolum Boric acid Potassium bromide	
7.	It is required to prepare furacilin solution (1:5000). What is the dissolution peculiarity of furacilin? It dissolves in the boiling water purified in the presence of sodium chloride It dissolves in the cold purified water It dissolves in a minimal amount of ethyl alcohol It dissolves in the purified water after the trituration It dissolves in the filtered purified water	
8.	A pharmaceutist has to prepare a medication by the following formulation: *Rp.: Natrii hydrocarbonatis 2,0 Natrii benzoatis 1,5 Liquoris Ammonii anisatis 4 ml Aquae Mentae 100ml* *M.D.S. 1 tablespoon 3 times a day.* Specify the component that is added in the first place: Mint water Sugar syrup Liquoris Ammonii anisatis Sodium hydrogen carbonate Sodium benzoate	
9.	To make a liquid №2 by Demyanovych prescription hydrochloric acid should be taken in the concentration: 24,8 – 25,2 % 0,83 % 98 % 30 % 10 %	
10.	A pharmacist has prepared a solution of menthol oil. Specify the dissolution temperature of the active substance: 40-50 ºC 60-70 ºC 30-40 ºC 70-80 ºC 20-30 ºC	

№	Test	Explanation
11.	A pharmacy received a prescription for 3% alcohol solution of boric acid. What concentration of ethyl alcohol is required for preparing the drug form? 70 % 60 % 40 % 90 % 96 %	
12.	A pharmaceutist prepares internal drops with the following formulation: 5 ml of adoniside, 10 ml of valerian and lily-of the-valley tincture each, 0,1 g of menthol, 2,0 g of potassium bromide. It will be efficient to dissolve potassium bromide in the following substance: In the adoniside In the lily-of-the-valley tincture In the valerian tincture In the mixture of tinctures Potassium bromide should be added into the selling vial last of all	
13.	A pharmacy received a formula for an alcohol solution of methylene blue with unspecified alcohol concentration. In this case, a pharmaceutist must use ethyl alcohol of the following concentration: 60 % 90 % 70 % 96 % 40 %	
14.	A pharmaceutist has to prepare 10% alcohol solution of iodine. What is the required concentration of ethanol for this purpose? 95 % 96 % 40 % 70 % 60 %	
15.	A pharmacist has prepared a liquid mixture. What component was added last into the vial? Tincture of valerian Simple syrup Purified water 20% sodium bromide solution Potassium bromide	

16.	Choose the solvent necessary to prepare concentrated solution of sodium bicarbonate in a pharmacy: Purified water Ethanol Peach-kernel oil Vaseline Chloroform	
17.	A pharmaceutical company produces Lugol's iodine solution. By type of solvent this solution belongs to the following group: Glycerine solutions Water solutions Oil solutions Alcohol solutions Chloroform solutions	

Notes

Topic 3: PREPARATION OF HETEROGENOUS LIQUID MEDICINAL FORMS

The objective: to learn to prepare heterogeneous liquid medicinal forms, to learn the ways of introduction of medicinal substances with different physical and chemical properties into the heterogeneous liquid medicinal forms.

Educational tasks

I. Study informational material according to the given topic

Solutions of high-molecular compounds (HMC)

HMC are natural or synthetic substances with a huge molecular weight from several thousands (not less than 10000 a.m.u.) to one million and more.

Name	Properties	Way of preparation
Pepsin	HMC with unlimited swelling	Dissolve in purified water, previously acidified by the solution of hydrochloric acid
Gelatin	HMC with limited swelling in cold water and unlimited – in hot	Add 10-multiple quantity of cold purified water, allow to stand for swelling for 30-40 min, then heat on the water bath. The drug is registered for dispensing by the label "Heat before use"
Methylcellulose	HMC with limited swelling in hot water and unlimited while cooling	Pour by hot water (the half amount of the total volume of the solution), after cooling up to the room temperature add the rest quantity of cold water and leave in refrigerator for 10-13 hours for complete dissolution
Starch	HMC with limited swelling in cold water and unlimited in hot	1 part of starch mix with 4 parts of cold water, add the muddy mixture obtained to the 45 parts of boiling water and boil for 1-2 min

Colloidal solutions

Colloidal solutions are ultramicroheterogeneous systems, where the structural unit is micelle (complex of molecules, atoms and ions).

Name	Properties	Way of preparation
1	**2**	**3**
Collargol	A colloidal substance. Strong effective, light sensitive substance. Slowly soluble in water.	Up to 1 % - dissolve in purified water in the bottle for dispensing, if 1 % and more - grind in the mortar adding purified water. Solutions are filtered through glass filters.
	Chemical Incompatibility: oxidation of solution of Adrenalin hydrochloride; coagulation in presence of dimedrol.	

1	2	3
Protargol	A colloidal substance (contains 8 % of silver oxide), soluble in water, glycerin.	Pour by a thin layer on the surface of the water to complete dissolution. If there is glycerin in the prescription, grind protargol with glycerin, then add water. Solutions are filtered through glass filters.
Ichthyol	A colloid, aromatic substance. Soluble in water and glycerin.	Weight out in a porcelain cup and dissolve in purified water. Solutions are filtered through glass filters.

Suspensions

Suspensions – are microheterogeneous dispersion systems consisting of solid medicinal substances in the suspended state, which are in the liquid dispersion medium (water, non-aqueous solvents).

Deryagin's rule: for thinner dispersion of powdered substances it is necessary to add the liquid in half the amount of its weight (**0.4-0.6 ml** of a liquid per 1.0 g of a dry substance).

The name of a stabilizer	The amount of a stabilizer per 1.0 g of the hydrophobic substance	
	With distinctly expressed properties (Camphor, Menthol, Thymol)	With poor expressed hydrophobic properties (Phenyl salicylate, Streptocide)
Gelatos	1.0	0.5
5 % solution of methylcellulose	2.0	1.0
Tween-80	0.2	0.1

! Suspensions of **sulfur** are stabilized by green soap (per 1.0 of sulfur – 0.1-0.2 of green soap).

Emulsions

Emulsions are homogeneous (by their appearance) medicinal forms consisting of mutual insoluble thin dispersed liquids intended for internal, external application, as well as for injections. Contains water phase, oil phase and emulsifier.

! Oil phase (sunflower, olive, peach oil) – 10 % from the mass of emulsion

Emulsifier	Water to prepare the primary emulsion
5.0 of gelatos	7.5 ml of water
2.0 of Tween-80	2-3 ml of water
1.0 of methyl cellulose	as 5 % solution – 20.0
0.5 g of sodium carboxymethylcellulose	as 5 % solution – 10.0
5.0 g of starch	as 10 % solution – 50.0

Introduction of medicinal substances (MS) into emulsions:

MS soluble in water →	dissolve in the portion of water intended for dilution of the primary emulsion
MS soluble in oil →	dissolve in oil before introducing it into the primary emulsion
MS insoluble in water and oil →	according to the rules of suspension's preparation (Deryagin's rule), add them as a fine powder thoroughly triturating with the emulsion prepared

Infusions and decoctions from medicinal plant raw material

Infusions and decoctions – are liquid medicinal forms, representing by water extracts from medicinal plant raw material and also by water solutions of dry or liquid extracts (concentrates).

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

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

The time of extraction

Water extraction	Time of infusion (the water bath temperature)	Time of cooling (the room temperature)
Infusion (up to 1 litre)	**15 min**	**45 min**
From 1 to 3 litres	25 min	45 min
Decoction (up to 1 litre)	**30 min**	**10 min**
From 1 to 3 litres	40 min	10 min
Infusions and decoctions with the indication "Cito!" in prescription	25 min	artificially

Technology of water extracts from plant raw material containing:

Alkaloids Bush pea (Thermopsis), Belladonna	The raw material is extracted by water acidified with the hydrochloric acid in the concentration of 0.83 %
Cardiac glycosides (Digitalis leaves, Adonis herb, Drimia bulbs, etc.)	pH of the medium should be neutral; observance of the degree of powdering the plant material; strict observance of the temperature and time regimen of infusion
Essential oils (Valerian roots and rhizomes, Mint leaves, Origanum herb, Chamomile flowers, etc.)	The process of extraction is conducted in infusers tightly closed with covers; Filter only after the complete cooling of infusion
Saponins (Polygala root, Polemonium root and rhizomes, Glycyrrhiza root)	Saponins are extracted in the presence of sodium hydrocarbonate (1.0 g per 10.0 g of the raw material), but only if it is prescribed
Anthraglycosides (Rhubarb roots, Rhamnus fruits, Senna leaves, etc.)	Decoctions from Rhubarb and Rhamnus are filtered immediately after removal of the infusion from the water bath. Filter decoctions from Senna leaves are filtered after the complete cooling (not less than in 3-4 hours)
Tannins (Oak bark, Potentilla rhizome, Sanguisorba root, Vaccinium fruits, Vitis idaea leaves, Uva-ursi)	These decoctions should be immediately filtered after removal the infusion from the water bath

Mucilages

Mucilages are viscous solutions of HMC or substances similar to polysaccharides.

Plant raw material	**Peculiarities of technology**	**The ratio between plant raw material and extragent**
Althea root	Infuse at the room temperature 30 min	1 : 20, use consumption coefficient
Flax seeds	Shake with hot water 15 min	1 : 30
Pumpkin seeds	Shake with cold water 5 min	1 : 50
Common plantain seeds	Shake with hot water 15 min	1 : 10

Infusions and decoctions from extracts-concentrates

Extracts-concentrates are a group of standardized extracts intended for the preparation of infusions and decoctions. By the consistence they can be liquid and dry.

! Dry extract is taken in the prescribed amount in prescription, liquid – in the double amount. For dry extracts, prescribed in the amount **more than 3 %**, is used CVI.

Dry extracts-concentrates →	Althea root 1:1, Adonis herb 1:1, Thermopsis herb 1:1, Convallaria herb1:1, Digitalis leaves 1:1
Liquid extracts-concentrates →	Valerian roots 1:2, Leonuri herb 1:2, Adonis herb 1:2

II. Answer the tests, give explanations

№	Test	Explanation
	A pharmacy prepared a solution of macromolecular substance with limited swelling capacity. What solution was labelled "warm up before use"? Gelatin Trypsin Pepsin Methyl cellulose Pancreatin	
2.	Specify the medicinal substance with pronounced hydrophobic properties: A. Sulfur B. Basic bismuth nitrate C. Zinc oxide D. Sodium bromide E. Magnesium oxide	
3.	Suspension workshop introduces production of new drugs. Specify the optimal approach to suspension production: Grinding in a liquid medium Drop method Repercolation Percolation Maceration	

№	Test	Explanation
4.	A pharmacist has used condensation method to prepare a suspension. Select the substances that make up the precipitate: Calcium chloride with sodium hydrocarbonate Caffeine and sodium benzoate with zinc oxide Sodium bromide with camphor Potassium bromide with sodium benzoate Magnesium sulfate with potassium iodide	
5.	To prepare a suspension a medicinal substance should be triturated with a small amount of liquid. Specify the optimal amount of liquid for trituration of 10g of zinc oxide according to the Deryagin's rule: 5 ml 10 ml 2 ml 1 ml 0.5 ml	
6.	To increase hydrophobic suspension stability a stabilizer is added. Name this stabilizer. Polysorbate 80 (Tween 80) Sodium chloride Dimethyl sulfoxide Glucose Vaseline oil	
7.	Stability of suspensions can be enhanced by substances which increase the viscosity of the dispersion medium. Specify the substance that exhibits such properties: Glycerol Purified water Ethanol Dimexid Ether	
8.	Suspensions as heterogenous systems can be characterized by kinetic and sedimentary instability. What substance is used for increasing suspension stability with hydrophobic substances? Gelatos Sodium chloride Boric acid Sodium sulphate Glucose	

№	Test	Explanation
9.	The method of suspension preparation depends on the properties of its components. Specify the substances having hydrophobic properties: Camphor, menthol Sodium bicarbonate, sodium sulfate Boric acid, calcium carbonate Zinc oxide, talc White clay, bentonite	
10.	5 % solution of methylcellulose is used as a stabilizer for preparing a suspension of the following drug substance: Terpine hydrate Magnesium oxide Starch Bismuth nitrate basic Zinc oxide	
11.	A pharmacy compounds suspensions. What substance can be used for preparing a suspension without adding the stabilizer? Magnesium oxide Camphor Sulfur Menthol Phenyl salicylate	
12.	A pharmaceutist prepared a suspension. It must contain the following amount of fluid in order to comply with Deriagin's rule: 0.4-0.6 milliliters for 1.0 substance 1-0.8 milliliters for 1.0 substance 1.5-0.7 milliliters for 1.0 substance 0.9-2.0 milliliters for 1.0 substance 0.1-1.0 milliliters for 1.0 substance	
13.	A pharmaceutist has prepared a suspension with a hydrophobic substance. What stabilizer is required for its preparation? 5 % solution of methyl cellulose Sodium thiosulfate Glucose Sodium chloride Polyethylene oxide	

№	Test	Explanation
14.	A pharmaceutist prepared 100,0 g of oil emulsion using 5 % solution of methylcellulose as an emulsifier. Specify the required amount of oil and emulsifier for the drug preparation: 10.0 g, 20.0 g 20.0 g, 30.0 g 10.0 g, 10.0 g 10.0 g, 30.0 g 20.0 g, 10.0 g	
15.	A pharmaceutist made a tincture of Adonis herds peculiarity of its preparation is that the active substances are derived in: In the neutral medium In the alkalescent medium In the alkaline medium In the subacid medium In the acid medium	
16.	A doctor prescribed his patient an emulsion of olive oil which includes anesthesin. To incorporate anesthesin into the emulsion it must be dissolved: In oil before preparing the emulsion In the finished emulsion In the purified water In the primary emulsion In the alcohol, and then added to the primary emulsion	
17.	A pharmaceutist has prepared an emulsion. Specify the way of incorporation of the fat-soluble substances: They are dissolved in oil They are dissolved in purified water They are incorporated in undissolved form They are added to the finished emulsion They are added to the emulsifier	
18.	A pharmaceutist has to prepare an oil emulsion with menthol. Specify the appropriate way of the active substance incorporation: Dissolution in oil Dispersion with the addition of ready emulsion Dissolution in water intended for diluting the primary emulsion Dissolution in the ready emulsion by heating Incorporation into the ready primary emulsion	

№	Test	Explanation
19.	What ratio is used in making hawthorn tincture? 1:10 1:2 1:5 1:20 1:1000	
20.	A pharmacist has made an althaea root tincture.What proportion of raw herbal material to extractant was chosen by the pharmacist to make this tincture? 1:20 1:10 1:30 1:100 1:400	
21.	A pharmaceutist prepared an oil emulsion containing zinc oxide. Specify the rational method of substance incorporation: Suspension-type icorporation into the emulsion Dissolution in oil Grinding with water for dilution of the primary emulsion Dissolution in water for preparation of the primary emulsion Dissolution in the finished emulsion	
22.	A pharmaceutics brews an aqueous extract out of medicinal raw material in the tightly closed infusion vessel for 15 minutes and stirs it without opening the lid. Such technology of infusion preparation is typical for the following medicinal raw material: Mint leaves Bilberry leaves Senna leaves Manzanita leaves Cowberry leaves	
23.	Specify the amount of herbal material necessary to make a dosage form according to the prescription: Take 200 ml of motherwort herb solution. Dispense. Prescribed dosage is 1 table spoon 3 times a day. 20.0 10.0 1.0 5.0 4.0	

№	Test	Explanation
24.	A pharmacy got the following recipe: *Rp.: Mucilaginis Amyli 50.0 Da. Signa. For the enema purposes.* How much starch and distilled water did the pharmaceutist use in order to make this preparation? 1.0 g of starch; 49 ml of distilled water 1.0 g of starch; 50 ml of distilled water 2.0 g of starch; 48 ml of distilled water 5.0 g of starch; 45 ml of distilled water 10.0 g of starch; 40 ml of distilled water	
25.	A pharmaceutist made a tincture of althaea root. What is the proportion of herbal crude drug and extractant? 1:20 1:10 1:30 1:100 1:400	
26.	A doctor prescribed a patient 100 ml of tincture made out of 0,25 of Herba Thermopsidis. How much dried concentrated extract of Herba Thermopsidis should be weighed by a pharmaceutist? 0.25 g 0,5 g 0.3 g 0.2 g 0.1 g	
27.	A pharmacy received a prescription for tincture. What raw herbal material can be used to make this dosage form? Valerian rootstock Rhubarb roots Oak bark Arrow-wood bark Buckthorn bark	
28.	How much water should be taken in order to prepare 200 ml of aqueous extract of motherwort (water absorption coefficient = 2 ml/g)? 240 ml 220 ml 200 ml 160 ml 210 ml	

№	Test	Explanation
29.	While preparing decoctions in volume from 1000 to 3000 ml time of processing in boiling water bath should be: 40 minutes 25 minutes 30 minutes 45 minutes 15 minutes	
30.	A patient acquired mint leaves at a pharmacy. What recommendations regarding infusion of this herbal raw material must be given by the pharmaceutist? The infusion is to be prepared in a tightly closed vessel The infusion is to be prepared on an open fire The infusion is to be prepared at room temperature The extract is to be immediately filtered after infusing The extract is to be artificially cooled 15 minutes after infusing	
31.	A pharmaceutist prepared 150 ml of *Adonis vernalis* infusion using dry extract concentrate [1:1] that had to be weighed in the amount of: 5.0 7.5 10.0 15.0 22.5	
32.	A patient purchased peppermint leaveseaves at a pharmacy. What recommendations on infusing this herbal raw material must be given by the pharmaceutist? The infusion is to be prepared in a tightly closed vessel The infusion is to be prepared on an open fire The infusion is to be prepared at room temperature The extract is to be immediately filtered after infusing The extract is to be artificially cooled 15 minutes after infusing	
33.	It is required to prepare a decoction of bearberry leaves. Specify the ratio of raw materials to the extractant if not indicated in the formulation: 1:10 1:20 1:30 1:5 1:400	

№	Test	Explanation
34.	A pharmaceutist prepares 3000 mL of valerian root infusion for a hospital department. The given amount of extract should be infused in a water bath for: 25 minutes 45 minutes 15 minutes 10 minutes 30 minutes	
35.	A pharmaceutist prepares an infusion at a ratio of 1:30.What herbal raw material will be used? Lily of the valley grass Marshmallow root Sage leaves Oak bark Shoots of Marsh Labrador tea	
36.	A pharmaceutist has to prepare an aqueous extract of medicinal plants. What can be used as a substitute of plant material in the drug preparation? Standardized extract concentrate Tincture Liquid extract Thick extract Aromatic water	
37.	While preparing marshmallow root extract, a pharmaceutist mistakenly used the water of improper temperature for this extract, and the end product came up turbid. What is the required water temperature for the extraction of this herbal material? Room temperature 40 ºC 100 ºC 60 ºC 80 ºC	
38.	A pharmacy prepares a drug that contains a high-molecular compound with unlimited swelling ability. Name this material: Pepsin Gelatine Methylcellulose Protargol Starch	

39.	A pharmacy has received a prescription for colloid solution. Name this solution: Collargol solution **5%** glucose solution Burow's solution Sodium chloride solution Nonaqueous solution	
40.	A pharmacist has made a drug by the prescription: Rp.: Sol. Protargoli 0,3 1,0 D.S. For irrigation. Specify the optimal technology of preparation: Grind protargol in the mortar with glycerine, add water Dissolve glycerine in -the water, add protargol Dissolve protargol in the water, add glycerine Measure out protargol into the vial, dissolve it in the water, add glycerine Measure out subsequently glycerine, . water, and protargol into the vial	
41.	To prepare a suspension a medicinal substance should be triturated with a small amount of liquid. Specify the optimal amount of liquid for trituration of 10 g of zinc oxide according to the Deriagi n's rule: 5 0,5 ml 1 ml 10 ml 2 ml	
42.	A pharmacist prepares a chamomile flowers infusion. Specify the proportion of raw material to infusion: 1:10 1:50 1:30 1:400 1:20	
43.	Infuser apparatus is used by a pharmacy to prepare: Infusions and decoctions Suspensions Emulsions Ointments Infusion solutions	

Notes

Topic 4: PREPARATION OF LINIMENTS, OINTMENTS, SUPPOSITORIES

The objective: to learn to prepare liniments, ointment, suppositories, to learn the ways of introduction of medicinal substances with different physical and chemical properties into these medicinal forms.

Educational tasks

I. Study informational material according to the given topic

Liniments

Liniments (or liquid ointments) are medicinal forms for external application, which melt at the body temperature and are used by rubbing into the skin.

Liniment-emulsion o/w type	**Liniment-solution**	**Liniment of Rosental**
Ol. Helianthi 7.4 Sol. Ammonii caustici 25 ml Ac. Oleinici 0.1 M.f. linimentum D.S. To be rubbed in.	Chloroformii Olei Helianthi Methylii salicylatis ana 10.0 M.D.S. For infriction. Specify the kind of disperse system	Iodi 0.3 Paraffini 15.0 Spiritus aethylici 95% 10 ml Chloroformii 80.0 M.D.S. For warm dressings.

! **Liniment of Rosental:** place iodine, paraffin and chloroform into a vial for dispensing, cover it with the lid, then put on the water bath till complete dissolution and then add alcohol.

Ointments

! If in the prescription concentration of the medicinal substances isn't indicated, prepare 10 % ointment.

Ointments-suspension (medicinal substances are insoluble in water and in oil: basic bismuth nitrate, salicylic acid, boric acid, xeroform, streptocide, talc, norsulfasol, zinc oxide, magnesium oxide)	Up to 5 %	Triturate with half amount of the liquid suitable to the base by properties
	from 5 % to 20 %	Triturate with half amount of the melted base
	20 % and more **[pastes]**	Triturate with whole melted base in the mortar
Ointments-solution (medicinal substances are soluble in oil: menthol, camphor, phenylsalicylate, thymol, anaestesin up to 2 %)	Up to 5 %	Dissolve in the equal amount of the liquid suitable to the base
	5 % and more	Dissolve in the equal amount of melted base
Ointments-emulsion (medicinal substances are soluble in water: dicain, novocain, dimedrol, protargol, tannin)	Up to 5 %	Dissolve in the equal amount of purified water (calculate from lanoline: contains **30 %** of water)
	5 % and more	Triturate with half amount of the melted base

Suppositories

Suppositories are medicinal dosage forms, which are solid at the room temperature and melt at the body temperature.

According to the place of insertion suppositories can be ***rectal*** (torpedo or cigar, cone, cylinder; ***vaginal*** (balls; egg-shaped vaginal suppositories; pessaries) and ***bacillus*** (sticks).

Hydrophilic bases

Base	Composition, properties
Gelatin-glycerin	Gelatin - 1, water - 2, glycerin - 5 parts It is stable, subjected to drying out and microbic damage, incompatible with electrolytes, acids, alkalis, salts of heavy metals
PEO base	PEO-400 5 %, PEO-1500 95 %

Hydrophobic bases

Base	Properties
Cacao butter	Has plastic properties and is used for preparation suppositories by the **rolling-out method**
Butyrol	Is recommended for preparation suppositories by the **pouring out and pressing methods**

! **Anhydrous lanoline** is using as a plasticizer in case of crumbling of suppository mass (1-1.5 g per 30.0 of suppositories mass).

Wax restores density and plasticity of suppository mass.

Introduction of medicinal substances into suppositories

Medicinal substances, soluble in the base	→ Mix with the base or dissolve in the part or in all quantity of the melted base
Medicinal substances, soluble in the water	→ Under 5 % - dissolve in few drops of water, more than 5 % - triturate in a dry form with a small quantity of liquid
Medicinal substances insoluble neither in water nor in the base	→ Incorporated into the mass as a superfine powder
Medicinal substances in the form of liquids	→ Mix with the powdered base and when pouring out - with the melted base

II. Answer the tests, give explanations

№	Test	Explanation
	A pharmaceutist made a medicinal preparation according to the following formulation: *Rp.: Chloroformii Olei Helianthi Methylii salicylatis ana 10,0 M.D.S. For infriction.* Specify the kind of disperse system: Liniment - solution Liniment - combined Liniment - emulsion Liniment suspension Liniment extractional	
2.	The patient has been prescribed Linimentum Rosentali. It is composed of: Paraffin, alcohol, chloroform, iodine Castor oil, calcium chloride, alcohol Chloroform, methyl salicylate, turpentine Iodine, potassium chloride, glycerin Sunflower oil, ammonia, oleic acid	
3.	Spesify the type of the following liniment: *Ol. Helianthi 7,4 Sol. Ammonii caustici 25 ml Ac. Oleinici 0,1 M.f. linimentum D.S. To be rubbed in.* Liniment, emulsion o/w Combined liniment Liniment-solution Liniment-suspension Liniment, emulsion w/o	
4.	A pharmacy received the following formulation: *Rp.: Xeroformii Picis Liquidae Betulae ana 3,0 Olei Ricini 100,0 M.D.S. For wound anointing.* Specify the dosage form: Liniment Hydrophilic ointment Paste Combined ointment Solution	
5.	Oil liniments are produced with fatty oils used as a base. What kind of oil should be used by a pharmacist if it was not specified in the formulation? Sunflower oil Petrolatum Cod-liver oil Sesame oil Eucalyptus oil	

№	Test	Explanation
6.	A pharmacy has to prepare a soft drug based on the gel made from inorganic substances. Which of these high-molecular compounds can be used for preparing such a base? Bentonites Cellulose ethers Starch Polyethylene oxides Collagen	
7.	A pharmaceutical enterprise produces ointments. What base is used for production of sulfur ointment simple? Emulsion Vaseline Base ”For ophthalmic ointments” Lanolin Polyethylene glycol	
8.	A pharmacy technologist received an ointment formulation: *Rp.: Unguentum Resorcini 1,5% - 10,0 Da. Signa. To be applied on the affected skin areas.* The pharmaceutist incorporated dry medical substance into the ointment by the following way: Trituration with a few drops of Vaseline oil Trituration with a few drops of ethyl alcohol Trituration with a few drops of water Adding to the fused vaseline Trituration with a part of vaseline	
9.	A pharmaceutist has prepared an ointment intended for application on the open wound surface. Such kind of ointment should meet the following additional requirement: Sterility Isotonicity Isoviscosity Isoionicity Prolonged action	
10.	A pharmaceutist prepares a suspension ointment. What substance is soluble in water, but should be incorporated into the ointments as a suspension? Resorcinol Zinc oxide Sulfacyl sodium Furacilin Potassium iodide	

№	Test	Explanation
11.	A pharmacy received a prescription for an oil liniment including streptocidum. What is the type of disperse system of this preparation? Suspension Emulsion Solution Alloy Combined	
12.	A pharmaceutist has prepared a suspension ointment. Specify the substance used for this type of ointments: Zinc oxide Protargolum Menthol Ichthyol Potassium iodide	
13.	It is required to prepare 50 g of zinc ointment for a patient. What amount of zinc and vaseline must be weighed out by a pharmaceutist? 5,0 and 45,0 g 10,0 and 40,0 g 2,5 and 40,0 g 1,0 and 49,0 g 0,5 and 49,5 g	
14.	A pharmaceutist prepared an ointment by the formulation: *Rp.: Tannini 0,2 Lanolini 3,0 Vaselini 10,0 M. ut f. ung. D.S. To anoint the affected skin areas.* What method of tannin incorporation is used? Water dissolution, emulsification with anhydrous lanolin Trituration with liquid petrolate in a mortar by Deryagin rule Dissolution in molten vaseline Trituration with an alcohol in a mortar, blending with the base Dissolution in liquid petrolate	
15.	Pharmaceutical plants produce ointments on various bases. Specify the ointment base having the most pronounced osmotic properties: Polyethylene oxide Silicon Vaseline, lanolin Methyl cellulose Hydrogenated fat	

№	Test	Explanation
16.	A pharmaceutist prepared a surface action ointment. What ointment base was used? Vaseline (petrolatum) Lanoline Kutumova's basis Gelatin-glycerol base Polyethylene oxide basis	
17.	A pharmaceutist prepared the massage cream of the following composition: Beeswax 12,0 Almond oil 68,5 Spermaceti 12,0 Anhydrous lanolin 7,5 Essential oil of lavender 3 drops. Specify the cream type: Oily Non-oily Emulsion Suspension Combined	
18.	A pharmacy prepares ointments with extracts. What is the way to incorporate the dry and thick extracts into the ointments? To triturate them first with alcohol-water-glycerol [1:6:3] mixture To incorporate them directly into molten ointment base To dissolve them in water first To disperse them with a liquid which is compatible with the base To disperse them with ethanol	
19.	A pharmaceutics prepares an ointment on a hydrophobic base. What substance does he use in order to reduce the melting point of the base? Vaseline oil Glycerol PEG-40 Dimexide Ethanol	
20.	A pharmaceutist prepared a drug by the prescription: Rp.: Streptocidi Dermatoli ana 1,0 Lanolini Vaselini ana 5,0 M.D.S.: Apply to the affected skin. Specify the type of the disperse system: Suspension ointment Solution ointment Hydrophilic ointment Combined ointment Extraction ointment	

№	Test	Explanation
21.	A pharmaceutist prepared a lipophilic ointment of suspension type. What substance is used for preparing this kind of ointments? Xeroform Protargolum Menthol Tannin Herbal extracts	
22.	When preparing dermatological ointments the following substance should be introduced by suspending: Xeroform Camphor Menthol Protargol (silver proteinate) Ephedrine hydrochloride	
23.	When preparing dermatological ointments the following substance should be introduced by suspending: Xeroform Camphor Menthol Protargol (silver proteinate) Ephedrine hydrochloride	
24.	A pharmacist has made polyethylene oxide-based suppositories with Streptocid. Specify the approach to introducing the active ingredient in to the vehicle: Dissolution in the molten vehicle Emulsification and blending with the vehicle Trituration with small amount of water Suspending in the vehicle Blending with vaseline oil	
25.	A pharmacist prepares cocoa butter-based round vaginal suppositories with less than 5% of citric acid. Specify the most rational approach to introduction of the active ingredient into the vehicle: Dissolve in minimal quantity of purified water Dissolve in Dimexid (Di- methylsulfoxide) Dissolve in molten cocoa butter Dissolve in vaseline oil Dissolve in alcohol	

№	Test	Explanation
26.	In course of preparation of suppositories by the pumping method the suppository mass became viscous and fluid after the incorporation of chloral hydrate into the cocoa butter. What substance should be added to the suppository mass in order to restore its density and plasticity? Wax Glycerine Purified water Dimexid Starch	
27.	A pharmaceutist prepared suppository mass with novocaine and cocoa butter, but it turned out to be crumbling. What substance to be added to form a plastic mass: Anhydrous lanolin Hydrous lanolin Paraffin Vaseline Wax	
28.	Which of the vaginal dosage forms relate to the officinal formula, that is, are prepared in a pharmacy? Pessaries Vaginal tablets Vaginal capsules Vaginal foams Vaginal tablets for preparing solutions and suspensions	
29.	A pharmaceutist has prepared vaginal suppositories. Specify the form of these suppositories: Marbles Torpedo Cylinder Cone Sticks	
30.	A pharmaceutist is preparing rectal suppositories based on cocoa butter and containing dimedrol with mass concentartion less than 5%. For rational incorporation of dimedrol into the base it should be solved: In the minimum amount of treated water In olive oil In the melted cocoa butter In vaseline oil In alcohol	

№	Test	Explanation
31.	What is the function of anhydrous lanolin in the suppository mass used for suppositories prepared by hand rolling? Plasticizer Solvent Preservative Solubilizer Emollient	
32.	A patient has been prescribed handrolled rectal suppositories with 0,1 g of aminophylline. What is the amount of base required for each suppository, provided that the suppository weight is not specified in the formulation? 2,9 g 3,9 g 2,4 g 1,9 g 1,4 g	
33.	A pharmaceutist is preparing fat based suppositories by method of pouring. What base is to be used for this purpose? Butirol Vaseline (petrolatum) Cocoa butter Wax Spermaceti	
34.	A pharmaceutist is preparing vaginal suppositories by method of pouring. Which hydrophilic base can he use for this purpose? Polyethylene oxide Cocoa butter Vitepsol Hard fat Butyrol	
35.	Lipophilic bases for suppositories include: Mixtures of hydrogenatedd fats Polyethylene oxide base Gelatin-glycerol base Collagen base Glycerol soap base	
36.	A pharmacist has prepared a drug by the prescription:	

	Rp.: Streptocidi Dermatoli ana 1,0 Lanolini Vaselini ana 5,0 ***M.D.S.: Apply to the affected skin.*** *Specify the type of the disperse system:* Suspension ointment Solution ointment Extraction ointment Hydrophilic ointment E. Combined ointment	
37.	A patient needs the pharmacy to prepare him a camphor ointment. What concentration of camphor should be in the ointment according to the regulatory documents? 10% 5% 1% 20% 15%	
38.	A pharmacist has made a topical solution with lipophilic vehicle. Specify the substance that produces such a type of solution: Menthol Starch Dermatol (bismuth subgallate) Sulfur Novocaine hydrochloride	
39.	Polyethylene oxide base belongs to the following group: Hydrophilic Emulsion Amphiphilic Hydrophobic Fat	
40.	A pharmacist has made a topical solution with lipophilic vehicle. Specify the substance that produces such a type of solution: Menthol Starch Dermatol (bismuth subgallate) Sulfur Novocaine hydrochloride	

№	Test	Explanation
41.	A pharmaceutist is preparing vaginal suppositories by method of pouring. Which hydrophilic base can he use for this purpose? Polyethylene oxide Cocoa butter Vitepsol Hard fat Butyrol	
42.	A pharmaceutist has to prepare suppositories with a glycerine gelatin base by the molding method. What is the ratio of gelatin, water and glycerine required for the base? 1:2:5 2:2:4 1:3:4 2:1:5 3:2:3	
43.	Suppositories are prepared by various methods such as rolling, pouring, pressing. What base is used in the pouring method? Butyrolum Paraffin Cocoa butter Vaseline Coriander oil	

Notes

Topic 5: PREPARATION OF ASEPTICAL MEDICINES

The objective: to learn to prepare homogeneous liquid medicinal forms, to learn the ways of introduction of medicinal substances with different physical and chemical properties into the homogeneous liquid medicinal forms.

Educational tasks

I. Study informational material according to the given topic

! Term of storage of water for injections is not more than **24 hours** in the aseptic conditions.

Sterilization of solutions for injections

Volume	Temperature and time
till 100 ml	120 °C – 8 min
101- 500 ml	120 °C – 12 min
501 – 1000 ml	120 °C – 15 min

Stabilisation of solutions for injections

Salts of strong bases and weak acids (Sodium caffeine benzoate solution)	Stabilizer – 0.1 M sodium hydroxide solution (4 ml per 1 liter of solution)
Salts of weak bases and strong acids (Novocain solution)	Stabilizer – 0.1 M hydrochloric acid solution
Glucose solutions	Stabilizer – Weibel liquid

Peculiarities of formulation of sodium hydrocarbonate solutions for injections:

- a substance with the mark «chemically pure», «pure for analysis», «suitable for injections»;
- dissolution is performed at of 15-20 ºC without shaking thoroughly;
- bottles are filled up to 2/3 of volumes (70 %);
- bottles are sterilized, when they are in the horizontal position;
- the medicine is used in 2-3 hours after complete cooling and shaking.

Ophthalmic ointments

! All ophthalmic ointments are prepared aseptically. If the base is not indicated in the prescription, the following one is usually used: **Vaseline** of «for ophthalmic ointments» type **and Anhydrous lanolin 9:1.**

! Resorcinol and zinc sulphate into ophthalmic ointments can be introduced only after dissolving in water

Medicinal forms with antibiotics

Ointments with antibiotics are prepared in aseptic conditions observing the general rules for preparing ointments using a mixture of **4 portions of anhydrous lanolin** and **6 portions of vaseline** («for eye ointments») as a base.

II. Answer the tests, give explanations

№	Test	Explanation
	Prior to making a sodium chloride isotonic solution a pharmacist baked the powder in a dry heat box. What substances are removed by this operation? Pyrogenic substances Redox substances Sulfates Chlorides Moisture	
2.	152. Sterilization methods applied for the preparation of drugs under aseptic conditions can be differentiated into physical, mechanical, and chemical ones. Specify the chemical method of sterilization: Addition of preservatives Dry heat sterilization Radiation sterilization Pressure steam sterilization UV light sterilization	
3.	Specify the indicator which measures the total contribution of various solutes to the osmotic pressure of the solution: Osmolality Isohydricity Isotonicity Isoviscosity Apyrogenicity	
4.	A pharmacy received an order for 2500ml of isotonic sodium chloride solution. How much sodium chloride and water for injections should be taken to prepare this dosage form? 22,5 g of sodium chloride and 2500 ml of water for injections 50,0 g of sodium chloride and 2450 ml of water for injections 25,0 g of sodium chloride and 2500 ml of water for injections 30,0 g of sodium chloride and 2500 ml of water for injections 100,0 g of sodium chloride and 2400 ml of water for injections	

№	Test	Explanation
5.	Pharmacies prepare injectable solutions. Which solution is prepared without any stabilizer? Sodium bicarbonate solution Sodium thiosulfate solution Solution of caffeine sodium benzoate Glucose solution Novocain solution	
6.	A pharmaceutist needs to sterilize 250 ml of glucose solution for injections. How many minutes should the solution undergo sterilization in the autoclave under the temperature of 120° C? 12 8 15 25 30	
7.	A pharmacist should make 200 ml of 3%sodium bicarbonate solution for injections. What are the specifics of making this solution? Vial should be filled to 2/3 of its volume; sterilization at 120 0C for 12 minutes No sterilization Dissolve by heating; sterilization at 120 0C for 12 minutes Use stabilizing agent Use water free of redox substances	
8.	100 ml of 0,9% sodium chloride solution were prepared according to the doctor's prescription. What sterilization schedule is required for this solution? 120 ℃ - 8 minutes 120 ℃ - 12 minutes 120 ℃ - 15 minutes 180 ℃ - 30 minutes 100 ℃ - 15 minutes	
9.	What stage is the last in making injection solutions? Labeling Sterilization Filtering Qualitative control Quantitative control	

№	Test	Explanation
10.	An edema can be relieved by means of hypertonic solutions. What phenomenon takes place in the blood cells after injection of such solution? Plasmolysis Hydrolysis Hemolysis Lipolysis Electrolysis	
11.	Hexamethylenetetramine solution sterility is achieved by: Filtering through bacterial filters Preserving agents Gas diffusion sterilization Tyndallization method of sterilization Pressure steam sterilization	
12.	A pharmaceutist has to sterilize 400 ml of calcium gluconate solution for injections. Specify the time of autoclave sterilization of the solution at 120*oC*: 12 minutes 20 minutes 15 minutes 10 minutes 30 minutes	
13.	Injection solutions of salts derived from weak acids and strong bases require stabilization. What stabilizers are used for these solutions? 0,1 M sodium hydroxide solution 0,1 M acid chloride solution Trilon B Ascorbic acid Buthylhydroxytoluene	
14.	A pharmacy produces some injection solutions that have to be apyrogenic. Solution of the following substance can be depyrogenized by method of adsorption with activated carbon? Glucose Atropine sulfate Papaverine hydrochloride Scopolamine hydrobromide Platyphyllini hydrotartras	

№	Test	Explanation
15.	A pharmacist has made an injection solution with 0,1M of sodium hydroxide solution as a stabilizer. What substance requires such stabilizer? Caffeine and sodium benzoate Dibazol (Bendazol) Sodium hydrocarbonate Sodium chloride Glucose	
16.	A pharmacy makes infusion solutions. Specify the solution that restores water-salt metabolism. Ringer-Locke's solution Polyglucinum Neohaemodesum Hydrolysine Dextran	
17.	A pharmaceutist prepares a solution for injections that must be stabilized with 0,1M of hydrochloric acid solution. What solution is to be prepared? Novocaine Calcium chloride Potassium chloride Hexamethylenetetramine Sodium benzoate	
18.	A pharmaceutist prepared an injectable solution of novocaine. What stabilizer had been used? Hydrochloric acid solution Sodium bicarbonate solution Stabilizator of Weibel Sodium sulfite solution Sodium thiosulfate solution	
19.	A pharmacy got an order for eye drops containing 1% solution of pilocarpine hydrochloride. What substance was used in order to ensure isotonicity? Sodium chloride Boric acid Glucose Sodium nitrate	
20.	A pharmaceutist prepared eye drops with silver nitrate. What substance must be taken to ensure isotonicity? Sodium nitrate Sodium chloride Boric acid Glucose Sodium sulfate	

№	Test	Explanation
21.	To prepare eye drops with antibiotic a dispensing chemist has been using flowing steam sterilization under 100 ºC for 30minutes.What antibiotic allows for such sterilization? Levomycetin (Chloramphenicol) Sodium benzylpenicillin Streptomycin sulfate Biomycin Erythromycin	
22.	A pharmacist made eye drops of pilocarpine hydrochloride and adrenaline hydrochloride solution. A peculiarity of the incorporation of the adrenaline hydrochloride solution is that it is added: After sterilization, aseptic After dissolving of solids To the half dose of solvent In the first place After isotoning	
23.	A pharmaceutist prepared eyedrops with boric acid. What sterilization method was applied? Sterilization by saturation vapor pressure Tyndallization Sterilization by dry heat Sterilization by gases By high-frequency current	
24.	Eyedrops are prepared with an ointment base which is an alloy of vaseline and lanolin. Specify the method of its sterilization: Dry heat Ethylene oxide Flowing steam Pasteurization Tyndallization	
25.	A pharmacy received a prescription for vaseline-lanoline based eye ointment. What proportion of vaseline to lanoline should be chosen by a pharmacist to make the ointment base? 9:1 1:1 5:1 8:2 7:3	

№	Test	Explanation
26.	A pharmacist has dissolved a medicinal substance in sterile purified water to make an eye ointment. Specify this medicinal substance: Pilocarpine hydrochloride Xeroform Menthol Basic bismuth nitrate Purified sulfur	
27.	A pharmacist needs to prepare 10.0 g of eye ointment vehicle. What amounts of lanolin and vaseline should be taken? 1.0 g of anhydrous lanolin and 9.0 g of vaseline 1.0 g of anhydrous lanolin and 29.0 g of vaseline 12.0 g of anhydrous lanolin and 18.0 g of vaseline 27.0 g of anhydrous lanolin and 3.0 g of vaseline 10.0 g of anhydrous lanolin and 20.0 g of vaseline	
28.	Ophthalmic drops are produced on the base of concentrated riboflavin solution (1:5000). How much solution should be taken if the formulation says "0,001 of riboflavin"? 5 ml 2 ml 3 ml 4 ml 1 ml	
29.	Dispersion degree of drug substances is of great importance for the preparation of ophtalmic ointments. What drug substance should be thoroughly triturated with sterile vaseline oil before incorporating it into the pharmacopoeiarecommended ointment base? Mercuric oxide yellow Resorcin Pilocarpine hydrochloride Zinc sulfate Ethyl morphine hydrochloride	
30.	Specify the base for the preparation of antibiotic ointments: 6 parts of vaseline + 4 part of lanolin 8 parts of vaseline + 2 part of lanolin 5 parts of vaseline + 5 part of lanolin 7 parts of vaseline + 3 part of lanolin 5 parts of vaseline + 1 part of lanolin	

№	Test	Explanation
31.	A pharmaceutist prepares several different solutions with antibiotics under aseptic conditions. He can sterilize the solution of the following substance: Chloramphenicol Benzylpenicillin-sodium Neomycin sulphate Benzylpenicillin-potassium Polymyxin sulphate	
32.	To prepare eye drops with antibiotic a pharmacist has using flowing steam sterilization under 100 ºC for 30 minutes. What antibiotic allows for such sterilization? Levomycetin (Chloramphenicol) Sodium benzylpenicillin Streptomycin sulfate Biomycin Erythromycin	
33.	A pharmaceutist is preparing an ointment under aseptic conditions on the sterile ointment base - composition of vaseline and lanoline with the ratio 6:4. The drug substance is incorporated by suspension type. Such technology of ointment preparation is typical for the following substance: Benzylpenicillin sodium Sodium chloride Thiamine chloride Pilocarpine hydrochloride Sodium sulfate	
34.	A pharmacy received a prescription for preparation of dermatological ointment with benzylpenicillin. Specify the type of ointment that necessary to prepare: Suspension ointment Liquid ointment Hydrophilic ointment Alloy ointment Combined	
35.	A pharmacy received a formulation for eye drops containing 1% solution of pilocarpine hydrochloride. What substance should be used to ensure that the resultant solution is isotonic? Sodium chloride Boric acid Glucose Sodium nitrate Sodium sulfate	

№	Test	Explanation
36.	A pharmacist has made an injection solution that contains a salt produced by reaction of a strong base with a weak acid. Specify the necessary stabilizer: Sodium hydrochloride (Sodium hydroxide) Sodium sulfate Hydrochloric acid Cysteine Ascorbic acid	
37.	50 ml of injection solution has been made in a pharmacy. Specify the process of solution sterilization: 120°C - 8 minutes 110°C -15 minutes 180°C - 30 minutes 160°C -15 minutes 140°C -12 minutes	
38.	Weibel's liquid is necessary to stabilize the solution of a certain substance. Name this substance: Glucose Novocaine Potassium chloride Sodium chloride Magnesium sulfate	
39.	If vehicle is not specified, an eye ointment should be prepared with the following sterile vehicle: 10 parts of anhydrous lanolin - 90 parts ***of vaseline*** For Eye Ointments ***Vaseline*** For Eye Ointments 30 parts of lanolin - 70 parts of vaseline Lanolin: vaseline -1:1 40 parts of anhydrous lanolin - 60 parts of vaseline **For Eye Ointments**	
40.	A pharmacy prepares 10% sodium chloride injection solution. What sterilization would be optimal in this case? Autoclave chamber with high-pressure saturated steam Sterile filtration through membrane Irradiation sterilization Dry-heat sterilization Gas sterilization	

Topic 6: INCOMPATIBILITIES

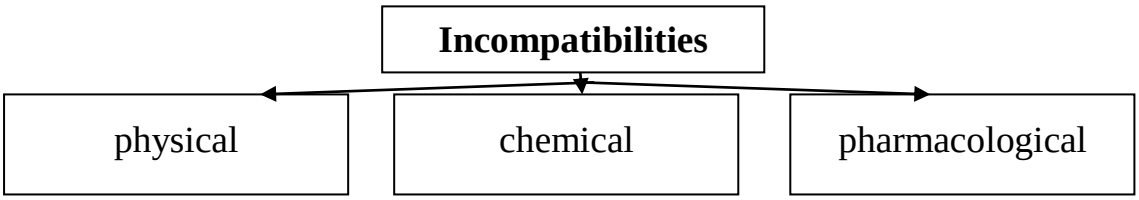
The objective: to learn to prepare medicines according to the difficult formulas using special technological methods, to recognize incompatible combinations – physical, physical and chemical, and pharmacological incompatibilities.

Educational tasks

I. Study informational material according to the given topic

The difficult formulas are such combinations of medicinal substances when a pharmacist can prepare a medicine using special technological operations.

«False» incompatibilities are formulas, in which antagonistic combinations of medicines (according to their pharmacological effect or to chemical interaction between ingredients), as well as the change in the physical state of medicines is envisaged by a doctor, as a therapeutic factor.



II. Answer the tests, give explanations

№	Test	Explanation
	A pharmaceutist refused preparation of nasal drops to a patient because of incompatibility between collargol and dimedrol written in the prescription. What is the reason for incompatibility between these ingredients? Coagulation Immiscibility Adsorption Dissection Eutectic formation	
2.	A pharmaceutist has revealed an incompatibility in the prescription. What drug substances form an eutectic mixture? Chloral hydrate + camphor Antipyrine + analgin Calcium chloride + sodium chloride Ephedrine hydrochloride + glucose Sodium hydrocarbonate +hexamethylenetetramine	

№	Test	Explanation
3.	A pharmacy received a prescription for powders with a too high single dose of phenobarbital not justified by proper documentation. What actions should a pharmaceutist take? Put the stamp "invalid" and return the prescription to the patient Supply 1/3 of the maximum single dose Supply the maximum single dose, multiplied by the number of powders Supply the highest single dose Supply 1/3 of the maximum single dose, multiplied by the number of powders	
4.	A pharmacy got a formulation of a mixture containing manzanita decoction and belladonna extract. What is the reason for incompatibility between these components? Precipitation Hydrolysis Oxidation-reduction processes Emission of gaseous substances Coagulation of colloid systems	
5.	A pharmaceutist was preparing an ointment with ricin oil and Vaseline but failed to get homogenous system. What is the most likely cause of incompatibility between these components? Component immiscibility Restricted solubility Release of water of crystallization Coagulation Adsorption	
6.	A pharmaceutist revealed physical incompatibility caused by coagulation. This process takes place in a solution if the combination of the following substances is present: Dimedrol and collargol Dimedrol and novocaine Dimedrol and sodium chloride Dimedrol and diazoline Dimedrol and glucose	

№	Test	Explanation
7.	A pharmaceutist revealed physical incompatibility in a recipe. Specify the combination of drug substances demonstrating eutectic when blended: Camphor and menthol Glucose and phenyl salicylate Streptocid and antipyrine Ascorbic acid and hydrocarbonate sodium Basic bismuth nitrate and magnesium oxide	
8.	A patient has been administered a solution containing boric acid and camphor. What solvent should his doctor prescribe in order to prevent physical incompatibility? Ethyl alcohol 70% Purified water Sunflower oil Glycerol Ethyl alcohol 40%	
9.	A doctor gave a prescription for the tincture of digitalis with hydrochloric acid. What is the reason for their incompatibility? Hydrolysis (with no visible changes) Precipitation Gassing Change in colour Change in odour	
10.	A pharmaceutist revealed incompatibility in a prescription for powders with ascorbic acid and hexamethylene tetramine. What process takes place when these components are combined? Mixture dampening Eutectic Immiscibility Adsorption Isolation of crystallization water	
11.	A pharmacy received a prescription for a mixture. What drug substances are incompatible? Papaverine hydrochloride + aminophylline Novocaine + diphenhydramine Sodium bromide + sodium chloride Codeine phosphate + extract of Thermopsis Phenobarbital + glucose	

№	Test	Explanation
12.	A pharmacy got an order for manzanita decoction and hexamethylenetetramine.A pharmacist cancelled it with a stamp "Invalid prescription". What is the reason for the incompatibility? Deposition Eutectic Oxidization Moisture-repellant Insolubility	
13.	A pharmaceutist revealed incompatibility in the formulation. Rp.: Sol. Collargoli 1% - 10 ml Sol. Adrenalini hydrochloridi 0,1% - 1 ml M.D.S. Nasal drops. What chemical process underlies this incompatibility? Oxidization Neutralization Precipitation Hydrolysis Absorption	
14.	A pharmacist technologist revealed incompatibility in the following prescription: Rp.: Mentholi 0,5 Natrii hydrocarbonatis Natrii tetraboratis aa 1,5 Aquae purificatae 100 ml M.D.S. 1 tablespoon twice a day. In order to prepare this drug form the pharmacist should apply the following techniques: Add stabilizer Apply fractional dissolution Apply another solvent Change one of the component Change dosage form	
15.	Preparation of multicomponent powders with phenyl salicylate and camphor is accompanied by generation of some fluid. What is the reason for their incompatibility? Eutectic alloy formation Adsorption Crystallization water exudation Hygroscopic components Gases separation	

№	Test	Explanation
16.	When preparing an ointment with castor oil and vaseline a pharmaceutist failed to obtain a homogeneous system. What is the most likely cause of incompatibility between these components? Immiscibility of the ingredients Limited solubility Release of water of crystallization Coagulation Adsorption	
17.	A pharmaceutist-technologist has to prepare a medication with the following formulation: Rp.: Mentholi 0,1 Glycerini 10,0 M.D.S. Nasal drops. What is the reason for their incompatibility? Insolubility of ingredients Separation of the mixture Adsorption of the medicinal agent Eutectic alloy formation Coagulation of colloidal system	
18.	A pharmacy got an order for a mixture containing manzanita decoction and belladonna extract.What is the reason for their incompatibility? Sedimentation Hydrolysis Redox (oxidation-reduction) processes Liberation of gaseous substances Coagulation of colloidal systems	
19.	A pharmaceutist refused preparation of nasal drops to a patient because of incompatibility between collargol and dimedrol written in the prescription. What is the reason for incompatibility between these ingredients? Coagulation Immiscibility Adsorption Dissection Eutectic formation	
20.	A pharmacy got an order for powders containing ascorbic acid and sodium hydrocarbonate. What process takes place between the ingredients? Dampening Oxidization Absorption Sedimentation Stratification	

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Робочий зошит містить основні теми з аптечної технології ліків, згідно із затвердженою програмою. Він призначений для індивідуальної роботи здобувачів вищої освіти, що навчаються англійською мовою, включає в себе теоретичний матеріал, а також тестові питання із буклетів для підготовки до ліцензійного іспиту «Крок-2».

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РОБОЧИЙ ЗОШИТ
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