TASHKENT PHARMACEUTICAL INSTITUTE

PHARMACY FACULTY

DRUG TECHNOLOGY DEPARTMENT

5510500 – Pharmacy and 5111000 – professional education directions

on the "Pharmaceutical Technology"

TEACHING-METHODICAL MANUAL

for laboratory lessons for the 3rd course students

«Aqueous and non –aqueous solutions»

Toshkent 2018

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“Approved”
Vice-rector on academic
affairs S.U.Aliyev

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«Aqueous and non –aqueous solutions»

Toshkent 2018

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Scientific secretary_____ V.R. Khaydarov

Introduction

This methodical manual has been compiled on the basis of the academic program on pharmaceutical technology. It includes the amount of laboratory work intended for conducting lessons on study aqueous and non-aqueous solutions. For practical training guidelines, a number of topics including, for them to understand the purpose of protection of individual questions, assignments, practice guidelines, and to check the list of recommended literature, performance test questions, case studies.Each session foresees the application of the methods of modern pedagogical technologies.

Methodical manual on "Pharmaceutical Technology is for 3rd year students of the Pharmacy and Professional education Faculty. It is intended for 4 practical laboratory lessons for 3 hours which are devoted to aqueous and non-aqueous solution technology.**The Lesson 1** describes features of preparing solutions from hardly soluble and complexing agents.During the development of the theme students introduce with the largest refractory, crystal, acidity and complex compounds formed soluble compounds and in participation with substances soluble salt-forming processing rules.

The Lesson 2 includes preparation of medicines using a burette installation, preparation of concentrated solutions, strengthening and dilution of concentrated solutions. During this practical lesson students learn how to prepare mixtures and concentrated solutions using a buret plant, get acquainted with the rules and calculations for strengthening and diluting concentrated solutions

The Lesson 3 includes the information about preparation of mixtures using concentrated solutions, galenic preparations and dissolution of substances of less than 3% and more than 3% of the volume of the mixtures.This practical lesson helps students to master the methods and rules for preparing medicines from concentrated solutions, galenic preparations, and dissolving substances of less than 3% and more than 3% of the volume of the medicine.

The Lesson 4 is devoted to dilution of standard solutions and preparation ofnon-aqueous solutions. Students learn how to dilute standard solutions, prepare non-aqueous solutions and evaluate their quality on the basis of theoretical provisions.

Laboratory lesson-1

Subject: Features of preparing solutions from hardly soluble and complexing agents

1. The purpose of the theme: During the development of the theme of the largest refractory, crystal, acidity and complex compounds formed soluble compounds and in participation with substances soluble salt-forming processing rules,they have to provide information about the methods of preparing the participation of students made their own goals.

2. The significance of the subject: Subject pharmacy refractory conditions, with large crystals, acidity and complex compounds formed with the participation of refractory materials and auxiliary substances to work with the soluble salt-forming substances, as they are important methods for preparation of solutions with the participation of students to familiarize with the use of them.

Methodological supply and lesson equipment: visual aids on the lesson, methodological guide, reference, lectures, videos, auxiliary utensils, cold and hot water, funnels, glass filters, filtered paper, cotton swab, and other medicines.

Students carry out the following recipes on the laboratory lessons:

1. Take solution of boric acid of 3,0 – 120 ml
   Give. Mark. For gargling.
2. Take: Sodium sulphate solution of 2,0 - 50 ml
   Give. Mark. For drinking once.
3. TakePotassium permanganate solution of 1:4000 – 200 ml
   Give. Mark. 1 tablespoon 4-5 times a day.
4. Take: Iodine 0,75
   Potassium iodine of 1,5
   Purified water to20 ml
   Mix. Give. Mark. For rubbing.

Questioning:

1. How is the drug used in the form of solutions?
2. Are the solvents used in the preparation of solutions?

3. What are the requirements for purified water?

4. Tell the stages of preparing solutions.

5. Tell the methods of determining the concentration of solutions.

6. Tell what substances are soluble in cold water and their technology of preparing solutions.

7. Show the specificity of preparing solutions with strong oxidizing agents.

8. How to prepare a solution of silver nitrate?

9. What complex compounds which formed from solublesubstances do you know?

10. Tell about preparing of Lyugol solution and using of it.

11. The preparing of toxic preservatives and their rules.

In order to master the subject we use modern educational technology Venn diagram.

Venn diagram method

2 and 3 aspects of Venn Diagram, as well as general aspects of the subject are used to compare or contrast.Systemic thinking of the students will develop the skills to analyze and compare.

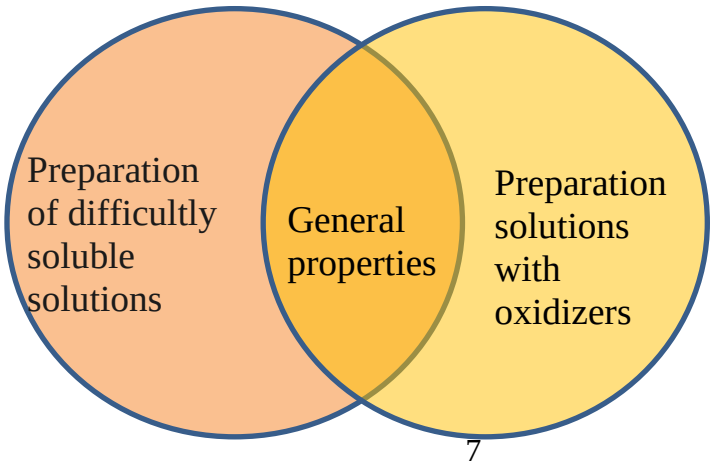
1. Students are divided into small groups (2-3);

2. Drawing circles of Venn Diagram fill them with the necessary information;

3.Then working in pairs they compare and fill their diagrams;

4. Overlapping circles in place, which is common to two or three circles, create a list of information;

5. Results of their work.



Test questions:

1. How do they clean solutions for external and internal use from external impurities?

a) straining; b) filtering;

c) agitation; d) straining with gauze .

2. Stress is difficult to prepare a solution of soluble substances soluble substances to facilitate technological methods?

a) hot water tanks; b) dissolution of crushed in a mortar;

c) agitation; d) are all correct.

3. What is the reason of slow copper sulphate solubility?

a) a water-wetting; b) the melting temperature is too high;

c) the solubility is not good; d)soluble in alcohol

4. The aqueous solution of iodine in the equipment of the vessels for the patient?

a) a bottle, mouth tightly sealed; b) black glass containers;

c) in sealed glass containers; d) how insignificant bowl.

5. Sirossol solution is used as a solvent for the preparation of what?

a) water; b) hydrochloric acid;

c) organic solvents; d) sodium bicarbonate solution.

6. What should be added to the solution so that when the mercury of the dichloride dissolves, the acidic medium does not form after hydrolysis?

a) sodium sulfate; b) potassium nitrate;

c) sodium chloride; d) add a large amount of water.

7. How are solutions of potassium prepared by permanganate and silver nitrate filtered?

a) glass filter; b) through a cotton swab;

c) through a layer of gauze; d) through a paper filter.

8. What is the amount of iodine in the Lugol solution used for drinking?

a) 5%; b) 1%; c) 4%; d) 3%.

9. At what concentration of silver nitrate will the filtration be insignificant?

a) 0.5%; b) 1%; c) 8%; d) 10%

10. When preparing an iodine solution, what substance is added for complexation?

a) sodium chloride; b) Silver nitrate

c) Potassium iodide; d) water.

11. To obtain an aqueous solution of phenol, what phenol is used?

a) liquid phenol; b) crystal phenol;

c) concentrated solution; d) sodium phenolate

12. At what concentration of potassium permangonate does not feel the filtration?

a) 0.5%; b) 1%; c) 8%; d) 10%.

13. How many percent of iodine is contained in the lugol solution for external use?

a) 1%; b) 4%; c) 2%; d) 10%.

14. What is the method of making solutions from large crystals?

a) is crushed in a pond by itself or with the solvent in the recipe;

b) crushed in a mortar with purified water;

c) dissolve in alcohol;

d) crushed in a mortar in dry state.

15. How to drink Lugol solution?

a) adding some drops to milk; b) with water;

c) tea spoon 3 times a day; d) 1 spoon 1 time a day.

16. How to prepare Temisal solution?

a) with freshly distilled or freshly boiled water;

b) with purified water;

c) freshly boiled water;

d) with alcohol.

17. Identify the method used to prepare the solutions with the oxidants:

a) if necessary, washed with hot purged cotton bottles or glass filters;

b) only filtered through a glass filter;

c) is washed with cotton buffer, washed with fresh boiled water;

d are not filtered.

18. What substances are the strong oxidants?

a) potassium permanganate, iodine, oscarol;

b)potassium permanganate, silver nitrate;

c) copper sulfate, silver nitrate, iodine;

d) scarlet acetate, silver nitrate, oscarol.

19. What substances are included in the large crystalline substance?

a) potassium permanganate, acetic acid, magnesium sulphate, acetic acetate;

b) copper sulfate, sodium sulfate, magnesium sulphate, coconut acetate, anhydrous;

c) copper sulfate, silver nitrate, iodine, copper sulfate, sodium sulfate;

d) acetic acid, sodium sulfate, magnesium sulfate

20. How to prepare solutions difficult soluble in water (iodine and mercury diodide)?

a) crushed in a mortar dissolving in purified water;

b) dissolve in 95% alcohol;

s) dissolve in potassium or sodium iodine solution;

d) no correct answer.

Case study

1. Take: Sodium tetraborate 2,0

Purified water 160 ml

Give. Mark. To remove face skin

The student dissolved in sodium tetraborate sodium tetraborate sodium 2,0g sodium tetraborate and dissolved in 150 ml of purified water and slipped into glass bottles and tied with appropriate label. Did the solution be prepared correctly?

2. Take: From acetic acid 2,0 – 180 ml

Give. Mark. For rinsing.

The student for preparing solution of alum dissolve 2,0 g of alum in purified water in the auxiliary container.What to do to accelerate the melting process?

3. The student dissolved in an auxiliary container for preparation of a potassium permanganate solution, squeezed into a bottled container and equipped with appropriate label. Explain the correctness of the work done.

4. The student calculated and prepared the solutions of lyugol solution equally passport of drinking and external using . Do they have any differences? If there is a difference, explain the difference and the technology.

Recipes for independent work

1. Take: Solution Bitter of 2.0: 150 ml
   Give. Designate. For a gargle of
2. Take: Solution Furatsillinof 1: 5000 250 ml
   Give. Designate. For a gargle of
3. Take: SolutionCalcium gluconate1.5: 120 ml
   Give. Designate.1 tablespoon 2 times a day.
4. Take: Magnesium sulfate 20.0
   Purified waterof 100 ml
   Mix.Give. Designate.For single use. (Laxative)
5. Take: Caffeine 0.2
   Purified water 200 ml
   Mix well. Give. Designate. 1 tablespoon 2 times a day.
6. Take: Solution of potassium permangonat 1% - 25 ml
   Give. Designate. In 1 cup of water to add 30-40 drops to rinse
7. Take: Solution of silver nitrate 1% in 120 ml
   Purified waterof 25 ml
   Give. Designate. To wash the bladder.
8. Take: Potassium iodide solution 0,5: 20 ml
   Iodine 0.2
   Mix well.Give. Designate. For lubrication.

Methodical instructions

Solvents, liquid medicines, one or more substances obtained through melting and injection, used to drink surface. Used in the preparation of aqueous solutions of water must meet the requirements of the regulatory document edition.

Preparation is conducted in the following stages:

1) checking doses for toxic and potent substances;

2) determine the amount of the solvent;

3) solution;

4) filters, swimming;

5) equipment;

6) evaluation.

Preparation of solutions from hardly soluble substances

Boric acid, amidopirin, calcium gluconate, rancid, sodium tetraborate like substance that dissolves slowly in cold water and urinate. Their solutions are used in the preparation of hot water.

Take: Borat acid solution 2,0: 75 ml

D.S. Lavage.

Passport:

Borat acid 2.0

Purified water 75 ml

The total volume of 75 ml

Technology: Borat acid 1:25 in cold water, hot water, 1: 4 ratio of soluble. My tank 2g of boric acid is dissolved in 75 ml of purified 89-900 C, hot water, shaking her head and screwed into the bottle, cover your tab.

Preparation of solutions from large crystal substances

In addition, sodium sulfate, magnesium sulfate, copper sulfate, acetate, rancid and others.His first for the preparation of aqueous solutions or recipes solvent participation in a mortar.

Take: Copper sulfate solution 2% - 80 ml

D.S. wash

Passport:

Copper sulfate 1.6

Purified water 80 ml

The total volume of 80 ml

Technology: Copper sulfate soluble in water (1: 3), but the crystals are large and poorly wetted with water. This is to expedite the process of copper sulfate and pulverized in a mortar 89-90^{0}C dissolved in hot water. Solution bottle sailed through a cotton tampon.

Preparation of solutions with oxidants

Solutions of silver nitrate and potassium permanganate can collapse quickly under the influence of organic matter (especially in the filtering process). The filter paper silver ions adsorbed. Therefore, the preparation of such substances melt prepared expelled from the new, purified water. Filter if necessary; filter glass in the first or second numbers.

Take: Silver nitrate solution 0.12: 100 ml

D.S. 1 tbsp 3 times a day before meal drink.

Passport:

Silver nitrate 0.12

Purified water of 100 ml

The total volume of 100 ml

Technology: 0,125 of silver nitrate previously expelled from the filter, is dissolved in 180 ml of purified water. The finished solution is sealed with sealing wax.

The solution must be filtered through a glass filter No. 1. Put up "Caution division" warning labels and write as well as for new-born babies.

Take: Potassium permanganate 5% - 50 ml

Give. Mark. For lubrication.

Passport: Potassium permanganate 2,5

Purified water 50 ml

Overall volume 50 ml

Technocology: Potassium permanganate dissolve in cold water 1: 8, and in hot water 1:3. That's why 2,5 g of potassium permanganate crushed in a mortar with 50 ml freshly distilled, filtered water dissolve in hot water and put on a dark glass bottle and stick it to the appropriate label.

Preparation of aqueous solutions from medicinal substances possessing readily soluble complex compounds

Water-soluble iodine (1: 5000), mercury iodide (HgI2) (1: 25,000), such as potassium or sodium water-soluble iodide can be complex. For example,Lyugol solution. 5% (to drink) and 1% (surface) solutions.

1. Take: Solution Lyugolof50 ml
   D.S. wipe throat.
   Ingredients: Iodine 1.0
   Potassium iodide 2.0
   Purified waterof 100 ml

Passport:

Potassium forget2.0

Lost 1.0

Purified water of 100 ml

The total volume of 100 m

2. Take: Iodine of 1,0
   Potassium iodine of 2,0
   Purified water to 20 ml
   Give. Mark. For drinking.

Passport:

Iodine of 1,0

Potassium iodine of 2,0

Purified water to 20 ml

Total volume 20 ml

Technology: 2,0g of potassium iodide dissolved in 1.5-2.0 ml of purified water. n the resulting saturated solution, 1 g of iodine of crystalline iodine suspended on paper will dissolve. After complete dissolution of iodine, it is brought to 100 ml(or according 2 recipes on20 ml).

The solution was filtered through a cotton buffer or a glass filter and dark glass containers, label glued. If the lugol solution is for internal use, then it is applied with drops of milk.

Preparation of the solution with the help of auxiliary substances forming highly soluble salts

Sirossol very poorly soluble in water, but easily dissolved in a solution of sodium. Usually the 1,0g to sirossol 0.61 dissolved by adding sodium.

Take: Sirossol solution of 3% - 100 ml

Sodium calcium 2.0

A. B. B. surface.

Passport:

Sodium calcium 1,83

Sirossol of 3.0

Purified water of 100 ml

The total volume of 100 ml

Technology: 1.83 sodium salt is dissolved in water, and the resulting solution 3.0 of Sirossol carbon dioxide mix until completely melted and placed in a glass vessel sailing.Writeas poisonous ssubstances.

Evaluation of the quality of aqueous solutions

The quality control of aqueous solutions is carried out in accordance with the normative documentation, i.e. checking the records in the documentation (prescription, passport), packaging, design, color, odor, lack of mechanical inclusions, deviation in volume.

Table-1

Solubility

Conditionalterms	The amount of solvent (ml), necessary for dissolution 1gr of substance
Veryeasilysoluble	Upto 1
Easilysoluble	Morethan 1 Upto 10
Soluble	» 10 » 30
Moderatelysoluble	» 30 » 100
Slightlysoluble	» 100 » 1 000
Verylittlesoluble	» 1 000 » 10 000
Practically insoluble	» 10 000

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*Ansel's Pharmaceutical dosage forms and drug delivery system/LoydV.Allen, Jr., Nicholas G.Popovich, Howard C. Ansel. -9thed/ -2011. –P.398.

Laboratory lesson-2

Theme: Preparation of medicines using a burette installation. Preparation of concentrated solutions.Strengthening and dilution of concentrated solutions.

The purpose of theme: to learn how to prepare mixtures using a buret plant, to prepare concentrated solutions, to know the rules and calculations for strengthening and diluting concentrated solutions, be able to prepare mixtures using concentrated solutions.

The significance of the subject:the topic allows students to master the methods and rules for preparing medicines in pharmacy conditions using a burette plant, preparing concentrated solutions, strengthening and diluting concentrated solutions, using concentrated solutions, be able to prepare mixtures

Methodological supply and lesson equipment: visual aids on the lesson, methodological guide, reference, lectures, videos, auxiliary utensils, cold and hot water, funnels, glass filters, filtered paper, cotton swab, and other medicines.

In the laboratory class, students perform the following tasks:

1) Prepare 1 liter of 10% sodium benzate solution.

CoS = 0.60; P = 1.038

The analysis revealed: a) 8% sodium benzate solution was prepared,

b) 12% sodium benzate solution was prepared, how should the concentration of solutions be corrected?

2) Prepare 1 liter of 10% hexamethylenetetramine solution

CoS = 0.78; P = 1,042

The analysis revealed: a) 8% hexamethylenetetramine solution was prepared,

b) 12% hexamethylenetetramine solution was prepared, how should the concentration of solutions be corrected?

3) Prepare 1 liter of 20% calcium chloride solution

CoS= 0.37; P = 1.0780

The analysis revealed: a) 18% calcium chloride solution was prepared,

b) 22% calcium chloride solution was prepared, how should the concentration of solutions be corrected?

Questioning:

1.What devices are used in the preparation of medicines using a burette system? Rules of operation.

2. What are the basic instructions for the preparation of liquid medicinal products using a burette system?

3. What are the conditions, technology, control and storage of concentrated solutions for burette installation?

4. How are calculation related to the strengthening and dilution of concentrated solutions for burette installation?

5.How are concentrated solutions prepared in the absence of a volumetric flask?

6. What is the volume expansion factor?

7. Why are concentrated solutions prepared underaseptic conditions?

8. If the strength of the prepared concentrated solutionis higher than normal, how is the volume of dilutionwater calculated?

9. If the strength of the prepared concentrated solution turns out to be below normal, then how is the amountof salt calculated for strengthening?

To test the mastery of the topic by students, the methods of modern pedagogical technology SWOT analysis is using

SWOT analysis method

This is a tool for strategic analysis and planning, used to assess the phenomena and factors that affect the company or project.

The SWOT analysis technique serves to solve the problem by analyzing ideas, events, experiences and results of works, the totality of the comparison is to find

solutions to problems, strengthen knowledge, repeat, evaluate, develop analytical thinking.

SWOT - analysis is conducted in four directions:

1. Students are divided into smaller groups (4);
2. Each group is distributed with the 4th stage of SWOT analysis methods –

   S -(strength) –advantages;

   W – (weakness) – disadvantages;

   O – (opportunity) opportunities

   T – (tnreat) – barriers (external factors that hinder the implementation of activities).
3. Each group of students has a problem that needs to be addressed;
4. Students fill the table with information on the subject;
5. The results of the presentation are presented.

S – (strength) – the positive sides	W – (weakness) –negative aspects
O -(opportunities) –potential opportunities	T – (tnreat) – potential threats

Test questions:

1. Why concentrated solutions are prepared in aseptic conditions?

   a) due to the development of microorganisms in liquids

b) the salt may precipitate

c) the concentration of the substance may change

d) to increase the stability of the prepared solution

2. When and how do you use the Byurette device?

a) to increase the efficiency of working out simple ingredients;

b) to increase the efficiency of the production of complex ingredients;

c) for the preparation of complex compounds without a measuring tube;

d) for preparing concentrated solutions

3. What substances are prepared from concentrated solutions?

a) from simple substances;

b) from hydroscopic substances;

c) hydroscopic and large quantities of crystallization water preservatives;

d) from salts

4. What is the solvent used to prepare concentrated solutions?

a)purified water;

b) alcohol;

c) freshly distilled water;

d) injection water

5What depend the quality of concentrated liquids on?

a) cleanliness of the substance;

b) cleanliness of the solution;

c) technological condition;

d) cleanness and accuracy of concentrates.

6. By what method are highly concentrated solutions prepared?

a) by weight; b) by volume;

c) using volumetric flasks; d) all answers are correct.

7. According to what order are concentrated solutions prepared?

a) order №582; b) order №447;

c) order № 195; d) order № 583.

8. What tool does the concentration of the concentrated solution determine?

a) spectrophotometer; c) microscope;

b) refractometer; d) chromatograph.

9. How is mechanical particles tested for the quality of concentrated solutions?

a) white and black background with the effect of light;

b) under normal cconditions;

c) in color background;

d) under the influence of light.

10. How to clean the prepared concentrated solutions?

a) filtered through a sticky filter;

b) through filtrate and cotton tampon;

c) filter through a glass filter;

d) decant through gauze.

11. What is the volume expansion factor?

a) the amount of increase in the volume of the solution when dissolving 3 g of the substance in the solvent;

b) the amount of increase in the volume of the solution when dissolving 1 g of the substance in the solvent;

c) the amount of increase in weight of the solution when dissolving 1 g of the substance in a solvent

d) the amount of increase in weight of the solution when dissolving 3 g of the substance in the solvent.

12. When preparing a concentrated solution according to order No. 582(Q'zRSSV 582- dated December 29, 2002), if the amount of solvent volume is indicated in the recipe

a) when calculating the volume of purified water, the volume of concentrated solutions is subtracted from the total volume of the medicine;

b) the volume of purified water is calculated as specified in the recipe;

c) calculation of the volume of purified water is carried out by adding a volume of concentrated solutions;

d) there is no correct answer

13. What should be the permissible rate of deviation of the concentration of concentrated solutions if the larger or smaller limit is up to 20%?

Permissible restrictions

a) ±2%; b) ±3%; c) ±4%; d) ±5%.

14. If the concentration limit of concentrated solutions is more or less than 20%, then what is the permissible deviation rate?

Permissible restrictions

a) ±0.2%; b) ±1%; c) ±0.4%; d) ±0.5%.

15. In the absence of measuring dishes in the preparation of concentrated solutions, how is the amount of solvent calculated?

a) with the help of CWD; b) by means of scales;

c) using the density of the solution; d) a and c answer.

16. In what cases is strengthened or diluted concentrated solutions?

a) If specified in the recipe;

b) If the % content of the solution is higher than norm;

c) If the % content of the solution is less than the norm;

d) b and c answer.

16.In what cases are the concentrated solutions condensed?

a) If it is shown in recipe;

b) If the percentage of prepared solution exceeds the demand;

c) If the percentage of prepared solution is less than required;

d) If the prepared solution spill

17. In what cases is the concentrated solution diluted?

a) If it is shown in recipe;

b) If the percentage of prepared solution exceeds the demand;

c) If the percentage of prepared solution is less than required;

d) If the prepared solution spill.

18. What concentrated solutions are usually called?

a) solutions; b) concentrates;

c) liquids; d) mixtures

19. Why should not the concentration of the solution be decreased to the concentration of concentrated solutions?

a) the dissolved substance can precipitate as a result of the temperature drop;

b) xona xaroratida erigan modda cho'kmaga tushishi mumkin;

c) Storage life may be reduced;

d) no correct answer.

20. How are the nomenclature of concentrated solutions determined?

a) according to the ecstemporal recipe requirement;

b) availability of substitutes;

c) according to the wish of a pharmacist;

d) no correct answer.

Tasks and questions for self-study

1.Prepare 50 ml of 10% solution of hexamethyltinetetramine.

2. Prepare 50 ml of 10% solution of sodium benzoat.

3. Prepare 70 ml of a 20% solution of sodium bromide.

4. Prepare 60 ml of a 10% solution of sodium salicylate.

5. How much water should be taken to prepare 1 liter of 20% hexamethylenetetramine solution?

6. When testing 1liter 20% hexamethylenetetramine solution, the solution was 22% to reduce the concentration to 20% what needs to be done?

7. When testing 1 liter of a 20% solution of hexamethylenetetramine, the solution turned out to be 17%, in order to strengthen the solution concentration to 20% what needs to be done?

8. To prepare 1 liter of 10% caffeine-sodium benzoate solution, how much water will be required?

9. If the concentration of 10% of caffeine-sodium benzoate is checked when the prepared solution is 1 liter, what should be done to reduce the concentration to 10%?

10. If the concentration of 8% of caffeine-sodium benzoate is checked during the test of a prepared solution of 1 liter, what should be done to increase the concentration to 10%?

Methodical recommendations

The use of a burette system significantly increases labor productivity in the manufacture of liquid medications. In pharmacy conditions, when preparing complex mixtures of concentrated solutions, a buret system is used.

Concentrated solutions are concentrates, i.e. working solutions of medicinal substances in a definitely higher concentration than prescribed in the prescriptions. Usually, concentrated solutions are prepared from hygroscopic substances and substances containing a large amount of crystallization water. Concentrated solutions of medicinal substances for the burette system are prepared in a mass-scale measurement under aseptic conditions on freshly purified water.

All auxiliary materials, as well as dishes for preparation and storage of solutions must be pre-sterilized.

The prepared concentrates are carefully filtered and checked for consistency, purity and quantitative content of the drug substance (mainly with the refractometer), since the quality of the liquid preparations prepared with their use depends on the purity and accuracy of the concentrates.

In the absence of measuring dishes, the calculation of the amount of water for preparing a concentrated solution is carried out in two ways: 1) using the density of the solution; 2) taking into account the coefficient of increase in the volume (CoS) of the substance. After complete dissolution of the substance, the solution is filtered into a bottle through a paper filter with a cotton swab attached. In the prepared solution, the quantitative content of the substance is determined by means of a refractometer. If necessary, strengthen or dilute the solution and again check the quantitative content of the drug substance.

Calculating of the amount of water required for the density of the solution:

To prepare 1 liter of 20% hexamethylenetetramine solution, how much should you take the amount of purified water?

The density of the solution is 1,042 g / ml. When calculating the mass of 1liter 20% solution of hexamethylenetetramine is:

1.042 g / ml. 1000 ml = 1042 g

Therefore, you need to take water: 1042g - 200g = 842g (ml)

Calculation of the amount of water required for CoS:

The CS of hexamethylenetetramine is 0.78 200. 0.78 ml / g = 156 ml (the volume occupied by dissolving 200 g of hexamethylenetetramine). Therefore, you need to take water: 1000 ml - 156 ml = 844 ml.

Dilution and strengthening of concentrated solutions

If the result of the chemical analysis shows a greater or lesser concentration of the solution, then it is necessary to bring the concentration to nome. The formulas for diluting or strengthening the solution are used. If the solution concentration is higher than required, then the dilution formula is used.

For example, suppose that it was necessary to prepare a solution of hexamethylenetetramine 20% concentration, after preparing it was 23%, then you need to dilute the solution. This is achieved using the following formula:

If the concentration of the solution is less than the norm, then the strengthening formula is used. When testing the hexamethylenetetramine solution, instead of 20%, 18% came out, so the solution needs to be strengthened. This is achieved using the following formula:

52,1 – 5 = 47,1 gr (ml)

2) CoS = 0,78

0,78 x 5 = 3,9

50 – 3,9 = 46,1

Evaluation of the quality of concentrated solutions.

Evaluation of the quality of the prepared concentrated solution is carried out by checking the documentation (passport), color, odor, absence of mechanical inclusions, % content of the active substance.

Table 1

The coefficients of spreading of medicinal substances coefficient of increase (CoS) and density of solution

№	**Nameofmedicinalsubstance**	**CoS, ml/g**	**Solution concentration, %**	**Density of solution, kg/m^3**
1	Amidopyrine	0,9	5	1,0032
2	Ammoniumchloride	-	20	1,0551
3	Analgin	0,68	-	-
4	Antipyrine	0,85	-	-
5	Barbitalsodium	0,64	10	1,0350
6	Hexamethylenetetramine	0,78	10	1,0212
7	Glucose	0,64	50	1,1857
8	Potassiumbromide	0,27	20	1,1438
9	Potassiumiodide	0,25	20	1,1478
10	Calciumchloride	0,58	50	1,2066
11	Codeinephosphate	-	10	1,0321
12	Sodiumcaffeine-benzoate	0,65	10	1,0341

13	Magnesiumsulfate	0,50	50	1,2206
14	Sodiumbenzoate	0,60	10	1,0381
15	Sodiumbromide	0,29	20	1,1488
16	Sodiumbicarbonate	0,3	5	1,0331
17	Sodiumsalicylate	0,59	10	1,0301
18	Sodiumchloride	0,33	-	-
19	Chloralhydrate	0,57	20	1,0860

Laboratory lesson-3

Theme: Preparation of mixtures using concentrated solutions, galenic preparations and dissolution of substances of less than 3% and more than 3% of the volume of the mixtures.

Purpose of the theme: to learn how to prepare potions from concentrated solutions, galenic preparations, and dissolving substances that make up less than 3% and more than 3% of the volume of the mixture. Assess their quality on the basis of theoretical provisions, the properties of medicinal and auxiliary substances and in accordance with the requirements of regulatory technical documentation.

The significance of the theme: the topic allows students to master the methods and rules for preparing medicines from concentrated solutions, galenic preparations, and dissolving substances of less than 3% and more than 3% of the volume of the medicine. Introduces and teaches you how to use important techniques for preparing complex mixtures.

Methodological supply and lesson equipment: visual aids on the lesson, methodological guide, reference, lectures, videos, auxiliary utensils, cold and hot water, funnels, glass filters, filtered paper, cotton swab, and other medicines.

Students carry out the following recipes on the laboratory lessons:

1. Take: Calcium chloride solution of 10% - 200 ml
   Valerian tincture of 10 ml
   Mix. Give.Mark. 1 tablespoon 3 times a day.
2. Take: Sodium bicarbonate
   Sodium benzoate in equal amount
   Ammonia drops 4 ml
   Sugar syrup 10 ml
   Mint water to 100 ml
   Mix. Give. Mark. 1 tablespoon 3 times a day.
3. Take: Chlorohydrate1,0

Potassium bromide solution 2% 200 ml

Lily of the valleytincture6 ml

Mix. Give. Belgilang. 1 tablespoon 3 times a day.

4. Take : Sodium bicarbonate

Sodium salicylate in equal amount 10,0

Ammonia drops

Valerian tincture equal number 3 ml

Purified water 100 ml

Mix. Give. Belgilang. 1 teaspoon 3 times a day.

Questioning:

1. What is the difference between the preparation of liquid dosage forms by weight-based method from the preparation of liquid dosage forms by weight-based method from the preparation by weight method?
2. How are mixtures prepared, if dry substances are added to the mixture of more than 3%?
3. How to prepare mixtures, if the composition of the mixture adds dry substances less than 3%?
4. What is the order of introduction of tinctures, liquid extracts, syrups into the mixture?
5. What is the peculiarity of dosing sugar syrup?
6. What is the peculiarity of preparation of mixtures containing aromatic water?
7. What is the order of mixing the ingredients of the medicine?

To check the level of knowledge (mastering the topic) students use the method of modern pedagogical technology "Project".

Technique of pedagogical technology "Project"

1. Subdivided into small groups (2-3 people each);
2. Each group is asked one question per topic;
3. Self-preparation groups are given 10 minutes;

4. Discussion of the issue. To do this, each group leaves one and answers the question;

5. The final word of the teacher. The teacher complements and evaluates the answers.

Test questions:

1. How Liquid Drugs are made in Pharmacy?

a) the scale is measured in a volume-volumetric manner;

b) and are measured in terms of volume;

c) scale and measure by volume;

d) depending upon the situation

2. What are prepared liquid drugs called?

a) liquid drugs; c) medley;

b) mixture; d) solution

3. What is the first thing to do when preparing a liquid drug?

a) the amount of water is measured;

b) dry matter is measured;

c) tincture is put;

d) concentrate is put.

4. How do the compounds of toxic and powerful substances in mixtures add?

a) first; c) no matter;

b) last; d) between substances.

5. When is the juice added in the mixture?

a) last; c) between substances;

b) first; d) no matter.

6. How is the total volume of liquid drug determined?

a) all liquid ingredients are added;

b) only with addition of aqueous ingredients;

c) by removing dry substances;

d) no correct answer.

7. If the word "to" is written in the text, what is the amount of galen's medication it contains?

a) is added to the aqueous solution volume;

b) the volume of aqueous solution is removing;

c) volume is not counted;

d) multiple to aqueous solution volume.

8. What are the Galen's drugs?

a) drinks, juices, fragrant water;

b) drinks, juices, concentrates;

c) juices, alcohol, fragrant water;

d) flagrant water, juices, concentrates.

9. How does the amount of matter in concentrated solutions come from?

a) in percentage and dilution;

b) only in percentage;

c) only in dilution;

d) in milliliters.

10. What are the viscous substances that are included in the definition of the volume of a mixture?

a) according to density; c) by weight;

b) by volume; d) no correct answer.

11. How to prepare concentrated solutions in the absence of a volumetric flask?

a) calculate the amount of water using the density of the solution;

b) calculate the amount of water by means of an increase in the volume of the drug substance;

c) a and b is the correct answer;

d) not prepared in the absence of a volumetric flask

12. What methods are used to prepare mixtures if in pharmacies there are no concentrated solutions of dry matter amounting to 3% of the volume of the mixtures?

a) adding oils to the dry matter;

b) dissolve in water or other solvents;

c) is prepared in glycerol;

d) dissolve in alcohol

13.How are galenic preparations added to the composition of the mixtures?

a) dropwise; b) in milliliters;

c) the last; d) at the beginning of preparing.

14. If more than 3% of medicinal substances are added to the composition of the mixtures, how are they prepared?

a) in measuring dishes, taking into account the volume when dissolving the substance;

b) Using a burette device;

c) using a volumetric flask, not considering the volume of the solute;

d) there is no correct answer.

15. Indicate to the technology of this recipe:

Rp.: Magnii sulfatis 20,0

Tincturae Valerianae

Tincturae Convallariae ana 6,0

Aquae purificatae 200 ml

M.D.S.

a) in a 200 ml volumetric flask, dissolve 20 grams of magnesium sulfate in approximately 100 ml of purified water and bring to the required volume, the solution is filtered into a release vial. In this bottle, place 6 ml of tincture of valerian and lily of the valley.

b) 20 gr of magnesium sulfate is dissolved in 200 ml of purified water and 6 ml of tincture of valerian and lily of the valley are added on top and filtered into a vial for tempering

c) 20 g of magnesium sulfate is dissolved in 200 ml of purified water and filtered into a vial for tempering. In this bottle, place 6 ml of tincture of valerian and lily of the valley.

d) 20 gr magnesium sulfate is placed in a measuring dish for 200 ml, dissolved in purified water approximately 100 ml and adjusted to the required volume. On top with 6 ml of tincture of valerian and lily of the valley, filtered into a vial for tempering.

16. When preparing mixtures using concentrated solutions according to Order No. 582 2002 year 29 December)., if the volume of the solvent is not specified in the recipe ..

a) when calculating the volume of purified water, the volume of concentrated solutions is taken away from the total volume of the mixtures;

b) the volume of purified water is calculated as specified in the recipe;

c) calculation of the volume of purified water is carried out by adding a volume of concentrated solutions;

d) there is no correct answer.

17. When preparing liquid dosage forms, what measuring utensils are used?

a) burette; b) pipette;

c) volumetric flasks; d) all answers are correct.

18. What is the coefficient of volume growth?

a) Increasing of amount of volume of solution in dissolving in 3 grams of solvent;

b) Increasing of amount of volume of solution in dissolving in 1 grams of solvent;

c) Increasing of grams of solution in dissolving in 1 grams of solvent;

d) Increasing of grams of solution in dissolving in 3 grams of solvent.

19.What is the total volume of the ingredients in preparing mixtures?

a) the amount of liquids listed in the recipe;

b) all of the items listed in the prescription;

c) increasing volume coefficient;

d) no correct answer.

20. How is the amount of water purified in the preparation of the ingredients measured?

a) The total volume of mixture of the used concentrates, galen, novogalen is removed

b) The total volume of mixture of the used concentrates, galen, novogalen is added;

c) separating the total volume of the concentration from the concentrate used only;

d) adding only the concentration of the concentrate used to the total volume of the mixture

Case study

1.Take: Barbital sodium 1,0

Sodium bromine 6,0

Valerian tincture 6 ml

Purified water 200 ml

Mix. Give. Mark. 1 table spoon 3times a day.

The student measured 200 ml of purified water in a bowl of dark color. He washed 6.0 g of sodium bromide and barbital sodium salts on a weighing scale, measuring 6 ml of valerian tincture and shaking it all. The mixture is labeled “is kept in cool place”. Did the student prepare the mixture correctly? Explain her/his actions.

2. The student prepared the mixture using concentrated dry matter burette agent when the water was replaced with fresh water instead of purified water. Did the mixture prepared correctly? Explain your answer.

3. Take: Sodium bromine

Potassium bromine 2,0

Valerian tincture 10 ml

Purified water 100 ml

Mix. Give. Mark. 1 table spoon 3 times a day.

The student prepared mixture from sodium bromide and potassium bromide salts in 90 ml of purified water for filtration. Add 10 ml of valerian tincture and

then apply the required label. Describe the student's actions and correct mistakes in technology.

Recipes for self-study

1. Take: Potassium chloride solution 10% -200ml
   Tinctures of valerian 10ml
   Adoniside 0.2
   Mix Give Mark it. For 1 tablespoon 3 times a day.
2. Take: A solution of sodium bromide 2.0-100ml
   Caffeine-sodium benzoate 1.0
   Litterwort tincture
   Tinctures lily of the valley equally divided into 2 ml
   Mix, Give. Mark it. For 1 tablespoon 3 times a day.
3. Take: * Chloral hydrate 1.0
   Potassium bromide solution 2% -200ml
   Adoniside 5 ml
   Lily of the valley tincture 6 ml
   MixGive. Mark it. For 1 tablespoon 3 times a day.
4. Take: A solution of sodium bromide 2.0
   Liverwort infusions 4 ml
   * Glucose 5.0
   Water mint 200 ml
   Mix Give. Mark it. For 1 tablespoon 3 times a day.
5. Take: Magnesium sulfate 8.0
   Sodium bromide 2.5
   Waters purified 120 ml
   Mix Give. Mark it. For 1 tbsp. Spoon 2 times a day.
6. Take: Sodium bicarbonate
   Sodium benzoate equally 0.5
   Waters purified to 180 ml

Mix Give. Mark it. For 1 tbsp. Spoon 3 times a day.

7. Take: Sodium Salicylate 2.0

Sodium bromide

Sodium bicarbonate equally to 4.0

Waters purified 200 ml

Mix Give. Mark it. For 1 teaspoon 3 times a day.

Methodological recommendations

Liquid medicinal forms prepared in a pharmacy are prepared in a weight-based method, the patient is given by volume (ml). In the preparation of potions by weight, a burette system, pipettes, volumetric flasks, cylinders are used.

The technology of liquid dosage forms includes the following stages of preparation: dissolution, filtration or straining (if using a dry substance), mixing, packaging, formulation for release. In the preparation of medicines, the following rules must be observed: Firstly, the calculated amount of water is measured in a vial. Solutions of toxic and strong substances are added to the water first, the remaining concentrates are the order of prescription in the prescription. Tinctures, liquid concentrates, aqueous solutions and solutions on ethanol and syrups are added last.

Determination of the total volume of a liquid medicinal preparation is carried out by summing up the volumes of liquid ingredients: water, solutions of medicinal substances, tinctures and syrups, etc. When determining the total volume of a mixtures, the amount of dry matter is not taken into account.

If the prescription indicates "up to a certain volume", then the amount of galenical preparations listed in the prescription is included in the volume of the aqueous solution. To galenic preparations are tinctures of medicinal plant substances, syrups, aromatic waters (mint, dill, etc.).

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*Occjurs in dru form

The content of the substance in the concentrated solution can be expressed as a percentage and in dilution (the ratio of the substance to the volume of the solution). For example, a solution of Calcium chloride of 50% or 1: 2, in this case, when calculating the amount of substance is multiplied by its dilution.

The amount of purified water in the calculation is reduced by the volume of the concentrate used or the amount of volumes if several substances are prescribed.

Take: Sodium bicarbonate

Sodium benzoate equally divided into 0.5

Waters cleared up to 180 ml

Mix it up. Give. Mark it. 1 tablespoon 3 times a day.

Passport:

A solution of sodium bicarbonate 1:20 0.5 x 20 = 10 ml

A solution of sodium benzoate1: 10 0.5x10 = 5 ml

Waters purified 180- (10 + 5) = 165 ml

The total volume of 180 ml

Technology: 165 ml of purified water, 10 ml of a 5% solution of sodium bicarbonate, 5 ml of a 10% solution of sodium benzoate are measured from a burette system in a vial for dispensing and shaken. Make out the medicine for tempering with the label "Mixture".

Take: Sodium bicarbonate

Sodium salicylate equally divided into 2.0

Valerian tinctures 5 ml

Syrup sugar 10 ml

Water purified 180 ml

Mix it up. Give. Mark it. 1 tablespoon 3 times a day.

Passport:

A solution of sodium hydrogencarbonate 1:20 2 x 20 = 40 ml

A solution of sodium salicylate 1:10 2x10 = 20 ml

Valerian tinctures 5 ml

Syrup sugar 10 ml

Waters purified 180 - (40 + 20) = 120 ml

Total volume 180 +5 + 10 = 195ml

Technology: 120 ml of purified water, 40 ml of a 5% sodium hydrogen carbonate solution, 20 ml of 10% sodium salicylate solution are measured from the burette system in the vial. Pipette measure 10 ml of sugar syrup and 5 ml of tincture of valerian, shake. The bottle is made for tempering by the label "Mixture".

Preparation of complex medicines using less than 3% of dry matter from the volume of the mixture

In the preparation of potions, in addition to concentrated solutions of dry substances, the percentage of them in a liquid medicinal preparation is taken into account. If the mixture contains dry substances less than 3% of the volume of the mixture, then the change in volume during dissolution of substances is not taken into account, since a small amount of it during dissolution leads to an insignificant increase in volume.

Take: Hexamethylenetetramine solution 3.0: 100

Ammonium chloride 1.0

Monotonously aniseed drops of 3 ml

Mix it up. Give. Mark it. For 1 dessert spoon 3 times a day.

Passport:

A solution of hexamethylenetetramine 1: 10 3 x 10 = 30 ml

Ammonium chloride 1.0

Monotonously aniseed drops of 3 ml

Waters purified 100 - 30 = 70 ml

Total volume 70 + 30 + 3 = 103 ml

Technology: 70 ml of purified water are put in a stand, weigh 1.0 g of ammonium chloride and dissolve. The solution is filtered into a vial for tempering from orange glass, 30 ml of hexamethylenetetramine solution is measured from the burette and

shaken. 5-8 ml of the prepared mixture is placed in a glass, 3 ml of anatomical drops are added, mixed and poured into a vial for tempering. The bottle is made for tempering by the label "Mixture".

Preparation of complex mixtures using more than 3% of dry matter from the volume of the mixtures

When preparing such mixtures, the change in volume during dissolution must be taken into account and the mixture is prepared either in a measuring container or in the calculation of the amount of water the coefficient of increase in the volume of the aqueous solution is used.

Take: Magnesium sulfate 8.0

Sodium bromide 2.5

Waters cleared 120 ml

Mix it up. Give. Mark it. 1 teaspoonful 2 times a day.

Passport:

Magnesium sulphate 8.0 CoS = 0.5Coefficient of Spreading

A solution of sodium bromide 1: 5 2.5 x 5 = 12.5 ml

Waters purified 120 - ((8.0x0.5) +12.5 ml) = 103.5 ml

The total volume of 120 ml

Technology: 103.5 purified water are put in a stand, weigh 8.0 gr of magnesium sulfate and dissolve. The solution is filtered into an orange-colored bottle, 12.5 ml of a 20% solution of sodium bromide is measured from the burette and shaken. Make out the medicine for tempering with the label "Mixture".

Quality evaluation of medicines

Evaluation of the quality of the prepared medicine is carried out as well as all dosage forms with checking the documentation (prescription, passport), packaging, design, color, odor, absence of mechanical inclusions, deviation in volume.

Laboratory lesson-4

Subject: Dilution of standard solutions. Preparationof non-aqueous solutions.

Purpose of the theme: to learn how to dilute standard solutions, prepare non-aqueous solutions and evaluate their quality on the basis of theoretical provisions, the properties of medicinal and auxiliary substances and in accordance with the requirements of regulatory documentation, to learn how to produce ethanol dilution.

The significance of the theme: the topic allows students to master the techniques and rules for diluting standard solutions, the features of preparing non-aqueous solutions, the rules and techniques for diluting ethanol and know how to pack, formalize for tempering, and evaluate the quality of the solutions manufactured.

Methodological supply and lesson equipment: visual aids on the lesson, methodological guide, reference, lectures, videos, auxiliary utensils, cold and hot water, funnels, glass filters, filtered paper, cotton swab, and other medicines.

Students carry out the following recipes on the laboratory lessons:

1. Take: Salicylic acid 0,2
   Ethanol 10 ml
   Mix. Give. Mark.For rubbing.
2. Take: Sodium tetraborate 2,5
   Glycerol 20,0
   Mix. Give. Mark.For the oral cavity.
3. Take: Iodine 0,1
   Potassium iodine 0,3
   Purified water 1 ml
   Glycerol 25,0
   Mix. Give. Mark.For throat treatment.

4. Take: Menthol

Thymol in equal amount 0,05

Vaseline oil 10,0

Mix. Give. Mark.For inhalation.

5. Take: Chloride acid 5ml

Purified water 200 ml

Mix. Give. Mark.1 teaspoon after meal

6. Take: Potassium acetate solution 180 ml

Mix. Give. Mark.Externally.

Questioning:

1. What are the standard (pharmacopeia) solutions used in pharmacy practice?
2. What concentration should the hydrochloric acid be released if there is no indication in the recipe?
3. What is the principle of diluting hydrochloric acid?
4. In what cases are 25% hydrochloric acid released?
5. What concentration should ammonia be used if there is no indication in the prescription?
6. What is the principle of dilution of pharmacolin, Burov's fluid, perhydrol, potassium acetate liquid?
7. By what principle are diluted solutions of ammonia and acetic acid?
8. What concentration should be released hydrogen peroxide if there are no indications in the recipe?
9. Which standard fluids have two names: conditional and chemical?
10. Which groups, according to the principle of dilution, can be divided into standard solutions?

To test the level of knowledge (mastering the topic) students use the method of modern pedagogical technology "FSMU".

Methodology of FSMU technology

(F) - Outline the thought;

(S) - Outline the thought;

(M) - For the reason shown, give an illustrative example;

(U) - Generalize the thought;

To the student using the method of FSMU, for active participation in the lesson, the following question is given on the topic: In pharmacy practice, what non-aqueous solvents are used to prepare the dosage form?

F- Createanidea	
S - To the above thought, show the reason	
M - For the reason shown, give an illustrative example	
U – Generalize the thought	

Test questions:

1What is the purpose of non-aqueous solutions?

a) for external using; c) for injection;

b) for drinking; d) for ingalation.

2. What methods are used to prepare solutions from viscous solvents?

a) by weight and volume; c) by volume;

b) by weight; d) no correct answer.

3. How much of the 1% and 2% solution of calcium acids, 0.5% boric acid, is prepared in ethanol capacity?

a) 70%; b) 90%; c) 40%; d) 96%.

4. How to prepare 5% and 10% solution of iodine solution?

a) according to the standard document;

b) in accordance with the Order No. 582 of the RSS feed (QRSSSS, December 29, 2002);

c) in 70% alcohol;

d) in 40% alcohol.

5. In what dishes non-aqueous solutions are prepared?

a) in axillary vessels;

b) in dry vessel;

c) washed with freshly distilled purified water;

d) in dry axillary vessel.

6. What is 1% and 2% of brilliant green, 1% of methylene blue is prepared in strong ethanol?

a) 60; b) 70%; c) 90%; d) 96%.

7. What kind of document is written for ethanol solution when used for delivery?

a) signature; b) passport; c) recipe; d) document.

8. What vessels are used for preparing menthol petrolatum ?

a) in a dry lacquerware container;

b) in a colorless container;

c) in a freshly grounded container, rinse in freshly drained fresh water;

d) in dry axillary vessel.

9. Dorixatda xlorid kislotasining kontsentratsiyasi keltirilmagan bo'lsa, X - DF bo'yicha eritma tayyorlash uchun qanday kontsentratsiyadagi xlorid kislota ishlatiladi?

a) 8,2 - 8,4%; b) 0,83%; c) 24,8-25,2%; d) 98%.

10. In what form are the non-volatile solvents used in the preparation of the drug in the bowl?

a) after drug substance; b) before drug substance;

c) after ethanol; d) no matter.

11. To obtain 95% ethanol 70% ethanol, which formula should be used?

a)

12. How many groups are divided into non-aqueous solutions?

a) 4; b) 2; c) 1; d) 3.

13. By what method are non-aqueous solutions prepared?

a) by weight; b) by volume;

c) using volumetric flasks; d) by mass-volume method;

14. Point the chemical name of perhydrol:

a) concentrated hydrogen peroxide; b) aluminum acetate;

c) formaldehyde solution; d) potassium acetate solution

15. If the concentration of alcohol is not specified in the recipe, how much percentage alcohol is used?

a) 95%; b) 90%; c) 70%; d) 40%

16. If the concentration of hydrogen peroxide is not specified in the recipe, then how much of the percentage solution is prepared?

a) 3%solution ; b) 1,5% solution; c) 2% solution; d) 4% solution

17. Indicate volatile solutions:

a) ethanol, paraffin, petrolatum;

b) ethanol, ether, gasoline, oil;

c) glycerol, liquid paraffin, liquid paraffin;

d) Ethanol, chloroform, petrolatum, terpenhydrate.

18. When preparing solutions from volatile substances, which technological methods are not used?

a) filtration; b) decanting; c) heating; d) all answers are correct

19. Why are oils used in medical practice?

a) for the preparation of oily solutions of medicinal substances;

b) when preparing injection solutions;

c) when preparing the ointment;

d) a and b the answers are correct.

20. If the concentration of alcohol is not specified accurately in the recipe for the preparation of 5-10%, 1-2% iodine solution, 1.5% hydrogen peroxide solution, 1%

citral solution, then according to the order of (Ministry of UzR No. 582 2002 year 29 December)from the amount of ethanol, these solutions are prepared ?

a) 95% ; b) 96%; c) 70%; d) 60%.

Case study

1. Because of the lack of 25% hydrochloric acid to prepare Demyanovich's solution 2, the student did not prepare it because of 8.3% acidity. What is your opinion? Explain students' actions.

2. Take: Solution of Burov 5% 200 ml

Give. Mark. Lotion.

The student drilled 190 ml of purified water into a bubble liquid solution and immersed it with 10 ml of flushing fluid and stacked it with sticky labels.Did is prepared correctly?

3. Take: Boric acid 0,5

Glycerine 15,0

Mix. Give. Mark. For wiping hands

In order to prepare a non-aqueous solution, the student weight boric acid on a scale and crush it on a dry mortar and measures glycerin in a mince and mixed until the same solution. Then put the necessary labels in the bowl and put it in the bowl. Did the students prepared the solution correctly?

Recipes for self-study

1. Take: Boric Acid 0.3

Ethanol 70% -20 ml

Mix it up. Give. Mark it. Drops in the ear.

2. Take: Hydrochloric acid 5 ml

Waterpurified 200 ml

Mix it up. Give. Mark it. 1 tea spoon 3 times a day.

3. Take: Salicylic acid

Resorcinol equally in 0.1

Ethanol 70% - 10ml

Mix it up. Give. Mark it. For external use.

4. Take: Boric acid 0.5

Glycerol 15.0

Mix it up. Give. Mark it. For lubrication.

5. Take: Menthol 0.05

Camphoras 0.06

Paraffin wax 10,0

Mix it up. Give. Mark it. For inhalation

6. Take: Ammonia solution 4% -250 ml

Mix it up. Give. Mark it. For external use.

7. Take: Ammonia solution 5 ml

Waterpurified 500 ml

Give. Mark it. For the treatment of hands.

8. Take: Acetic acid solution 3% 100ml

Give. Mark it. Lotion.

9. Take: Burov's liquid solution 10% 100ml

Give. Mark it. Lotion.

10. Take: Hydrogen peroxide solution 50 ml

Give. Mark it. For lubricating the gums.

Methodical instructions

In pharmacy practice, in addition to aqueous solutions, medicinal preparations are prepared on non-aqueous solvents. Non-aqueous solvents include volatile substances such as ethanol, ether, chloroform, gasoline, turpentine, the most widely used are ethanol and non-volatile solvents such as vegetable oils, liquid paraffin, glycerin, silicones. They are usually used externally.

Solutions of medicinal substances on viscous solvents are prepared by weight in a weight concentration. All solutions of medicinal substances on ethanol are prepared in a mass-volume concentration using co-metric tables. If ethanol

concentration is not indicated in the recipe, 90% ethanol is used (in State Pharmacopoeia X edition), except iodine solutions 1% and 2%, hydrogen peroxide 1.5%, citral 1% - 96% ethanol, salicylic acid 1% and 2% , Boric acid 0.5-5% -70% ethanol, brilliant green 1% and 2%, methylene blue 1% -60% ethanol, for the preparation of which ethanol is used in the concentration indicated (Ministry of UzR dated 29.12.2002 Order No. 582). Iodine solutions of 5% and 10% on ethanol are prepared according to documentary edition.

The technology of non-aqueous solutions, as well as the technology of aqueous solutions, includes several stages: dissolution, straining or filtration, packaging and clearance for release. The peculiarity of dissolution in this case is that it is carried out directly in holiday vials. Vials should be dry, since water diluting ethanol and glycerin and not mixing with oils, worsens their dissolving power.

In the dispensary vial, the medicinal substances are firstly placed then non-volatile solvents. In the case of ethanol, heating and straining are undesirable in order to avoid loss of solution. In non-volatile solvents, to accelerate the dissolution of the drug substance, it is desirable to heat it, and filter through gauze if necessary. When preparing for the release of solutions on ethanol, a signature is written out, the prescription remains in the pharmacy for the quantitative registration of ethanol.

Take: Boric acid 0,3

Ethanol 70% - 10 ml

Mix it up. Give. Mark it. For External use

Passport:

Acids of boron 0,3

Ethanol 70% - 10 ml

The total volume of 10 ml

Technology: 0.3 g of boric acid is placed in a dry tempered vial of orange glass, then 10 ml of 70% ethanol is measured, clogged and shaken until dissolved. Filter if necessary and arrange for leave. Write out the signature.

Sometimes, in the absence of 70% ethanol, it is necessary to prepare it from 95% ethanol. Then the dilution formula is used:

.

of mechanical inclusions are checked. The total weight of viscous solutions is checked, and the total volume is checked for alcohol solutions.

Dilution of standard solutions

Standard (pharmacopoeial) solutions (liquids) are solutions of drugs of a strictly defined concentration, which are indicated in the documentary edition. These include solutions of acids, alkalis, salts, pharmacaldehyde and other aqueous solutions that enter the pharmacy network in the finished form. Calculations for dilution of these solutions are carried out according to documentaryedition. And Order No. 582 2002 year 29 December). For the convenience of mastering the rules for diluting standard liquids, it is advisable to divide them into 3 groups.

1 group - dilution of hydrochloric acid. In State Pharmacopoeia X edition there are 2 types of hydrochloric acid solution:

Acidumhydroshloricum 24,8-25,2%

Acidum hydroshloricumdilutum8,2-8,4%

2 group - dilution of a solution of ammonia and acetic acid. The State Pharmacopoeia X edition included Liquor ammonia caustici, Ammonium causticumsolutum with a content of 9.5-10.5% ammonia, and Acidumaceticum with an acetic acid concentration of 98% and Acidumaceticum dilutum30% concentration.

3 group - dilution of standard liquids, having two names: conditional (pharmacopeial) and chemical.

Conditional	Chemical
Liquor Burovi (Burov's fluid)	SolutioAluminiisubacetatis 7,6-9,2% (Aluminum acetate solution of basic 7.6-9.2%)

Liquor Kaliiacetatis (Potassium acetate liquid)	SolutioKaliiacetatis 33-35% (Potassium acetate solution 33-35%)
Perhudrolum (Perhydrol)	SolutioHydrogeniiperoxydiconcentrata 27,5-30,1% (A solution of hydrogen peroxide concentrated at 27.5-30.1%)
Formalinum (formalin)	SolutioFormaldehudi36-40% (Formaldehydesolution 36-40%)

1.Preparation of solutions of hydrochloric acid

According to State Pharmacopoeia X edition. If the prescription does not indicate the concentration of hydrochloric acid, then Asidumhydrochloricum dilutum8,2-8,4% is used. However, taking into account the volatility of hydrochloric acid in the pharmacy, SolutioAcidi hydrochloric diluti (1:10), which contains 0.83% hydrogen chloride, is used in the pharmacy.

Take: From Hydrochloric acid solution 2% - 100ml

Da. Signa. 1 teaspoonful 3 times daily before meal

Passport:

A solution of hydrochloric acid diluted (1:10) 2x10 = 20ml

Water purified 100-20 = 80 ml

The total volume of 100 ml

Technology: 80 ml of purified water and 20 ml of a dilute hydrochloric acid solution (1:10) 20 mlare dispensed into the vial. The bottle is sealed and labeled with "Mixture".

If a solution of hydrochloric acid in any concentration is prescribed in the prescription, Asidumhydrochloricumdilutum is also used, taking it as a unit (100%)

Take: Hydrochloric acid 2 ml

Water purified 150 ml

Mix it up. Give. Mark it. 20 drops before meal

Passport:

Acid hydrochloric diluted 2ml

Water purified 150 ml

The total volume of 152 ml.

Technology: 150 ml of purified water are then measured in the support, followed by 2 ml of hydrochloric acid. Filter through a cotton swab in the holiday vial and make out the label "Mixture."

Hydrochloric acid with a hydrogen chloride concentration of 24.2-25.3% is used in the pharmacy only for the preparation of Demyanovich's solution (for external use), in calculations it is taken as a unit (100%).

Take: Hydrochloric acid solution 6% -200 ml

Give. Mark it. Solution №2 Demyanovich (for lubricating the skin)

Passport:

Acids of hydrochloric acid (24.2-25.3%) 12 ml

Purified water 188 ml

The total volume of 200 ml

If there is no hydrochloric acid in the pharmacy (24.2-25.3%), this solution can be prepared from hydrochloric acid diluted (8.3%), taking 3 times as much.

Passport:

Hydrochloric acid diluted in 36 ml

Water purified 164 ml

The total volume of 200ml

Technology: 164 ml of purified water is filtered into the vial and then 36 ml of hydrochloric acid diluted. Make out the label "For external use" "Solution No.2 for Demyanovich" and a warning inscription "Keep in a cool place."

2. Preparation of solutions of ammonia and acetic acid.

Solutions of ammonia and acetic acid are prepared from standard solutions of ammonia (9.5-10.5%) and acetic acid concentrated (98%) and diluted, but taking into account the actual content of active substances from them. The dilution formula is used.

Passport:

A solution of hydrogen peroxide

66.6 ml X = (10 .200) / 30 = 66.6 ml

Water purified 133.4 ml 200-66.6 = 133.4 ml

The total volume of 200 ml

Technology: 133.4 ml of purified water are poured into the stand, 66.6 ml of a solution of hydrogen peroxide are mixed. Filter in vacation vial. Make out the label "For external use".

If in the prescription the concentration of hydrogen peroxide is not shown,it is prepared 3% solution and is named: Solutionis Hydrogenii peroxydi diluta.

Take: Solution of perhydrol 1% -100 ml

Give. Mark it. For external use.

In the reception it is written standard chemical name, that’s why for calculating liquid formula is used.

Passport:

Perhydrol solution 33,3 ml

Table 2

Mass ratio of the medicinal substance

Medicinal substance	Alcoholic solutions	
	HOK, ml/g	Alcohol concentration, %
Benactyzine	0,89	70
Ammonium chloride	0,85	70, 90, 96
Antipyrin	0,88	70
Borat acid	0,65	70, 90, 96
Barbital	0,77	70
Benzoic acid	0,87	70, 90, 96
Monobromated camfora	0,80	70
Gexsametilentetramin	0,79	70, 90
Dibasol	0,86	30
Benadryl	0,87	70, 90, 96
Iodine	0,22	70, 90, 96
Potassium bromide	0,36	70
Camfora	1,03	70, 90, 96
Resorcin	0,77	70, 90, 96
Salicylic acid	0,77	70, 90, 96
The standardized althea		

root dry extract-concentrate (1:1)	0,61	12
Sulfacyl sodium	0,65	70
Tannin	0,60	70, 90, 96
Chloralhydrate	0,59	70, 90, 96
Aminophylline	0,71	12

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