UKRAINIAN MINISTRY OF PUBLIC HEALTH
NATIONAL UNIVERSITY OF PHARMACY

GUIDELINES FOR PREPARING TO THE FINAL MODULE CONTROL AND STATE ATTESTATION ON THE DISCIPLINE "CHEMIST'S TECHNOLOGY OF DRUGS"

For English students of specialty "Pharmacy"

Kharkiv
NUPh
2014

UDC 615.45.014 (076)

Approved by the Central Methodological Council of the National University of Pharmacy (protocol No. 2 from 27.03.2014)

Authors: T. G. Yarnykh, O. A. Rukhmakova, M. V. Buryak, N. V. Khokhlenkova, V. V. Kovalov, K. V. Tolochko

Reviewed by: *V. I. Chueshov*, Doctor of Pharmacy, Professor of Industrial Pharmacy, National Pharmacy University; *T. V. Vedernikova,* PhD (Phylology), Associate professor of the Department of theoretical and practical of English language, Kharkiv National Pedagogical University named after G. S. Skovoroda

Guidelines to prepare for the final module control and state attestation on the discipline "Chemist's Technology of Drugs" : for English students of specialty "Pharmacy": Reference edition. For individual student's work / T. G. Yarnykh, O. A. Rukhmakova, M. V. Buryak and others. – Kharkiv : NUPh, 2014. – 48 p.

In the guidelines are given lists of theoretical questions, prescriptions and calculation tasks that need in studying the discipline chemist's technology of drugs. The list of medicinal substances is indicated to study their physical,chemical properties and peculiarities of introduction of these substances in the various dosage forms.

Also guidelines are presented tables of medicinal substances, which more often meet in the extemporaneous prescriptions, with indication of their physical and chemical properties and methods of introduction in different medicinal forms. In these materials is given a example of copybook filling. Mastering in tests with the use of these materials will help students in preparation to the licensed examination on chemist's technology of drugs.

Guidelines are intended for individual and out laboratory English student's work of specialty «Pharmacy» on chemist's technology of drugs.

INTRODUCTION

These guidelines are designed to assist full-time students of the specialty "Pharmacy" in preparation for the final module control and state attestation of chemist’s technology of drugs.

Whole controlling base of chemist’s technology of drugs includes 50 theoretical questions, 30 prescriptions, calculation tasks and the bank of tests CROCK-2.

To prepare for the final module control and state attestation in the guidelines is given a list of theoretical questions that covers the entire course of chemist’s technology of drugs. In their study should use the lecture materials and basic reference books, which are provided in these guidelines.

The main practical skill of chemist’s technology of drugs is preparing extemporaneous medicines, so for this type of control are indicated 30 prescriptions in various dosage forms. Students using theoretical knowledge must be able to justify the rational technology and prepare medicines according given prescription. For this students should know physical and chemical properties of medicinal substances and excipients, list of which is presented in the guidelines.

For systematization of information about medicinal substances and excipients in these guidelines as a table is presented the list of medicinal substances, which more often meet in the extemporaneous prescriptions, their properties and peculiarities of introduction in different medicinal forms are indicated. In addition, are resulted information about auxiliary substances, used in technology of different medicinal forms, and official prescriptions of drugs with pointing of their composition and technologies.

To prepare for the final module control also are given 7 types of calculation task (with solving standards). They will help students to acquire practical skills on the pharmaceutical calculations.

To prepare for the license examination CROCK 2 students should learn all of the above tasks and Bank of tests.

Authors hope that these guidelines will help students to prepare for the final module control, license examination CROCK 2 and state attestation of chemist’s technology of drugs.

LIST OF THEORETICAL QUESTIONS

GENERAL QUESTIONS

1. Extemporaneous medicines. Definition, classification, testing by State Pharmacopoeia of Ukraine.
2. Definition of chemist's technology of drugs as a scientific discipline, its objectives and main directions of development.
3. The current regulations which regulate preparation, quality control, storage and dispensing of extemporaneous medicines.
4. Documentation in the preparation medicines in pharmacies conditions, its types and tasks.

POWDERS

5. Powders. Definition, classification, requirements of SPhU. Technology of complex powders.
6. Preparation of powders with poisonous, narcotic and strong-effective substances. Triturations, their purpose, storage and registration.
7. Preparation of powders with poorly powdered substances and extracts.
8. Preparation of powders with dyeing and aromatic substances.

HOMOGENEOUS LIQUID MEDICINAL FORMS

9. Aqueous solutions. Special cases of preparing aqueous solution (Lugol's solution, furacilin, ethacridine lactate, potassium permanganate, osarsol, calcium gluconate, boric acid).
10. Concentrated solutions. Definition, requirements of SPhU, technology.
11. Technology of mixtures using dry medicinal substances, concentrated solutions, tinctures, extracts, syrups.
12. Standard Pharmacopoeian solutions. Definition, nomenclature, methods of prescribing in prescriptions.
13. Non-aqueous solutions (ethanol, glycerol, vegetable oils, vaseline oil). Classification, requirements of SPU. Technology of alcohol and oil solutions.
14. Drops. Definition, classification. Technology of aqueous and non-aqueous drops.

HETEROGENEOUS LIQUID MEDICINAL FORMS

15. High-molecular compounds (HMC). Definition, classification, using in pharmacy.
16. Technology of HMC solutions (pepsin, starch, gelatine, methylcellulose).
17. Colloidal solutions. Definition. Factors influencing on the stability of colloidal solutions. Technology of colloidal solutions (protargol, collargol and ichthyol).
18. Suspensions. Definition, classification, requirements of SPhU. Cases of formation suspensions.
19. Factors influencing on the stability of the suspensions. The Stokes law. The

Deryagin's rule.

20. Methods of preparation suspensions. Technology of suspensions with hydrophilic substances.
21. Technology of suspensions with hydrophobic medicinal substances. Stabilizers and their mechanism of action.
22. Oil emulsions. Definition, classification, requirements of SPhU. Methods of preparation.
23. Introduction of medicinal substances with different physical and chemical properties to emulsions. Peculiarities of introduction phenylsalicylate.

INFUSIONS AND DECOCTIONS

24. Infusions and decoctions. Definitions. Factors which influence on completeness and speed of extraction of active substances from medicinal plant raw material.
25. Technology of aqueous extracts from plant raw materials containing tannins, anthraglycosides, alkaloids, cardiac glycosides, essential oils, saponins. Introduction of medicinal substances to infusions and decoctions.
26. Standardized extracts-concentrates. Definition, classification. Technology of aqueous extracts using extract-concentrates of different physical state.
27. Technology of aqueous extracts with plant raw materials containing mucus (marshmallow root, flax seed).

SOFT MEDICINAL FORMS. SUPPOSITORIES

28. Liniments. Definition, classification, requirements of SPhU. Technology of homogeneous and heterogeneous liniments.
29. Ointment bases. Classification, requirements of SPhU. Characteristics of hydrophobic ointment bases (petrolatum, Vaseline oil, paraffin).
30. Characteristics of hydrophilic and dyphillic ointment bases (bentonite, polyethylene oxide, lanolin, beeswax).
31. Ointments. Definition, classification, requirements of SPhU. Technology of homogeneous ointments.
32. Technology of emulsion ointments. Introduction of medicinal substances according to prescribed amounts.
33. Technology of suspension ointments. Introduction of medicinal substances according to prescribed amounts. Pastes, rules of their preparation.
34. Preparation of vaginal and rectal medicines. Definition, classification, requirements of SPhU.
35. Characteristics of suppository bases (cocoa butter, butyrol, vitepsol, PEO-base, gelatin-glycerin and soap-glycerine base).
36. Technological stages of preparation suppositories by rolling method. Introduction medicinal substances according to prescribed amounts, physical and chemical

properties.

37. Technological stages of preparation suppositories by pouring method. Introduction medicinal substances according to prescribed amounts, physical and chemical properties.

STERILE AND ASEPTIC MEDICINAL FORMS. PHARMACEUTICAL INCOMPATIBILITIES.

38. Medicines for parenteral use. Definition, classification, requirements of SPhU.
39. Requirements of good pharmaceutical practice to the preparation of sterile medicines (air preparation, personnel, clothing, equipment, facilities).
40. Requirements to the medicinal substances and excipients use for the preparation solutions for injections.
41. Solutions for injection. Definition, classification, requirements of SPhU. Technological stages of preparation solutions for injection, stepwise control.
42. Methods of sterilization. Equipment used during physical methods of sterilization.
43. Stabilization of solutions for injections. Principles of selection stabilizers (for novocain, caffeine sodium benzoate, ascorbic acid, glucose solutions).
44. Infusion solutions. Definition, classification, requirements of SPhU (isotonicity, isoionisity, isohydricity, osmolarity).
45. Ophthalmic drops. Definition, requirements of SPhU. Technology of ophthalmic drops, depending on the solubility of ingredients.
46. Characteristics of stabilizers, preservatives and prolongation agents used in technology of ophthalmic drops (mertiolat, polyvinyl alcohol, methyl cellulose, benzalkonium chloride, benzyl alcohol, nypahin, nypazol).
47. Ophthalmic soft medicinal forms. Definition, classification, requirements of SPhU. Bases used for preparation of ophthalmic ointments.
48. Medicinal forms with antibiotics. Technology of different medicinal forms with antibiotics.
49. Medicinal forms for newborns and children up to 1 year. Requirements, peculiarities of technology.
50. Pharmaceutical incompatibilities. Definition, classification. The rights and responsibilities the pharmacist towards prescriptions containing incompatibilities.

LIST OF PRESCRIPTIONS

Write the formula in Latin according to the Order of MPH of Ukraine N 360 of 19.07.05. Point the proper calculations and ground the technology. Prepare the given medicine. Write the front side of the written control passport. Register the medicine for dispensing according to the requirements of Order of MPH of Ukraine N 391 of 03.08.05 and № 812 of 17.10.12

POWDERS

51. Take: Magnesium oxide 0.2
Bismuth basic nitrate
Sodium hydrocarbonate each for 0.3
Mix until obtain powder.
Give such doses number 6.
Designate. Use one powder 3 times a day.

52. Take: Atropine sulfate 0.0003
Sugar 0.3
Mix until obtain powder.
Give such doses number 6.
Designate. Use one powder 3 times a day.

53. Take: Riboflavin 0.005
Ascorbic acid 0.05
Glucose 0.1
Mix until obtain powder.
Give such doses number 6.
Designate. Use one powder 3 times a day.

54. Take: Belladonna extract 0.015
Sodium hydrocarbonate 0.25
Phenyl salicylate 0.15
Mix until obtain powder.
Give such doses number 6.
Designate. Use one powder 3 times a day.

HOMOGENEOUS LIQUID MEDICINAL FORMS

55. Take: Caffeine - sodium benzoate 1.0
Solution of sodium bromide 3 % 100 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.

56. Take: Analgin 0.5
Magnesium sulfate 2.0
Solution of sodium bromide 3% 100 ml

Simple syrup 5 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.

57. Take: Codeine phosphate 0.1
Sodium benzoate 1.0
Sodium bromide 2.0
Purified water 100 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.

58. Take: Lugol solution 20 ml
Distribute. Designate. For throat.

59. Take: Solution of hydrogen peroxide 1% 50 ml
Distribute. Designate. For greasing gums.

60. Take: Boric acid 0.5
Ethyl alcohol 50 ml
Mix. Distribute. Designate. For greasing skin.

61. Take: Adoniside 5 ml
May lily tincture
Valerian tincture each for 10 ml
Menthol 0.05
Potassium bromide 2.0
Mix. Distribute. Designate. Use 25 drops 3 times a day.

HETEROGENEOUS LIQUID MEDICINAL FORMS

62. Take: Solution of hydrochloric acid 2% 100 ml
Pepsin 1.0
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.

63. Take: Solution of protargol 1% 10 ml
Distribute. Designate. Use 3 nasal drops 3 times a day.

64. Take: Solution of collargol 2% 200 ml
Distribute. Designate. For urethral washings.

65. Take: Solution of caffeine-sodium benzoate 1% 100 ml
Bismuth basic nitrate 2.0
Simple syrup 10 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.

66. Take: Solution of calcium chloride 10% 100 ml
Sodium hydrocarbonate 2.0
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.

67. Take: Althea root's infusion 100 ml
Sodium benzoate 2.0
Ammonia anise drops 3 ml
Simple syrup 5 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.
(Prepare from medicinal plant raw material).

68. Take: Althea root's infusion 100 ml
Sodium hydrocarbonate 1.0
Ammonia anise drops 2 ml
Simple syrup 5 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.
(Prepare using standardised extract-concentrate).

69. Take: Bush pea herb's infusion from 0.3 100 ml
Sodium benzoate
Sodium hydrocarbonate each for 1.0
Ammonia anise drops 3 ml
Mix. Distribute. Designate. Use 1 tablespoon 3 times a day.
(Prepare from medicinal plant raw material).

SOFT MEDICINAL FORMS. SUPPOSITORIES

70. Take: Tar
Xeroform each for 0.3
Castor oil 10.0
Mix. Distribute. Designate. Balsamic Vishnevsky liniment (for bandages).

71. Take: Sunflower oil 7.4
Ammonium solution 2.5 ml
Oleic acid 0.1
Mix till obtain liniment.
Distribute. Designate. For rubbings.

72. Take: Protargol
Glycerin each for 0.5
Lanoline 2.0
Vaseline 10.0
Mix till obtain ointment.
Distribute. Designate. Ointment for nose.

73. Take: Novocain 0.25
Menthol 0.3
Lanoline 1.0
Vaseline 10.0
Mix till obtain ointment.
Distribute. Designate. For greasing of the staggered parts of skin.

74. Take: Dimedrol 0.03
Analgin 0.1
Cacao butter 1.5
Mix till obtain suppository.
Give such doses number 6.
Designate. Use 1 suppository 3 times a day.

75. Take: Zinc oxide
Bismuth basic nitrate each for 0.2
Butyrol as much as necessary
Mix till obtain suppository.
Give such doses number 10.
Designate. Use 1 suppository 2 times a day.

STERILE AND ASEPTIC MEDICINAL FORMS.

76. Take: Solution of novocain 1% isotonic 50 ml
Sterilize!
Distribute. Designate. Use 5 ml intramuscular 1 time in 2 days.

77. Take: Solution of caffeine-sodium benzoate 10% 50 ml
Sterilize!
Distribute. Designate. Use 1 ml subcutaneous 2 times a day.

78. Take: Solution of pilocarpin hydrochloride 1 % 10 ml
Distribute. Designate. 2 drops into both eyes 3 times a day.

79. Take: Solution of levomycetin 0.15% 20 ml
Distribute. Designate. 2 drops 6 times a day into the left eye.

80. Take: Benzylpenicillin sodium salt 100 000 U
Base 10.0
Mix till obtain ointment.
Distribute. Designate. To inflict on the eye's mucous.

Standard of solving prescription No. 52

Rp.: Atropini sulfatis 0.0003

Sacchari 0.3

Misce, ut fiat pulvis

Da tales doses numero 6

Signa: Use 1 powder 3 times a day.

Signature of the doctor personal doctor seal

Seal of medicinal establishment

The given medicine is a complex dosed powder for internal use prescribed by the distributive method, which includes a poisonous substance atropine sulphate that is prescribed in a non-weighing quantity.

Check of doses for atropine sulphate:
H.S.D. – 0.001 M.S.D. – 0.0003
H.D.D. – 0.003 M.D.D. – 0.0003×3 = 0.0009
Doses are not exceeded.

Technology:

Atropine sulphate is prescribed in a non-weighing quantity, therefore, trituration (1:100) is used. Put into a mortar 1.62 g of sugar and grind thoroughly. Then pour out the part of it on a paper capsule so that the quantity of the rest is the same with the quantity of trituration of atropine sulphate (approximately 0.18 g). Then put into the mortar 0.18 g of trituration of atropine sulphate (1:100) and grind. After grinding put the rest of sugar by parts into the mortar and mix thoroughly until homogeneity of the powder is obtained.

Registration for dispensing (packing, labels):

Powders are dispensed in beeswax or paraffin capsules, which are put into paper packets. Labeling: number of prescription, signature, labels: "To be handled with caution!", "Keep in a dry place", "Keep out of the reach of children", sealing up.

WCP (reverse side)

Atropine sulphate 0.0003×6 = 0.0018

Trituration of atropine sulphate (1:100): 0.0018×100 = 0.18
Sugar 0.3×6 = 1.8; 1.8 – 0.18 = 1.62

Mass of 1 powder: $\frac{0.18+1.62}{6} = 0.3$

Received by: Triturationis Atropini sulfatis (1:100) 0.18 series No
Date Signature of the person, who received

Delivered by: Triturationis Atropini sulfatis (1:100) 0.18 series No
Date Signature of the person, who delivered

WCP (front side)

Date No. of prescription
Sacchari 1.62
Triturationis Atropini sulfatis (1:100) 0.18 series No
0.3 N 6

Prepared by:
Checked by:

LIST OF CALCULATION TASKS

CONCENTRATED SOLUTIONS

Calculate the amount of medicinal substance and water for the preparation of:

81. 5 liters of 20% solution of hexamethylenetetramine (CVI hexamethylenetetramine 0.78; density of 20% solution of hexamethylenetetramine 1.0421). Correct concentration, if the analysis is equal to 20.7%, 19.8%.
82. 3 liters of 10% solution of caffeine-sodium benzoate (CVI caffeine-sodium benzoate 0.65; density of 10% solution of caffeine-sodium benzoate 1.0341). Correct concentration, if the analysis is equal 9.5%; 10.9%.
83. 2 liters of 20% solution of chloral hydrate (chloral hydrate CVI 0.76; density of 20% solution of chloral hydrate 1.0860). Correct concentration, if the analysis is equal to 20.7%; 19.3%.
84. 10 liters of 20% solution of potassium bromide (potassium bromide CVI 0.27; density of 20% solution of potassium bromide 1.1438). Correct concentration, if the analysis is equal to 19.5%; 20.6 %.
85. 4 liters of 20% solution of potassium iodide (CVI potassium iodide 0.25, density of 20% solution of potassium iodide 1.1478). Correct concentration, if the analysis is equal to 23.6 %; 18.7 %.
86. 7 liters of 10% solution of calcium gluconate (CVI calcium gluconate 0.50; density of 10% solution of calcium gluconate 1.0441). Correct concentration, if the analysis is equal to 9.6%; 10.3 %.
87. 2 liters of 20% solution of potassium iodide (CVI potassium iodide 0.25, density of 20% solution of potassium iodide 1.1478). Correct concentration, if the analysis is equal to 18.9%; 23.0 %.
88. 2 liters of 50% solution of magnesium sulfate (magnesium sulfate CVI 0.50; density of 50% magnesium sulfate solution 1.2206). Correct concentration, if the analysis is equal to 49,3%; 50.6%.
89. 4 liters of 10% solution of sodium salicylate (CVI sodium salicylate 0.59, density of 10% sodium salicylate 1.0301). Correct concentration, if the analysis is equal to 9.4 %; 10.5 %.
90. 500 ml of 10% sodium benzoate (CVI sodium benzoate 0.65; density of 10% sodium benzoate 1.0381). Correct concentration, if the analysis is equal to 9.8 %; 10.4 %.
91. 5 liters of 20% solution of potassium bromide (potassium bromide CVI - 0.27; density of 20% solution of potassium bromide 1.1438). Correct concentration, if the analysis is equal to 207%; 19.3%.
92. 1 liter of 25% solution of magnesium sulfate (CVI magnesium sulfate 0.50, density of 25% magnesium sulfate solution 1.1159). Correct concentration, if the analysis is equal to 25.8%; 24.5%.

Standard of solving task No. 92

Magnesium sulfate $25 - 10$

$x - 1000 \quad x = 250.0$

Purified water $1000 - (250.0 \times 0.50) = 875$ *ml or* $(1000 \times 1.1159) - 250.0 = 865.9$ *ml*

If C= 24.5%, than masse of magnesium sulfate:

$x = [1000 \times (25 - 24.5)] : [(100 \times 1.1159) - 25] = 500 : 86.59 = 5.77.$

If C= 25.8%, than purified water:

$x = [1000 \times (25.8 - 25)] : 25 = 32$ *ml.*

STANDARD PHARMACOPOEIA LIQUIDS

Calculate the amount of ingredients for the preparation of:

93. 150 ml of 5% perhidrol.
94. 50 ml of 5% ammonia.
95. 90 ml of acetic acid 2%.
96. 400 ml of 10% formalin.
97. 100 ml of potassium acetate 3%.
98. 150 ml of hydrogen peroxide 10%.
99. 500 ml formalin 10% (from 34%).
100. 150 ml of hydrochloric acid 6% (solution number 2 in words Dem'yanovich).
101. 100 ml of hydrochloric acid 1%.
102. 100 ml of hydrochloric acid 3%.
103. 150 ml of fluid Burova of 10%.
104. 60 ml of formaldehyde 10% (from 30%).

Standard of solving task No. 103

The solution of the standard pharmacopeia liquid discharged under the conditional name that's the calculation of the standard concentration is taken as 100%.

The solution of basic aluminum acetate 8%: $\frac{150 \times 10}{100} = 10$ *ml.*

Purified water: 150 – 15=135 ml.

NON-AQUEOUS SOLUTIONS

Calculate the amount of purified water and alcohol, using alcohol calculation dilution formula and table. 2.9.10-3 SPhU, ext. 1, to calculate the purified water - table. 2.9.10-3 and 2.9.10. 5 SPhU, ext. 1.

105. Calculate the amount of 95% alcohol and water to prepare 1500 ml of 70% alcohol.
106. Calculate the amount of 95% alcohol and water to prepare 90 ml of 80% alcohol.
107. Calculate the amount of 90% alcohol and water to prepare 100 ml of 40% alcohol.

108. Calculate the amount of 95% alcohol and water to prepare 20 ml of 70% alcohol.
109. Calculate the amount of 95% alcohol and water to prepare 50 ml of 70% alcohol.
110. Calculate the amount of 90 % alcohol and water to prepare 60 ml of 50 % alcohol.
111. Calculate the amount of 95% alcohol and water to prepare 150 ml of 60% alcohol.
112. Calculate the amount of 90% alcohol and water to prepare 400 ml of 60% alcohol.
113. Calculate the amount of 95% alcohol and water to prepare 150 ml of 50% alcohol.
114. Calculate the amount of 95% alcohol and water to prepare 50 ml of 60% alcohol.
115. Calculate the amount of 90% alcohol and water to prepare 30 ml of 40% alcohol.
116. Calculate the amount of 70 % alcohol and water to prepare 70 ml of 40 % alcohol.

Standard of solving task No.136

I way (using Table 2.9.10-5 SPhU)

x = (70 ml×40%):70%=40 ml of 70% alcohol
SPhU addition 1 table 2.9.10-5
To 1000 ml of 70% alcohol add 774 ml of water
To 40 ml of 70% alcohol – x *x = 30.96 ml ≈ 31 ml of water*

II way (using Table 2.9.10-3 SPhU)

To get 1000 ml of 40% alcohol should be mixed 571 ml of 70% alcohol and 443 ml of purified water and to get 70 ml of 40% alcohol, it is necessary:
1000 ml of 40% alcohol – 571 ml of 70% alcohol
70 ml of 40% alcohol – x *x = 39.97 ml ≈ 40 ml of 70% alcohol*
1000 ml of 40% alcohol – 443 ml of water
70 ml of 40% alcohol – x *x = 31.01 ml of water*

INFUSIONS AND DECOCTIONS

Calculate the amount of medicinal plant raw material and water for the preparation of water extracts:

117. 180 ml infusion of Salvia leaves.
118. 120 ml decoction of Oak bark.
119. 180 ml infusion of Motherwort herb.
120. 200 ml decoction of Buckthorn bark.
121. 200 ml decoction of Senna leaves.
122. 180 ml infusion of Chamomile flowers.
123. infusion of Althea root from 4,0 100 ml.
124. 120.0 mucus of Linen seeds.
125. 200 ml infusion of Mint leaves.
126. 150 ml decoction of Glycyrrhiza roots.
127. 200 ml infusion of Althea root.

128. 300 ml infusion of Thermopsis herb (alkaloid content 1.8%).
129. 180 ml infusion of Valerian rhizomes and roots.

Standard of solving task No.149
Infusion of Valerian roots and rhizomes is prepared in a ratio 1:30
Valerian roots and rhizomes
1 — 30 ml
x — 180 ml x = 6.0
Purified water: 180 + (6.0×2.9) = 197.4 ml

SUPPOSITORIES

Calculate how much *fat base* is required:

130. For preparing 120 suppositories that contain 0.25 of analgin, if the form gives suppositories on the fat base with weight 3.8 ($1/E_{f\ analgin} = 0.79$).
131. For preparing 120 suppositories that contain 0.25 of boric acid, if the form gives suppositories on the fat base with weight 3.2 ($1/E_{f\ boric\ acid} = 0.625$).
132. For preparing 100 suppositories that contain 0.2 of zinc oxide and 0.15 of dermatol, if the form gives suppositories on the fat base with weight 3.1 ($1/E_{f\ zinc\ oxide} = 0.25$, $1/E_{f\ dermatol} = 0.38$).
133. For preparing 60 suppositories that contain 0.15 of bismuth basic nitrate and 0.1 of phenylsalicylate, if the form gives suppositories on the fat base with weight 3.5 ($1/E_{f\ bismuth\ basic\ nitrate} = 0.21$, $1/E_{f\ phenylsalicylate} = 0.72$).
134. For preparing 60 suppositories that contain 0.15 of boric acid and 0.1 of tannin, if the form gives suppositories on the fat base with weight 2.9 ($1/E_{f\ boric\ acid} = 0.625$; $1/E_{f\ tannin} = 0.90$).
135. For preparing 100 suppositories that contain 0.2 of xeroform and 0.1 of tannin, if the form gives suppositories on the fat base with weight 3.1 ($1/E_{f\ xeroform} = 0.21$; $1/E_{f\ tannin} = 0.90$).

Calculate how much *gelatin – glycerin base* is required:

136. For preparing 120 balls that contain 0.2 of zinc oxide, if the form gives balls on the fat base with weight 2.2 ($1/E_{f\ zinc\ oxide} = 0.25$).
137. For preparing 100 balls that contain 0.3 of xeroform, if the form gives balls on the fat base with weight 3.6 ($1/E_{f\ xeroform} = 0.21$).
138. For preparing 100 balls that contain 0.2 of alums, if the form gives balls on the fat base with weight 2.4 ($1/E_{f\ alums} = 0.56$).
139. For preparing 60 balls that contain 0.2 of ichthyol, if the form gives balls on the fat base with weight 4.0 ($1/E_{f\ ichthyol} = 0.91$).
140. For preparing 60 balls that contain 0.15 of zinc oxide, if the form gives balls on the fat base with weight 2.6 ($1/E_{f\ zinc\ oxide} = 0.25$).
141. For preparing 60 balls that contain 0.15 of protargol, if the form gives balls on the fat base with weight 2.7 ($1/E_{f\ protargol} = 0.71$).

Standard of solving task No.155

$\%_{dry\ substances}$: 3.1 – 100%

0.3 – x x = 9.7%>5%

Fat base: 100×3.1–(100×0.2×0.21 + 100×0.1×0.90) = 296.8

ISOTONIC SOLUTIONS

Make calculations of isotoning solution for injections:

142. Take: Solution of trimecaine 1 % isotonic 10 ml
Sterilize!
Give. Indicate. For anesthesia of 1 ml
(equivalent of trimecaine by NaCl is 0.21;
depression of 1% solution of trimecaine is 0.121°C).

143. Take: Solution of strychnine nitrate 0.1 % isotonic 50 ml
Sterilize!
Give. Indicate. 1 ml 2 times a day subcutaneously.
(equivalent of strychnine nitrate by NaCl is 0.12;
depression of 1 % solution of strychnine nitrate is 0.069°C).

144. Take: Solution of ephedrine hydrochloride 1% 50 ml
Sodium chloride sufficient amount,
to form an isotonic solution
Sterilize!
Give. Indicate. 1 ml subcutaneously
(equivalent of ephedrine hydrochloride by NaCl is 0.28;
depression of 1 % solution of ephedrine hydrochloride is 0.161°C).

145. Take: Solution of papaverine hydrochloride 2% 100 ml
Sodium chloride sufficient amount,
to form an isotonic solution
Sterilize!
Give. Indicate. 2 ml subcutaneously
(equivalent of papaverine hydrochloride by NaCl is 0.1;
depression of 1 % solution of papaverine hydrochloride is 0.057°C).

146. Take: Solution of calcium chloride 0.5% 100 ml
Sodium chloride sufficient amount,
to form an isotonic solution
Sterilize!
Give. Indicate. For intravenous drip
(equivalent of calcium chloride by NaCl is 0.36;
depression of 1 % solution of calcium chloride is 0.207°C).

147. Take: Solution of atropine sulfate 0.1% 50 ml
Sodium chloride sufficient amount,
to form an isotonic solution
Sterilize!
Give. Indicate. For intravenous infusion by 0.25 ml
(equivalent of atropine sulfate by NaCl is 0.1;
depression of 1 % solution of atropine sulfate is 0.057°C).

148. Take: Novocain 0.1
Water for injections 20 ml
Sodium chloride sufficient amount,
to form an isotonic solution
Sterilize!
Give. Indicate. For peridural anesthesia.
(equivalent of novocain by NaCl is 0.18;
depression of 1% solution of novocain is 0.104°C).

149. Take: Solution of glucose isotonic 200 ml
Sterilize!
Give. Indicate. For injections by 10 ml
(equivalent of glucose by NaCl is 0.18;
depression of 1 % solution of glucose is 0.104°C).

150. Take: Solution of novocain 2% isotonic 200 ml
Sterilize!
Give. Indicate. 5 ml intramuscularly 1 time in 2 days.
(equivalent of novocain hydrochloride by NaCl is 0.18;
depression of 1 % solution of novocain is 0.104°C).

Standard of solving task No. 170

a) Calculation using equivalent of novocain by sodium chloride:

1. *Amount of novocain:*

2.0 – 100 ml
X – 200 ml *X = 4.0*

2. *Amount of sodium chloride, which creates osmotic pressure such as 4.0 of novocain (based on equivalent of novocain by sodium chloride - 0.18):*

1.0 – 0.18
4.0 – X *X = 0.72*

3. *Amount of sodium chloride, which is necessary for isotoning 200 ml solution:*

0.9 – 100 ml
X – 200 ml *X = (0.9×200) / 100 = 1.8 of sodium chloride*

4. *Amount of sodium chloride, which is necessary for reisotoning 200 ml solution:*

1.8 – 0.72 = 1.08 of sodium chloride

b) Calculation using depression of freezing point of the solution:

1. *Isotonic concentration of solution:*

1% – 0.104℃

X – 0.52℃ *X = (0.52×1) / 0.104 = 5%*

2. *Amount of novocain by prescription:*

2.0 – 100 ml

X – 200 ml *X = 4.0*

3. *Volume of solution which will isotonate 4.0 of novocain:*

5.0 – 100 ml

4.0 – X *X = (4.0×100) / 5.0 = 80 ml*

The volume of the solution, which is needed to be reisotonated:

200 ml – 80 ml = 120 ml

The remaining amount of sodium chloride to be added for isotonicity:

0.9 – 100 ml

X – 120 ml *X = 1.08*

OPHTHALMIC DROPS

Make calculations of isotoning ophthalmic drops:

151. Take: Solution of sodium tetraborate 2 % 10 ml
Boric acid sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops in both eyes 3 times a day.
(equivalent of sodium tetraborate by NaCl is 0.34;
equivalent of boric acid by NaCl is 0.53).

152. Take: Solution of ascorbic acid 0.5 % 10 ml
Glucose sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops 3 times a day.
(equivalent of ascorbic acid by NaCl is 0.18;
equivalent of glucose by NaCl is 0.18).

153. Take: Solution of thiamine bromide 0.02% 10 ml
Glucose sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops in both eyes 2 times a day.
(equivalent of thiamine bromide by NaCl is 0.24;
equivalent of glucose by NaCl is 0.18).

154. Take: Solution of physostigmine salicylate 0.5% 20 ml
Sodium sulfate sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops 3 times a day.
(equivalent of physostigmine salicylate by NaCl is 0.16;
equivalent of sodium sulfate by NaCl is 0.23).

155. Take: Solution of zinc sulfate 0.25 % 20 ml
Boric acid sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops in both eyes 3 times a day.
(equivalent of zinc sulfate by NaCl is 0.34;
equivalent of boric acid by NaCl is 0.53).

156. Take: Solution of copper sulfate 0.25% 20 ml
Sodium sulfate sufficient amount to obtain isotonic solution
Give. Indicate. Ophthalmic drops.
(equivalent of copper sulfate by NaCl is 0.13;
equivalent of sodium sulfate by NaCl is 0.23).

157. Take: Solution of silver nitrate 1% 10 ml
Sodium nitrate sufficient amount to obtain isotonic solution
Give. Indicate. Ophthalmic drops.
(equivalent of silver nitrate by NaCl is 0.33;
equivalent of sodium nitrate by NaCl is 0.66).

158. Take: Solution of calcium chloride 2% 10 ml
Glucose sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops in both eyes 3 times a day.
(equivalent of calcium chloride by NaCl is 0.36;
equivalent of glucose by NaCl is 0.18).

159. Take: Solution of chinine hydrochloride 1 % 10 ml
Glucose sufficient amount to obtain isotonic solution
Give. Indicate. Ophthalmic drops.
(equivalent of chinine hydrochloride by NaCl is 0.14;
equivalent of glucose by NaCl is 0.18).

160. Take: Solution of zinc sulfate 0.25% 20 ml
Sodium sulfate sufficient amount to obtain isotonic solution
Give. Indicate. 2 drops in the left eye 2 times a day.
(equivalent of zinc sulfate by NaCl is 0.12;
equivalent of sodium sulfate by NaCl is 0.23).

Standard of solving task No. 160

The calculation is carried out using the equivalent of zinc sulfate by sodium chloride:

1. Amount of Zinc sulfate:

0,25 – 100 ml
X – 20 ml *X = 0,05*

2. Sodium chloride, corresponding to prescribed amounts of zinc sulfate:

1,0 – 0,12
0,05 – X *X = 0,006*

3. Amount of sodium chloride, which is necessary for isotoning 20 мл:

0,9 – 100 ml

X – 20 ml *X = 0,18*

4. Amount of sodium chloride, which is necessary for reisotoning:

0,18 – 0,006 = 0,174

5. Amount of Sodium sulfate, which is necessary for isotoning eye drops are calculated through equivalent sodium sulfate for sodium chloride:

0,23 sodium chloride – 1,0 sodium sulfate

0,174 sodium chloride – X $X \approx 0,76$

LIST OF MEDICINAL SUBSTANCES AND EXCIPIENTS

1. Aethacridin lactate
2. Aethylmorphin hydrochloride
3. Ammonia anise drops
4. Anaesthesin
5. Analgin
6. Antibiotics (Benzyl penicillin sodium (potassium) salt, Erythromycin, Neomycin, Streptomycin sulfate, Rifampicin)
7. Ascorbic acid
8. Atropine sulfate
9. Bismuth basic nitrate
10. Boric acid
11. Bromocamphor
12. Caffeine – sodium benzoate
13. Calcium carbonate
14. Calcium gluconate
15. Camphor
16. Chinosol
17. Chloral hydrate
18. Codeine phosphate
19. Collargol
20. Copper sulfate
21. Dermatol
22. Dibazol
23. Dicain
24. Dimedrol
25. Ephedrine hydrochloride
26. Extract of Belladonna
27. Fat oils (sunflower, olive, castor, peach)
28. Furacilin
29. Gelatin
30. Glucose
31. Hexamethylenetetramine
32. Ichthyol
33. Iodine
34. Laevomycetin
35. Magnesium oxide
36. Magnesium sulfate
37. Menthol
38. Mercury oxide yellow
39. Methyl salicylate
40. Methylcellulose
41. Methylene blue
42. Norsulfazol
43. Novocain
44. Oleic acid
45. Osarsol
46. Papaverine hydrochloride
47. Pepsin
48. Phenobarbital
49. Phenylsalicylate
50. Pilocarpine hydrochloride
51. Platiphyllin hydrotartrate
52. Potassium bromide
53. Potassium iodide
54. Potassium permanganate
55. Protargol
56. Resorcin
57. Riboflavin
58. Salicylic acid
59. Scopolamine hydrobromide
60. Silver nitrate
61. Sodium benzoate
62. Sodium bromide
63. Sodium chloride
64. Sodium hydrocarbonate
65. Sodium salicylate
66. Sodium tetraborate
67. Sodium thiosulfate
68. Solution of adrenaline hydrochloride
69. Solution of citral
70. Starch
71. Streptocide
72. Sulfur
73. Tannin
74. Tar
75. Terpinhydrate
76. Tripsin
77. Xeroform
78. Zinc oxide
79. Zinc sulfate
80. Ephedrine hydrochloride

AROMATIC WATERS, GALENIC, NOVOGALENIC MEDICATIONS

81. Mint water
82. Water mint
83. Elixir pectoral
84. Adonisid
85. Belladonna tincture
86. Valerian tincture
87. Lily of the valley tincture
88. Motherwort tincture

PLANT RAW MATERIAL

89. Althea root
90. Thermopsis herb
91. Valerian root
92. Oak bark
93. Bearberry leaves
94. Lily of the valley herb
95. Adonis herb
96. Motherwort herb
97. Senna leaves
98. Saponins roots
99. Mint leaves
100. Digitalis leaves

STANDARD PHARMACOPEIA LIQUIDS

101. Burov liquid
102. Liquid of potassium acetate
103. Formalin
104. Perhydrol
105. Solution of hydrogen peroxide
106. Solution of ammonium
107. Acetic acid
108. Hydrochloric acid

AUXILIARY SUBSTANCES (EXCIPIENTS)

109. Sugar
110. Lactose
111. Fat oils (sunflower, olive, castor, peach)
112. Glycerin
113. Tween-80
114. Gelatos
115. 5 % methylcellulose solution
116. Simple syrup
117. Alcohol-water-glycerin mixture
118. Vaseline
119. Vaseline oil
120. Non-water Lanoline
121. Water Lanoline
122. PEO base
123. Gelatin-glycerin base
124. Cacao butter
125. Butyrol
126. Soapy alcohol
127. Weybel liquid (sodium chloride, solution of hydrochloric acid, water for injections)
128. Solution of sodium hydroxide 0,1 M
129. Base for ophthalmic ointments (9:1)
130. Base for ointments with antibiotics (6:4)

LIST OF PRACTICAL ABILITIES AND SKILLS
from chemist technology of drugs

1. Know the legal framework regulating industrial activity of pharmacies; be able to work with it.
2. Know and analyze the content of requirements of normative documentation for the organization, implementation and control of the production process in the pharmacy.
3. Be able to implement the requirements of normative documentation in the practice of pharmacies.
4. Conduct pharmaceutical expertise of prescription.
5. Check single, daily doses of poisonous, narcotic, strong-effective substances and dispensing norms of narcotic substances and similar to them.
6. Identify in prescriptions physical, chemical and pharmacological incompatibilities.
7. Conduct processing and pharmaceutical washing of tableware, carry sanitize rooms and equipment, conduct personal sanitary preparation.

POWDERS

8. Calculate the amount of medicinal substances for the preparation of powders.
9. Conduct basic technological operations in the preparation of powders: weigh, grind, mix and dose.
10. Use devices of small mechanization for mixing and dispensing powders.
11. Pick up packing material considering the components properties and register powders to dispensing.

LIQUID MEDICINAL FORMS

12. Calculate the amount of water and medicinal substances for preparation concentrated solutions.
13. Perform basic technological operations for the preparation of concentrated solutions (weigh, measure, dissolve and filter). Use burette system.
14. Calculate the amount of medicinal substances, concentrated solutions and water for preparation solutions containing up to 3 % and more than 3 % of dry substances.
15. Perform basic technological operations for the preparation of liquid medicines using concentrated solutions and dry substances (measure, weigh, dissolve, strain).
16. Calculate the amount of water, medicinal and auxiliary substances for the

preparation of drops.

17. Calculate the amount of water and pharmacopoeial liquids depending on the way of their prescription.
18. Calculate the amount of alcohol and water to obtain alcohol of desired concentration (using the dilution formula and alcohol metric tables).
19. Perform basic technological operations for the preparation of non-aqueous solutions (weigh, measure, heat, dissolve, strain).
20. Define and justify optimal technology of solutions of HMC and protected colloids.
21. Perform basic technological operations for the preparation of solutions of HMC and protected colloids (weigh, measure, heat, dissolve, strain).
22. Calculate the amount of medicinal substances and solvent in the preparation of suspensions and quantity of stabilizer in the preparation of suspensions of hydrophobic substances.
23. Perform basic technological operations for the preparation of suspensions (weigh, disperse, mix, measure).
24. Pick up an appropriate emulsifier depending on physical and chemical properties of the emulsion's ingredients.
25. Calculate the amount of oil, emulsifier and water to prepare emulsions.
26. Choose and justify the method of preparation emulsions depending on the nature of the emulsifier.
27. Perform basic technological operations for the preparation of oil emulsions (weigh, measure, dissolve, warm up, mix, emulsify, strain).
28. Introduce medicinal substances with different physical and chemical properties in emulsions.
29. Calculate the amount of medicinal plants or extracts-concentrates and water for the preparation of infusions and decoctions.
30. Perform basic technological operations for the preparation of infusions and decoctions (grind, sift, weigh, measure, extract, cool, strain, bring to volume).
31. Use device of small mechanization in the preparation of water extracts (infusers with electric heating, etc.).
32. Introduce medicinal substances with different physical and chemical properties in the water extracts.
33. Pick up packing material considering the components properties and register liquid medicinal forms to dispensing.

LINIMENTS. OINTMENTS. SUPPOSITORIES

34. Calculate the percentage of medicinal substances with different physical and chemical properties in composition of ointments and amount of excipients for the preparation of homogeneous and heterogeneous ointments.
35. Perform basic technological operations for the preparation of liniments and ointments with various types of disperse system (weigh, measure, mix, grind, dissolve, emulsify).
36. Calculate the amount of medicinal and auxiliary substances for the preparation of suppositories.
37. Choose and justify the optimal variant of technology considering the properties of the components of the prescription, and the equipment used for this.
38. Perform basic technological operations for the preparation of suppositories by rolling and pouring method (weigh, grind, dissolve, mix, emulsify, dose, roll, melt, pour into forms, cool, remove from the form).
39. Use devices of small mechanization for preparation suppositories by rolling and pouring methods (pilullar machine, machine for grinding cocoa butter, devices for heating and melting bases, forms for pouring, etc.).
40. Pick up packaging material considering the components properties and register medicine for dispensing.

ASEPTIC MEDICINAL FORMS

41. Calculate the amount of medicinal and auxiliary substances for the preparation of.
42. Pick up stabilizer and justify the need to stabilize medicinal substance in solution for injections.
43. Calculate isotonic concentration of intravenous solutions by different methods.
44. Choose the optimal variant of technology solutions for injections considering physical and chemical properties of the ingredients and equipment available.
45. Choose and justify a rational method of preparing suspensions for injections or solutions of thermo labile substances.
46. Perform basic technological operations for the preparation of solutions for injections (weigh, dissolve, filter, provide control for the absence of impurities, hermetically clog, arrange for sterilization, sterilize).
47. Calculate the amount of medicinal and auxiliary substances for the preparation of

ophthalmic medicines and medicines with antibiotics.

48. Calculate isotonic concentration of eye drops, lotions, washes.
49. Choose and justify optimal variant of technology of ophthalmic medicines considering physical and chemical properties of the ingredients and equipment available.
50. Perform basic technological operations for the preparation of ophthalmic medicines and medicines with antibiotics (weigh, measure, dissolve, filter, disperse, mix, conflate, sterilized, roll out, form, divide on the dose, etc.).
51. Pick up packaging material, depending on the type of dosage form, physical and chemical properties of the ingredients.
52. Use devices of small mechanization in the preparation of sterile products (apparatus for filtering, machines for aluminum caps lids, equipment for sterilization, drying cabinets, etc.).

INTRAPHARMACY PRODUCTS, PACKING, REPACKAGING

53. Prepare concentrates, intrapharmacy products and medicinal products in store.
54. Carry out disassembly, cleaning and assembly burette system, fill it with solutions.
55. Conduct packing and repackaging of medicines.
56. Register intrapharmacy products in relevant journals.
57. Pick up packaging material considering properties of the components and register intrapharmacy products for storage or dispensing.
58. Draw up technological instructions for extemporaneous medicines and intrapharmacy products.
59. Work with the technical documentation at the pharmacy (use general and technological instructions, do production records in the written control passport and related journals).
60. Conduct stepwise quality control of prepared extemporaneous medicines.
61. Store prepared extemporaneous medicines and intrapharmacy products under appropriate conditions.

Medicinal substances, their properties and peculiarities of introduction in different medicinal forms

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
1.	**Aethacridin lactate** Strong effective substance (check doses), dyeing substance. Moderately soluble in cold water, soluble in hot water.	**Powders:** By the method of "three layers". Pack in parchment capsules.	***Chemical: with sodium chloride precipitate aethacridin base***
		Homogeneous liquid MF: Dissolve in hot water.	
		Ophthalmic drops: By the general rules. Dissolve in a half amount of prescribed hot water, isononate by boric acid.	
2.	**Aethylmorphin hydrochloride** Narcotic substance (check doses). Soluble in water. Drug seal up, Register for dispensing by signature, additional label «To be handled with caution».	**Powders:** By the general rules. If total mass of medicinal substance is less then 0,05 – it is used as trituration.	
		Homogeneous liquid MF: By the general rules.	
		Ointments on hydrophobic base: As water solution by the type of emulsion.	
		Ophthalmic drops: By the general rules. Dissolve in a half amount of prescribed water, isononate by sodium chloride.	
3.	**Ammonia anise drops** Aromatic, ammonia-alcohol solution of essential anise oil.	**Liquid MF:** Mix in separate vessel with equal amount of prepared mixture or with simple syrup (if it is prescribed), then add into the bottle for dispensing. Condensation methods of obtaining suspensions in the result of replacement of solvent - «muddy» mixtures are formed.	
4.	**Anaesthesin** Strong effective substance (check doses). Soluble in fat oils (up to 2 %), in chloroform; insoluble in water, Vaseline oil.	**Homogeneous liquid MF:** By the general rules: dissolve in fat oils (up to 2 %), in chloroform.	
		Emulsions: Up to 2 % – dissolve in fat oils, more than 2 % - as grinded powder by the type of suspension introduce in prepared emulsion.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
5.	**Analgin** Strong effective substance (check doses). Soluble in water.	**Homogeneous liquid MF:** By the general rules: dissolve in a vessel in purified water, strain into the bottle for dispensing.	
		Ointments on hydrophobic base: Up to 5 % - as water solution by the type of emulsion, more than 5 % - as grinded powder by the type of suspension mixing with the part of melted base.	
		Ointments on hydrophilic base: By the type of solution, dissolve in the melted base.	
		Suppositories (rolling method): Up to 5 % - dissolve in minimal quantity of water, more than 5 % - as grinded powder by the type of suspension mixing with the part of the base.	
		Suppositories (casting method): **On hydrophobic base (Butyrol) –** as grinded powder by the type of suspension mixing with the part of the base. **On hydrophilic base (PEO)** – by the type of solution, dissolving in the melted base.	
		Solutions for injections: By the general rules without stabilization.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
6.	**Antibiotics (Benzyl penicillin sodium (potassium) salt, Erythromycin, Neomycin, Streptomycin sulfate, Rifampicin)** Strong effective substances (check doses). Thermo labile substances. *All MF are prepared in aseptic conditions.*	**Solutions for injections and ophthalmic drops:** Dissolve in isotonic solution of sodium chloride, after its sterilization.	***Inactivate by strong acids (hydrochloric, sulphuric, etc.)***
		Dermatological and ophthalmic ointments: Introduce by the type of suspension – grind with the part of sterile melted base (6 parts of Vaseline : 4 parts of non-water Lanoline).	
		Suppositories (rolling method): As grinded powder by the type of suspension mixing with the part of the base.	
7.	**Ascorbic acid** Soluble in water. Easily oxidized substance. Use as antioxidant in solutions for injections.	**Powders:** By the general rules in the rubbed out mortar.	***Physical and chemical: formation of a damp mixture with hexamethylenetetramine, sodium hydrocarbonate***
		Solutions for injections: By the general rules. Stabilize by antioxidant – sodium sulfite.	
		Ophthalmic drops: Dissolve in the half amount of prescribed water. Isotonate by sodium chloride.	
8.	**Atropine sulfate** Poisonous substance (check doses). Soluble in water. Drug seal up, register for dispensing by signature, additional label «To be handled with caution».	**Powders:** By the general rules. If total mass of medicinal substance is less then 0,05 – it is used as trituration (1:100).	***Physical: adsorption by aluminum hydroxide***
		Drops: If total mass of medicinal substance is less then 0,05, it is taken as 1 % water concentrated solution.	***Physical and chemical: sedimentation by tannins***
		Ointments on hydrophobic base: As water solution by the type of emulsion.	
		Suppositories (rolling method): As water solution by the type of emulsion.	
		Solutions for injections: By the general rules, stabilize by 0,1 M solution of hydrochloric acid (10 ml per1liter of solution).	
		Ophthalmic drops: By the general rules. Dissolve in the half amount of prescribed water, isotonate by sodium sulfate.	
9.	**Bismuth basic nitrate** Big loses in the pores of mortars; amorphous substance. Insoluble in water and in fats.	**Powders:** By the general rules in the rubbed out mortar, without additional grinding.	
		Suspensions (dispersive method): By the method of "making muddy".	
		Emulsions: In the prepared emulsion - as grinded powder by the type of suspension.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
10.	**Boric acid** Coarse-crystalline substance. Soluble in 70 % alcohol, hot water, glycerin.	**Homogeneous liquid MF:** *Water solutions*: in hot purified water. *Glycerin solutions* – in the bottle for dispensing while heating. *Alcohol solutions* – on 70 % ethyl alcohol.	
		Suppositories (rolling method): Up to 5 % - dissolve in minimal quantity of water, more than 5 % – as grinded powder by the type of suspension, mixing with the part of the base.	
		Suppositories (casting method): **On hydrophobic base (Butyrol) –** as grinded powder by the type of suspension mixing with the part of the base. **On hydrophilic base (PEO)** – by the type of solution, dissolving in the melted base.	
		Ophthalmic drops: By the general rules, dissolve in the half amount of hot water.	
11.	**Bromocamphor** Volatile substance. Soluble in fats.	**Powders:** Add in the last turn to the prepared powder mixture.	
		Homogeneous liquid MF: Dissolve in fats by the general rules.	
		Emulsions: Dissolve in oil before preparing of primary emulsion.	
12.	**Caffeine - sodium benzoate** Strong effective substance (check doses). Soluble in water.	**Homogeneous liquid MF:** use as 10 % concentrated solution.	***Chemical: at the presence of acids forms precipitation of benzoic acid, with papaverine hydrochloride – forms precipitation of alkaloid***
		Emulsions: Dissolve in the part of water for dilution primary emulsion.	
		Solutions for injections: By the general rules. Stabilize by 0,1 M solution of sodium hydroxide (4 ml per 1 liter of solution) for preventing of hydrolysis (caffeine - sodium benzoate – a salt of strong base and weak acid).	
13.	**Calcium gluconate** Moderately soluble in cold water, easily – in boiling water.	**Homogeneous liquid MF:** by the general rules. Dissolve in hot water or heat till full dissolving.	
14.	**Camphor** Aromatic, volatile, poorly powdered substance. Soluble in fats, ethyl alcohol (not less 70 %). Hydrophobic substance with distinctly expressed properties.	**Powders:** Add to the powder mixture in the last turn. Grind with ethyl alcohol (10 drops of alcohol per 1,0 of camphor). Pack in parchment capsules.	***Physical: eutectic with phenylsalicylate, menthol, chloral hydrate***
		Homogeneous liquid MF: Dissolve in the fat oil while heating (40-50°C).	
		Suspensions (dispersive method): Add stabilizers in the next quantities: – gelatos = $m_{camphor}$, – 5 % methylcellulose solution = $m_{camphor} \cdot 2$, – Tween-80 = $m_{camphor} : 5$.	
		Emulsions: Dissolve in the oil before preparing of primary emulsion.	
		Ointments on hydrophobic base: Up to 5 % - dissolve in equal amount of the liquid, suitable on properties to the base; more than 5 % – dissolve in equal amount of the base, heated to 40°C.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
15.	**Chinosol** Soluble in water.	**Suppositories (rolling method):** Dissolve in minimal quantity of water.	
16.	**Chloral hydrate** Strong effective substance (check doses), Soluble in water and in fat oils.	**Homogeneous liquid MF:** by the general rules. Use as 20 % concentrated solution.	
		Suppositories (rolling method): by the type of solution: Up to 5 % - dissolve in equal amount of a fat oil, more than 5 % - dissolve in equal amount of melted base. In the case of violation of plasticity and closeness of suppository mass, it is necessary to add special auxiliary substances (beeswax, paraffin and others).	***Physical: eutectic with camphor, menthol, Cacao butter***
17.	**Collargol** Colloidal substance. 70 % of silver nitrate. Hard crystals with metallic brilliance. Strong effective substance, light sensitive. Slowly dissolve in water.	**Homogeneous liquid MF:** Up to 1 % - dissolve in purified water in the bottle for dispensing, if 1 % and more - grind in mortar with the adding of purified water. Solutions are filtered through glass filters.	***Chemical: oxidation of solution of Adrenalin hydrochloride; coagulation at joint presence with dimedrol***
		Ointments on hydrophobic base: regardless of the prescribed amount as water solution by the type of emulsion, mixing up with Lanoline.	
		Suppositories (rolling method): Regardless of the prescribed amount as water solution by the type of emulsion, mixing up with the base.	
		Ophthalmic drops: without isotonating and sterilization.	
18.	**Copper sulfate** Coarse-crystalline substance with blue color (colorized). Slowly soluble in water (poor wetting of crystals).	**Homogeneous liquid MF:** Grind in mortar with the part of hot water, and then add the remaining quantity of purified water.	
19.	**Dermatol** Colorized substance. Insoluble in water and in fats.	**Liniments:** dermatol is possible to replace by xeroform while preparing of Vishnevsky liniment – introduce as grinded powder by the type of suspension, grind with tar.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
20.	**Dibazol** Strong effective substance (check doses). Soluble in water.	**Suppositories (rolling method):** Up to 5 % - dissolve in minimal quantity of purified water, more than 5 % – as grinded powder by the type of suspension, mixing with the part of the base.	
		Solutions for injections: By the general rules, stabilize by 0,1 M solution of HCl (10 ml per 1 liter of solution) for preventing of hydrolysis (dibazol – a salt of strong acid and weak base).	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
21.	**Dicain** Poisonous substance (check doses). Soluble in water. Drug seal up, Register for dispensing by signature, additional label «To be handled with caution».	**Solutions for injections:** By the general rules. Stabilize by 0,1 M solution of HCl (10 ml per 1 liter of solution) for preventing of hydrolysis (dicain – a salt of strong acid and weak base).	
		Ophthalmic drops: by the general rules. Dissolve in the half amount of prescribed water. Isotonate by sodium chloride.	
22.	**Dimedrol** Strong effective substance (check doses). Soluble in water.	**Ointments on hydrophobic base:** Up to 5 % - as water solution by the type of emulsion, more than 5 % - as grinded powder by the type of suspension, grind with the part of melted base.	***Physical: causes coagulation of solutions of Collargol and Protargol***
		Suppositories (rolling method): Up to 5 % - dissolve in minimal quantity of water, more than 5 % – as grinded powder by the type of suspension, mixing with the part of the base.	
		Suppositories (casting method): **On hydrophobic base (Butyrol) –** as grinded powder by the type of suspension mixing with the part of the base. **On hydrophilic base (PEO)** – by the type of solution, dissolving in the melted base.	
		Solutions for injections: By the general rules without stabilization.	
23.	**Ephedrine hydrochloride** Strong effective, psychotropic substance (check doses). Soluble in water. Drug seal up, Register for dispensing by signature, additional label «To be handled with caution».	**Powders:** By the general rules. If total mass of medicinal substance is less then 0,05 – it is used as trituration.	
		Homogeneous liquid MF: By the general rules.	
		Ointments on hydrophobic base: As water solution by the type of emulsion.	
24.	**Extract of Belladonna** Strong effective substance (check doses), HMC, unlimited swelling. Soluble in water and glycerin.	**Powders:** Use as dry extract (1:2), introduce in double amount to prescribed quantity of dense extract. Pack in beeswax, paraffin capsules.	***Physical: absorption by activated carbon***
		Homogeneous liquid MF: use as solution of dense extract (1:2), introduce in the last turn into the bottle for dispensing (dose by drops).	***Physical and chemical:*** *precipitation with decoction of Bearberry leaves*
		Ointments and suppositories: By the type of emulsion as: – solution of dense extract (1:2), – dry extract, dissolved in alcohol-water-glycerin mixture.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
25.	**Fat oils (sunflower, olive, castor, peach)** Hydrophobic liquids.	**Emulsions:** If their quantity is not indicated, take 10 % of the mass of emulsion. Emulsifiers are added in amounts: - gelatose = $m_{oil\ phase}$: 2; - 5 % methylcellulose solution = $m_{oil\ phase} \cdot 2$; - Tween-80 = $m_{oil\ phase}$: 5.	***Physical:*** *unmixable with hydrophilic liquids, hydrophilic substances are not soluble in such oils*
26.	**Furacilin** Strong effective (check doses), dyeing substance. Hardly soluble in cold water, soluble in hot water.	**Homogeneous liquid MF:** Dissolve in hot purified water with adding of 0,9 % solution of sodium chloride.	
		Ointments and suppositories: As grinded powder by the type of suspension. Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
27.	**Gelatin** HMC, limited swelling in cold water and unlimited – in hot.	**Homogeneous liquid MF:** Add 10-multiple quantity of cold purified water, leave for swelling for 30-40 min, then heat on the water bath. Drug is registered for dispensing by the label « Heat before use ».	
		Solutions for injections: By the general rules. Must maintain a test for the absence of pyrogens.	
28.	**Glucose** Small loses in the pores of mortars. Soluble in water. Glucose is introduced in infusion solutions with the purpose of providing of vital functions of organism's cells and creation of necessary redox.	**Powders:** At the first turn in a mortar, filling its pores.	
		Homogeneous liquid MF: By the general rules, dissolve in a vessel in purified water.	
		Solutions for injections: take into account % of humidity. Stabilize by Weybel liquid (sodium chloride + solution of hydrochloric acid) in the quantity: 5 ml per 100 ml of solution. If necessary – isotonate by sodium chloride. Sterilize immediately after preparation (minimal time of sterilization by vapour is 60 minutes). Solution of glucose is possible to depyrogenisate by adsorption method with the use of absorbent carbon.	
		Ophthalmic drops: by the general rules. Take into account % of humidity; dissolve in the half amount of prescribed water. Isotonate by sodium chloride.	
29.	**Hexamethylenetetramine** Soluble in water, thermo labile substance.	**Powders:** By the general rules.	***Physical and chemical:*** *formation of a damp mixture with acetylsalicylic and ascorbic acid*
		Homogeneous liquid MF: By the general rules. Use as 10 % concentrated solution (1:10).	***Physical and chemical:*** *change of mixture's smell in combination with ammonium chloride, sedimentation of tannins from decoction of Bearberry leaves*
		Solutions for injections: In aseptic conditions, without sterilization or with using of bacterial filtration.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
30.	**Ichthyol** Colloid, aromatic substance. Ammonium salt of the sulphonic acid shale oil. Soluble in water and glycerin.	**Liquid MF:** Weight out in porcelain cup and dissolve in purified water.	
		Ointments on hydrophobic base, Suppositories (rolling method): Mix with the base.	
		Suppositories (casting method): Add to the melted base.	
31.	**Iodine** Strong effective substance (check doses), volatile, poorly powdered. Soluble in concentrated solution of potassium iodide, 96 % alcohol, chloroform.	**Powders:** Grind with ethyl alcohol (10 drops of alcohol per 1,0 of iodine).	
		Homogeneous liquid MF: *Water solutions* (Lugol solution) – dissolve in concentrated solution of potassium iodide (formation of soluble complex); *Non water solutions* – by the general rules.	
32.	**Laevomycetin** Antibiotic. Hardly soluble in a cold water. Thermostable substance till 110°C.	All MF with Laevomycetin are prepared in aseptic conditions.	
		Ophthalmic drops: Dissolve in the half amount of prescribed hot water, sterilize only by vapour (100 °C – 30 min). Isotonate by sodium chloride.	
33.	**Magnesium oxide** Amorphous, spraying substance. Insoluble in water and in fats.	**Powders:** Add to the powder mixture in the last turn without additional grinding.	
		Suspensions (dispersive method): Without stabilizing (hydrophilic substance).	
		Emulsions: In the prepared emulsion - as grinded powder by the type of suspension.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
34.	**Menthol** Aromatic, volatile, poorly powdered substance. Soluble in fats, ethyl alcohol. Insoluble in water, glycerin. Hydrophobic substance with distinctly expressed properties.	**Powders:** Add to the powder mixture in the last turn. Grind with ethyl alcohol (10 drops of alcohol per 1,0 of menthol). Pack in parchment capsules.	***Physical: eutectic with phenylsalicylate, camphor, chloral hydrate***
		Homogeneous liquid MF: Dissolve in fat oil while heating (40-50°C).	
		Suspensions (dispersive method): Add stabilizers in the next quantities: – gelatos = $m_{menthol}$, – 5 % methylcellulose solution = $m_{menthol} \cdot 2$, – Tween-80 = $m_{menthol} : 5$.	
		Emulsions: Dissolve in the oil before preparing of primary emulsion.	
		Ointments on hydrophobic base: Up to 5 % - dissolve in equal amount of the liquid, suitable on properties to the base; more than 5 % – dissolve in equal amount of the base, heated to 40°C.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
35.	**Mercury oxide yellow** Strong effective substance. Insoluble in water and in fats.	**Ophthalmic ointments:** As grinded powder by the type of suspension, mixing with sterile Vaseline oil, and then with sterile base (5 parts of Vaseline and 1 part of non-water Lanoline).	
36.	**Methylcellulose** HMC, limited swelling in hot water and unlimited while cooling.	**Homogeneous liquid MF:** Pour by hot purified water (half amount of the total volume of 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.	
37.	**Methylene blue** Dying substance. Soluble in 60% alcohol.	**Powders:** Use method of «three layers». Pack in parchment capsules.	
38.	**Norsulfazol** Insoluble in water and in fats. Hydrophobic substance with poorly expressed properties.	**Suspensions (dispersive method):** Add stabilizers in the next quantities: – gelatos = $m_{norsulfazol}$, – 5 % methylcellulose solution = $m_{norsulfazol} \cdot 2$, – Tween-80 = $m_{norsulfazol} : 5$.	
		Emulsions: As grinded powder by the type of suspension in prepared emulsion.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
		Ophthalmic ointments: As grinded powder by the type of suspension, grind with the part of melted base (9:1).	
39.	**Novocain** Strong effective substance (check doses). Soluble in water.	**Homogeneous liquid MF:** By the general rules.	
		Ointments on hydrophobic base: Up to 5 % - as water solution by the type of emulsion, more than 5 % - as grinded powder by the type of suspension, grind with the part of melted base.	
		Suppositories (rolling method): Up to 5 % - dissolve in a minimal quantity of purified water, more than 5 % - as grinded powder by the type of suspension, grind with the part of the base.	
		Suppositories (casting method): **On hydrophobic base (Butyrol) –** as grinded powder by the type of suspension mixing with the part of the base. **On hydrophilic base (PEO)** – by the type of solution, dissolving in the melted base.	
		Solutions for injections: by the general rules. Stabilize by 0,1 M solution of HCl for prevention of hydrolysis (Novocain – a salt of strong acid and weak base). Quantity of stabilizer depends on concentration of Novocain: per 1 liter 0,25 % solution add 3 ml; 0,5 % - 4 ml; 1 % - 9 ml; 2 % - 12 ml.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
40.	**Osarsol** Poisonous substance (check doses). Soluble in alkaline medium. Drug seal up, register for dispensing by signature, additional label «To be handled with caution».	**Powders:** By the general rules in the rubbed out mortar.	
		Homogeneous liquid MF: Dissolve in the presence of sodium hydrocarbonate (0,61 g per 1,0 g of osarsol).	
		Suppositories: As grinded powder by the type of suspension, grind with the part of melted base.	
41.	**Papaverine hydrochloride** Strong effective substance (check doses). Soluble in water.	**Powders:** by the general rules.	***Physical:*** *absorption by activated carbon.* ***Physical and chemical:*** *formation of a damp mixture with euphylline*
		Homogeneous liquid MF: by the general rules.	***Chemical:*** *precipitation of alkaloids with euphylline, caffeine - sodium benzoate*
		Suppositories (rolling method): Up to 5 % - dissolve in a minimal quantity of purified water, more than 5 % - as grinded powder by the type of suspension, grind with the part of the base.	
		Suppositories (casting method): **On hydrophobic base (Butyrol) –** as grinded powder by the type of suspension mixing with the part of the base. **On hydrophilic base (PEO)** – by the type of solution, dissolving in the melted base.	
42.	**Pepsin** Unlimited swelling HMC	**Homogeneous liquid MF:** Dissolve in purified water, previously acidified by solution of hydrochloric acid.	
43.	**Phenylsalicylate** Poorly powdered substance. Soluble in fats, Insoluble in water. Hydrophobic substance with poorly expressed properties.	**Powders:** By the general rules. Grind with ethyl alcohol (per 1.0 – 10 drops).	***Physical:*** *eutectic with camphor, menthol*
		Suspensions (dispersive method): Add stabilizers in the next quantities: – gelatos = $m_{phenylsalicylate}$: 2, – 5 % methylcellulose solution = $m_{phenylsalicylate}$, – Tween-80 = $m_{phenylsalicylate}$: 10.	
		Emulsions: As grinded powder by the type of suspension in prepared emulsion (for strengthening of pharmacological activity).	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
44.	**Pilocarpine hydrochloride** Poisonous substance (check doses). Soluble in water. Drug seal up, Register for dispensing by signature, additional label «To be handled with caution».	**Ophthalmic drops:** By the general rules, dissolve in the half amount of prescribed water, isotonate by sodium chloride.	
		Ophthalmic ointments: As water solution by the type of emulsion, mixing with sterile base (9:1).	
45.	**Platiphyllin hydrotartrate** Poisonous substance (check doses). Soluble in water. Drug seal up, register for dispensing by signature, additional label «To be handled with caution».	**Powders:** By the general rules in the rubbed out mortar. If total mass of medicinal substance is less then 0,05 – it is used as trituration (1:10).	
		Homogeneous liquid MF: by the general rules.	
		Suppositories (rolling method): As water solution by the type of emulsion.	
46.	**Potassium iodide** Soluble in water.	**Ointments on hydrophobic base:** up to 5 % - as water solution by the type of emulsion, more than 5 % - as grinded powder by the type of suspension, grind with the base.	
		Ophthalmic drops: By the general rules. At joint presence with ascorbic acid, potassium iodide introduce in aseptic conditions after sterilization of prepared drops.	***Chemical:*** *with ascorbic acid*
47.	**Potassium permanganate** Dyeing substance. Soluble in water.	**Homogeneous liquid MF:** Dissolve in fresh-distilled, filtrated water: up to 1 % - in the bottle for dispensing, if 1 % and more – grind in mortar with adding of hot water. Solutions are filtered through glass filters.	***Chemical:*** *redox reaction with hydrogenium peroxide*
48.	**Protargol** Colloidal substance (contains 8 % of silver oxide), soluble in water, glycerin.	**Homogeneous liquid MF:** Pour by a thin layer on the surface of the water and leave until completely dissolving. If in prescription is prescribed glycerin, protargol grind with glycerin, then add water. Solutions are filtered through glass filters.	
		Ointments on hydrophobic base: Mix with glycerin (6-8 drops per 1 g of protargol), and then add water and emulsify by Lanoline.	
		Suppositories (rolling method): Mix with glycerin, and then add water and by parts Cacao butter.	
		Suppositories (casting method): In gelatin – glycerin base introduce after previous mixing with glycerin and dissolving in water.	
		Ophthalmic drops: By the general rules. Without sterilization and isotonation.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
49.	**Resorcin** Soluble in water, 70 % alcohol.	**Homogeneous liquid MF:** By the general rules. *Alcohol solutions* – on 70 % ethyl alcohol.	
		Dermatological ointments on hydrophobic base: As grinded powder by the type of suspension. Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
		Ophthalmic drops: Introduce in aseptic conditions after sterilization of prepared drops.	
		Ophthalmic ointments: As water solution by the type of emulsion, mixing with sterile base (9:1).	
50.	**Riboflavin** Dyeing substance. Soluble in water.	**Powders:** By the method of "three layers". Pack in parchment capsules.	
		Ophthalmic drops: as concentrated solution 0,02 %.	
51.	**Salicylic acid** Coarse-crystalline substance. Insoluble in water and in fats. Soluble in 70 % alcohol.	**Powders:** Grind with alcohol (per 1,0 – 5 drops).	***Physical and chemical:*** *formation of a damp mixture with hexamethylene tetramine, sodium hydrocarbonate*
		Homogeneous liquid MF: *Alcohol solutions* – on 70 % ethyl alcohol.	
		Ointments on hydrophobic base: As grinded powder by the type of suspension: up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
52.	**Scopolamine hydrobromide** Poisonous substance (check doses). Soluble in water. Drug seal up, register for dispensing by signature, additional label «To be handled with caution».	**Powders:** By the general rules. If total mass of medicinal substance is less then 0,05 – it is used as trituration.	
		Solutions for injections: By the general rules. Stabilize by 0,1 M solution of HCl (10 ml per 1 liter of solution) for prevention of hydrolysis (scopolamine – a salt of strong acid and weak base).	
53.	**Silver nitrate** Poisonous substance (check doses). Soluble in water. Drug seal up, register for dispensing by signature, additional label «To be handled with caution».	**Homogeneous liquid MF:** By the general rules. Dissolve in fresh distilled purified water and filter through glass filters (strong oxidizing agent).	
		Ophthalmic drops: By the general rules. Isononate by sodium chloride.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
54.	**Sodium chloride** Soluble in water.	**Solutions for injections:** Sort "chemically pure", depyrogenisate in the dry heat oven 180 º C - 2 hours.	
55.	**Sodium hydrocarbonate** Soluble in water.	**Powders:** By the general rules. At joint presence with citric acid forms "sparkling" powders.	***Physical and chemical: forming of a damp mixture with ascorbic acid***
		Homogeneous liquid MF: By the general rules. Use as 5 % concentrated solution.	***Physical and chemical: precipitation of alkaloids (codeine base) at joint presence with codeine phosphate***
		Suspensions (condensation method): As a result of neutralization with solution of calcium chloride forms insoluble compound - calcium carbonate.	
		Solutions for injections: sodium hydrocarbonate must be of a sort "chemically pure" or "pure for analysis"; not stabilize; $t_{dissolution}$ =15-20 ºC without intensive mixing; bottles for dispensing are filled on 2/3 of volume or 80 %; sterilize in horizontal or upside down position; cool 2-3 hours, mixing occasionally	
56.	**Sodium tetraborate** Poorly powdered substance. Soluble in hot water, glycerin.	**Powders:** By the general rules. Grind with ethyl alcohol (5 drops of alcohol per 1,0 of sodium tetraborate).	
		Homogeneous liquid MF: *Water solutions*: in hot purified water. *Glycerin solutions* – in the bottle for dispensing while heating.	
57.	**Sodium thiosulfate** Soluble in water.	**Solutions for injections:** Stabilize by sodium hydrocarbonate. Sodium thiosulfate can be used as stabilizer in solutions of other oxidizing agents.	
58.	**Solution of Adrenaline hydrochloride** Strong effective substance. Thermo labile.	**Ointments on hydrophobic base:** By the type of emulsion, mixing with Lanoline.	***Chemical: with Collargol oxidizing of adrenaline hydrochloride and coagulation of collargol***
		Ophthalmic drops: Introduce in aseptic conditions after sterilization of prepared drops.	
59.	**Solution of Citral** Thermo labile	**Liquid MF:** Mix in separate vessel with equal amount of prepared mixture or with simple syrup (if it is prescribed), then add into the bottle for dispensing. Condensation methods of obtaining suspensions in the result of replacement of solvent - «muddy» mixtures are formed.	
		Ophthalmic drops: Introduce in aseptic conditions after sterilization of prepared drops.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
60.	**Starch** Amorphous substance. HMC, limited swelling in cold water and unlimited in hot.	**Powders:** By the general rules - add to the powder mixture in the last turn without additional grinding.	
		Homogeneous liquid MF: 1 part of starch mix with 4 parts of cold water, obtained muddy mixture add to the 45 parts of boiling water and boil during 1-2 min.	
61.	**Streptocide** Strong effective substance (check doses), poorly powdered. Insoluble in water and in fats. Soluble in PEO. Hydrophobic substance with poorly expressed properties.	**Powders:** By the general rules. Grind with ethyl alcohol (per 1.0 – 5 drops).	
		Suspensions (dispersive method): Add stabilizers in the next quantities: – gelatos = $m_{streptocide}$: 2, – 5 % methylcellulose solution = $m_{streptocide}$, – Tween-80 = $m_{streptocide}$: 10.	
		Emulsions: As grinded powder by the type of suspension in prepared emulsion.	
		Liniments: As grinded powder by the type of suspension.	
		Ointments on hydrophobic base: As grinded powder by the type of suspension. Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
		Ointments and suppositories on PEO base: By the type of solution, dissolving in the melted base.	
		Suppositories (rolling method): As grinded powder by the type of suspension mixing with Cacao butter.	
		Suppositories (casting method) on hydrophobic base (Butyrol) – as grinded powder by the type of suspension mixing with the part of the base.	
62.	**Sulfur** Colorized substance. Insoluble in water, moderately in fats. Hydrophobic substance with distinctly expressed properties.	**Powders:** By the general rules.	
		Suspensions (dispersive method): Add stabilizer ***(potassium green soap)*** in amount: 0,2 g per 1 g of sulfur.	
		Ointments: as grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
63.	**Tannin** Semi-colloidal substance, soluble in water.	**Homogeneous liquid MF:** By the general rules.	
		Ointments on hydrophobic base: Regardless of the prescribed amount as water solution by the type of emulsion, mixing with Lanoline.	
64.	**Terpinhydrate** Insoluble in water and in fats. Hydrophobic substance with poorly expressed properties.	**Suspensions (dispersive method):** Add stabilizers in the next quantities: – gelatos = $m_{terpinhydrate}$: 2, – 5 % methylcellulose solution = $m_{terpinhydrate}$, – Tween-80 = $m_{terpinhydrate}$: 10.	
		Emulsions: As grinded powder by the type of suspension in prepared emulsion.	

№	Name, properties	Peculiarities of introduction in medicinal forms	*Incompatibilities*
65.	**Tripsin** Unlimited swelling HMC.	**Homogeneous liquid MF:** Dissolve in water, previously acidified by solution of hydrochloric acid.	
		Ophthalmic drops: By the general rules. Without thermal sterilization.	
66.	**Xeroform** Aromatic substance. Insoluble in water and in fats.	**Powders:** Add to powder mixture in the last turn. Pack in parchment capsules.	
		Vishnevsky liniment – as grinded powder by the type of suspension, grind with tar.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
67.	**Zinc oxide** Amorphous substance. Insoluble in water and in fats. Hydrophilic substance.	**Powders:** By the general rules.	
		Suspensions (dispersive method): Without stabilizing.	
		Emulsions: In the prepared emulsion - as grinded powder by the type of suspension.	
		Ointments and suppositories: As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
68.	**Zinc sulfate** Soluble in water.	**Dermatological ointments on hydrophobic basis:** As grinded powder by the type of suspension: Up to 5 % - grind with the liquid, suitable on properties to the base; more than 5 % – grind with the part of melted base.	
		Ophthalmic drops: By the general rules. Dissolve in the half amount of prescribed water; isononate by sodium sulfate.	
		Ophthalmic ointments: As water solution by the type of emulsion, mixing with sterile base (9:1).	

AUXILIARY MATERIALS, USED IN TECHNOLOGY OF DIFFERENT MEDICINAL FORMS

№	Name and properties	Usage
	POWDERS	
1.	**Lactose (lactic sugar)** Non-hygroscopic, its closeness is near to the closeness of many alkaloids.	Auxiliary substance (filler) for preparing trirurations.
	LIQUID MF	
2.	**Alcohol-water-glycerin mixture**	**Composition:** alcohol -1 part glycerin - 3 parts water – 6 parts. Solvent for obtaining solutions of dense extracts (Belladonna, Glycyrrhiza etc.)
3.	**Glycerin** Non water solvent.	A component of a solvent for obtaining solution of dense extract. Antiflocculant for dissolving Protargol. **Suspensions*:*** Increases the viscosity of the medium, increasing the stability of suspension.
4.	**Gelatos**	**Use as:** – stabilizers in suspensions; – emulsifying agents in emulsions.
5.	**5 % methylcellulose solution**	
6.	**Tween-80**	
7.	**Simple syrup**	**Suspensions*:*** Increases the viscosity of the medium, increasing the stability of suspension.
	OINTMENTS	
8.	**Base for ointments with antibiotics** (sterile)	6 parts of Vaseline and 4 parts of non-water Lanoline. A base is sterilized by dry heat (180°C 2 hours).
9.	**Base for ophthalmic ointments** (sterile)	9 parts of Vaseline of a sort «for ophthalmic ointments » and 1 part of non-water Lanoline. In Vaseline of a sort «for ophthalmic ointments», evocative matters are absent. A base is sterilized by dry heat (180°C 2 hours).
10.	**Beeswax** Diphilic base. Melting temperature is 63-65 °C.	A component of ointment and suppository bases. Use for increasing of melting temperature and viscosity of hydrophobic bases.
11.	**Bentonit** Inorganic HMC. Hydrophilic base.	While mixing with water forms gels.
12.	**Kutumova base** Emulsion base of the type w/o.	Composition: Vaseline, emulsifying agent T-2, water.
13.	**Non-water Lanoline** (obtain from the scourages of sheep wool). Diphilic base. Incorporate 250 % of water.	**Ointments:** Emulsifying agent while introducing water solutions of medicinal substances in hydrophobic bases. **Ophthalmic ointments:** A component of a base for ophthalmic ointments. **Ointments with antibiotics:** A component of a base for ointments with antibiotics. A base is sterilized by dry heat.

№	Name and properties	Usage
14.	**Paraffin** Hydrophobic carbon base (product of petroleum conversion). Melting temperature is 50-57 °C.	A component of ointment and suppository bases. Use for increasing of melting temperature and viscosity of hydrophobic bases.
15.	**PEO base** Hydrophilic base - alloy of solid and liquid PEO.	Possesses high osmotic activity, clears wounds.
16.	**Vaseline** Hydrophobic carbon base (product of petroleum conversion). Melting temperature is 37-50 °C.	Pharmacopoeia base (is used if the base in the prescription is not specified). Ointments on Vaseline have a superficial effect. Unmixable with Castor oil.
17.	**Vaseline oil (liquid paraffin)** Hydrophobic carbon base (product of petroleum conversion). Unmixable with water, easily mix with vegetable oils (except Castor oil).	Use for decreasing of melting temperature of hydrophobic bases. A component of oil gels.
18.	**Water Lanoline** Diphilic base. Contains 30 % of water, 70 % of non-water Lanoline.	Emulsifying agent while introducing water solutions of medicinal substances in hydrophobic bases. Incorporate 150 % of water.
	SUPPOSITORIES	
19.	**Butyrol** Hydrophobic (fat) suppository base. Melting temperature is 37 °C.	***Composition:*** Cacao butter (30 %), paraffin (20 %), hydrogenated fats (50 %). Use while preparing suppositories by ***casting method.*** The nests of forms are moisten by soapy alcohol.
20.	**Cacao butter** (obtain from seeds of Cacao tree). Hydrophobic base. Melting temperature is 30-34 °C.	Use while preparing suppositories by ***rolling method.*** Pharmacopoeia base (is used if the base in the prescription is not specified). Emulsify water and water solutions (4-5 %).
21.	**Gelatin-glycerin base** Hydrophilic base. Can dry out and microbial spoil.	51. **Composition** (parts): gelatin 1; glycerin 5; water 2. 52. **Technology**: add purified water to gelatin and leave for swelling for 30-40 min, then add glycerin and while mixing heat on the water bath until obtain transparent mass. 53. When passing on the fatty base to the gelatin-glycerin one the transition module equal 1,21 is used. 54. Use only for preparing vaginal suppositories.

№	Name and properties	Usage
22.	**Non-water Lanoline** (obtain from the scourages of sheep wool). Diphilic base. Incorporate 250 % of water.	**Suppositories on Cacao butter:** Use as a plasticizer for suppositories bases (1-1,5 g per 30,0 of suppositories mass).
23.	**Soapy alcohol**	While preparing suppositories on hydrophobic bases, use for moist of the form's nests.
24.	**Soapy-glycerin base** Hydrophobic suppository base.	**Composition:** glycerin, sodium carbonate, stearin acid. **Has** a purgative action.
25.	**Vaseline oil** Hydrophobic	While preparing suppositories on hydrophilic bases, use for moist of the form's nests.
26.	**Vitepsol** Hydrophobic suppository base.	Use while preparing suppositories by casting method.
	SOLUTIONS FOR INJECTIONS	
27.	**Sodium metabisulphite**	Stabilizer for solutions of easily oxidized substances – direct antioxidant.
28.	**Solution of hydrochloric acid 0,1 M**	Stabilizer for solutions of salts, formed by strong acid and weak base.
29.	**Solution of sodium hydroxide 0,1 M**	Stabilizer for solutions of salts, formed by strong base and weak acid.
30.	**Weybel liquid**	**Composition**: sodium chloride, solution of hydrochloric acid, water for injections. Stabilizer for solutions of glucose (5 % from the volume of solution of glucose regardless of its concentration).
	OPHTHALMIC DROPS	
31.	**Benzalkonium chloride**	Organic preservatives.
	Benzyl alcohol	
32.	**Merthiolate**	Metal organic preservative.
33.	**Polyvinyl alcohol**	Prolongation agents.
	Methylcellulose	

OFFICINAL PRESCRIPTIONS OF EXTEMPORANEOUS DRUGS

Officinal name	Composition, technology
Ammonium liniment (volatile) Liniment – emulsion of the o/w type	**Composition**: oleic acid, sunflower oil, 10 % ammonium solution. **Technology:** Into the bottle for dispensing weight sunflower oil, add oleic acid (in drops) and mix. Then add ammonium solution, cork and shake. Emulsifier is ammonium oleate, which is formed as a result of neutralization reaction.
Lassar paste	**Composition**: zinc oxide, salicylic acid, starch and Vaseline. **Technology:** Melt the whole quantity of Vaseline. Zinc oxide and salicylic acid disperse in a warm mortar with melted Vaseline. Starch is introduced into the cool mixture.
Lugol solution	**Composition**: iodine, potassium iodide and water. For internal use -5 % For external use -1 % **Technology:** potassium iodide dissolve in equal quantity of purified water, in obtained solution of potassium iodide dissolve iodine (complex forming), add the remaining quantity of water.
Mercury yellow ointment (ophthalmic) Ointment- suspension.	**Composition:** mercury oxide yellow, sterile Vaseline oil, sterile Vaseline (of a sort for ophthalmic ointments) and non-water Lanoline in the ratio 5:1 **Technology:** In aseptic conditions mercury yellow oxide grind with a sterile Vaseline oil (according to Deryagin rule), add sterile Vaseline (of a sort for ophthalmic ointments) and non-water Lanoline.
Rosenthal paste (liniment) Liniment –solution in the moment of preparation and use.	**Composition:** paraffin, 95 % alcohol, chloroform, iodine. **Technology:** Into the bottle for dispensing put iodine, crushed paraffin, chloroform. Loosely cork and heat on the warm water bath (temperature 40-50 ° C) until dissolving. To the cool mass add 95 % alcohol. **or** **Composition**: paraffin, 70 % alcohol, chloroform, iodine, potassium iodide. **Technology:** In the dark glass bottle for dispensing dissolve paraffin in chloroform while heating. In a vessel in the calculated quantity of purified water dissolve potassium iodide, in obtained solution of potassium iodide dissolve iodine, add calculated amount of 95 % alcohol, transfer into the bottle for dispensing.
Vishnevsky liniment. Liniment– suspension	**Composition**: xeroform (or dermatol), tar (or vinylene), Castor oil (or cod liver oil). **Technology:** xeroform grind in a dry state, mix with a half amount of tar, dosed by drops (Deryagin rule), add the rest quantity of tar and Castor oil.

REFERENCES

BASIC

1. Вимоги до приготування нестерильних лікарських засобів в умовах аптек : метод. рек. / під ред. акад. АНТКУ проф. О. І .Тихонова і проф. Т. Г. Ярних . - Київ, 2005 . – 98 с.
2. Вимоги до приготування стерильних та асептичних лікарських засобів в умовах аптек : метод. рек. / під ред. акад. АНТКУ проф. О. І. Тихонова і проф. Т. Г. Ярних . - Київ, 2005 . – 76 с.
3. Тихонов, А. И. Технология лекарств / А. И. Тихонов, Т. Г. Ярных перераб. и допол.; под ред. А. И. Тихонова. — Х. : Изд-во «Оригинал», 2006. – 703 с.
4. Тихонов, О. І. Аптечна технологія ліків: підручник для фармацевтичних вузів і факультетів / О. І. Тихонов, Т. Г. Ярних ; за ред. О. І. Тихонова. – Вінниця : Вид-во «Нова Книга», 2004. – 640 с.
5. Технологія ліків : навч.–метод. посіб. : навч. пос. для студ. вищ. навч. закл. / О. І. Тихонов, П. А. Логвін, С. О. Тихонова та ін. ; за ред. О. І. Тихонова. – Х. : НФаУ; Оригінал, 2009. – 432. с.
6. Учебное пособие по аптечной технологии лекарств / А. И. Тихонов, Т. Г. Ярных, А. П. Гудзенко и др. ; под ред. А. И. Тихонова. – Х. : Основа, 1998. – 336 с.
7. Справочные материалы для подготовки к лицензионному екзамену «Крок-2» по аптечной технологии лекарств : практ. пособие для студ. спец. «Фармация»/ Т. Г. Ярных, Н. В. Хохленкова, Н. Ф. Орловецкая и др.. – Х. : НФаУ, 2011.– 26 с.
8. Сборник тестов по аптечной технологии лекарств : Специальности «Фармация» и «Клиническая фармация» : учеб. пособ. для студ. вузов / под ред. А. И. Тихонова и Т. Г. Ярных. – Х. : Изд-во НФаУ; Оригинал, 2008. – 270 с.

ADDITIONAL

Накази МОЗ України

9. Про лікарські засоби: Закон України від 04.04.1996 р. N 123/96-ВР (із зм. і доп.) / Верховна Рада України. – Офіц. вид. – К. : Парламентське вид-во, 1997. – 24 с. – (Закони України).
10. Державна Фармакопея України / Держ. п–во “Науково–експертний фармакопейний центр”. – 1–е вид. – Х. : РІРЕГ, 2001. – 556с.
11. Державна Фармакопея України / Держ. п–во “Науково–експертний

фармакопейний центр". – 1–е вид., 1 допов. – Х. : РІРЕГ, 2004. – 494 с.
12. Державна фармакопея України / Держ. п–во "Науково–експертний фармакопейний центр". – 1-е вид., 2 допов. – Х. : Держ. п-во «Науково-експертний фармакопейний центр», 2008. – 620 с.
13. Державна фармакопея України / Держ. п–во " Український науковий фармакопейний центр якості лікарських засобів ". – 1-е вид., 3 допов. – Х. : Держ. п-во «Український науковий фармакопейний центр якості лікарських засобів», 2009. – 280 с.
14. Державна фармакопея України / Держ. п–во " Український науковий фармакопейний центр якості лікарських засобів ". – 1-е вид., 4 допов. – Х. : Держ. п-во «Український науковий фармакопейний центр якості лікарських засобів», 2011. – 540 с.
15. Наказ МОЗ України № 812 від 17.10.2012 р. «Правила виробництва (виготовлення) та контролю якості лікарських засобів в аптеках».
16. Наказ МОЗ України № 197 від 07.09.93 р. «Про затвердження Інструкції по приготуванню в аптеках лікарських форм з рідким дисперсійним середовищем».
17. Наказ МОЗ України № 360 від 19.07.2006 р. «Про затвердження Правил виписування рецептів та вимог-замовлень на лікарські засоби і вироби медичного призначення, порядку відпуску лікарських засобів і виробів медичного призначення з аптек та їх структурних підрозділів, інструкції про порядок зберігання, обліку та знищення рецептурних бланків та вимог замовлень».

Методичні рекомендації

18. Асептичні лікарські форми : Екстемпоральна рецептура : метод. рек. / О. І. Тихонов, Л. В. Бондарева, Т. Г. Ярних та ін. ; за ред. О. І. Тихонова і Т. Г. Ярних. – Х. : Вид-во НФаУ ; Оригінал, 2005. – 184 с.
19. М'які лікарські форми : Екстемпоральна рецептура : метод. рек. / О. І. Тихонов, Т. Г. Ярних, О. В. Лукієнко та ін. ; за ред. О. І. Тихонова. – Х. : Вид-во НФаУ ; Золоті сторінки, 2003. – 127 с.
20. Рідкі лікарські форми : Екстемпоральна рецептура : метод. рек. / О. І. Тихонов, Т. Г. Ярних, Н. Ф.Орловецька та ін. ; за ред. О. І. Тихонова, Т. Г. Ярних. – Х. : Вид-во НФаУ; Оригінал, 2005. – 160 с.
21. Тверді лікарські форми : Екстемпоральна рецептура : метод. рек. / О. І. Тихонов, Т. Г. Ярних, С. В. Гриценко та ін. ; за ред. О. І. Тихонова. – Х. : Вид-во НФаУ; Золоті сторінки, 2003. – 176 с.

Content

Навчальне видання

Ярних Тетяна Григорівна
Рухмакова Ольга Анатоліївна
Буряк Марина Валеріївна
Хохленкова Наталя Вікторівна
Ковальов Володимир Вікторович
Толочко Катерина Валентинівна

МЕТОДИЧНІ РЕКОМЕНДАЦІЇ ДЛЯ ПІДГОТОВКИ ДО ПІДСУМКОВОГО МОДУЛЬНОГО КОНТРОЛЮ ТА ДЕРЖАВНОЇ АТЕСТАЦІЇ З ДИСЦИПЛІНИ “АПТЕЧНА ТЕХНОЛОГІЯ ЛІКІВ”

Для англомовних студентів спеціальності “Фармація”
денного відділення

Англійською мовою

Відповідальний за випуск *О. М. Котенко*

Формат 60х84/16. Ум. друк. арк. 3,25. Тираж 100 пр. Зам. № 0423-14.

Національний фармацевтичний університет
вул. Пушкінська, 53, м. Харків, 61002
Свідоцтво суб’єкта видавничої справи серії ДК № 3420 від 11.03.2009.

Надруковано з готових оригінал-макетів у друкарні ФОП Петров В.В.
Єдиний державний реєстр юридичних осіб та фізичних осіб-підприємців.
Запис № 24800000000106167 від 08.01.2009 р.
61144, м. Харків, вул. Гв. Широнінців, 79в, к. 137, тел. (057) 778-60-34.
e-mail: bookfabrik@rambler.ru