# REFERENCE MATERIALS
# for preparation to the licensed examination “CROCK-2” on Chemist’s Technology of Drugs

Kharkov

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UKRAINIAN MINISTRY OF PUBLIC HEALTH
NATIONAL UNIVERSITY OF PHARMACY
DRUG'S TECHNOLOGY DEPARTMENT

# REFERENCE MATERIALS for preparation to the licensed examination "CROCK-2" on Chemist's Technology of Drugs

## FOR ENGLISH STUDENTS OF "PHARMACY" SPECIALTY

Kharkov

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The summary table of medicinal substances occurring more often in the extemporaneous prescriptions with indication of their physical and chemical properties and methods of introduction into different medicinal forms is presented in the reference materials. An example of filling a workbook is also presented in these materials. Mastering the tests using these materials will help students in preparation to the licensed examination on Chemist's Technology of Drugs.

The reference materials are intended for individual and out-of-class work of the English students on Chemist's Technology of Drugs in specialty «Pharmacy».

# Introduction

These reference materials are intended for individual work of the English students while preparing to the licensed examination “CROCK-2”, in the process of which students should repeat and generalize theoretical material of the discipline “Chemist’s Technology of Drugs» by working with the tests given in the educational aid “Tests on Chemist’s Technology of Drugs”. While working with the tests students can use a textbook, texts of lectures, orders of the Ukrainian Ministry of Public Health and Pharmacopeias.

To answer the tests quickly and correctly students should know not only determinations, classification of medicinal forms (MF) and requirements to them, but also methods of introduction of medicinal substances in a MF depending on their physical and chemical properties. To systematize the information in these reference materials as a table the list of medicinal substances used more often in the extemporaneous prescriptions, their properties and peculiarities of introduction in different MF is presented. In addition, the data about auxiliary substances used in the formulation of different MF are presented, and official prescriptions of medicines with their composition and technology are given.

While working with the tests students should know how to substantiate the correct answer in the written form that will allow to learn better theoretical material. The example of the written answer for the different types of test questions is given in Appendix of these reference materials.

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

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 1. | **Ammonia anise drops**<br>Aromatic, ammonia-alcoholic solution of the essential anise oil | **Liquid MF:**<br>Mix in a separate vessel with the equal amount of the prepared mixture or with a simple syrup (if it is prescribed), then add into the bottle for dispensing.<br>Condensation methods of obtaining suspensions as the result of replacement of the solvent – "muddy" mixtures are formed | |
| 2. | **Anaesthesin**<br>A strong effective substance (check of doses). Soluble in fat oils (up to 2 %), in chloroform; insoluble in water, vaseline oil | **Homogeneous liquid MF:**<br>By the general rules. Dissolve in fatty oils (up to 2 %), in chloroform | |
| | | **Emulsions:**<br>Up to 2 % – dissolve in fatty oils,<br>more than 2 % - as a grinded powder by the type of suspension, introduce in the prepared emulsion | |
| | | **Ointments and suppositories:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| 3. | **Analgin**<br>A strong effective substance (check of doses).<br>Soluble in water | **Homogeneous liquid MF:**<br>By the general rules: dissolve in a vessel in purified water, strain into the bottle for dispensing | |
| | | **Ointments on the hydrophobic base:**<br>Up to 5 % - as a water solution by the type of emulsion, more than 5 % - as a grinded powder by the type of suspension mixing with the part of the melted base | |
| | | **Ointments on the hydrophilic base:**<br>By the type of solution: dissolve in the melted base | |
| | | **Suppositories (the rolling method):**<br>Up to 5 % - dissolve in the minimal quantity of water, more than 5 % - as a grinded powder by the type of suspension mixing with the part of the base | |
| | | **Suppositories (the casting method):**<br>**On the hydrophobic base (Butyrol) –** as a grinded powder by the type of suspension mixing with the part of the base.<br>**On the hydrophilic base (PEO)** – by the type of solution dissolving in the melted base | |
| | | **Solutions for injections:**<br>By the general rules without stabilization | |
| 4. | **Antibiotics (Benzylpenicillin sodium (potassium) salt, Erythromycin, Neomycin, Streptomycin sulphate, Rifampicin)**<br>A strong effective substances (check of doses). Thermolabile substances.<br>*All MF are prepared in aseptic conditions* | **Solutions for injections and ophthalmic drops:**<br>Dissolve in the isotonic solution of sodium chloride after its sterilization | ***Inactivate by strong acids (hydrochloric, sulphuric, etc.)*** |
| | | **Dermatological and ophthalmic ointments:**<br>Introduce by the type of suspension – grind with the part of the sterile melted base (6 parts of vaseline : 4 parts of anhydrous lanoline) | |
| | | **Suppositories (the rolling method):**<br>As a grinded powder by the type of suspension mixing with the part of the base | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 5. | **Ascorbic acid**<br>Soluble in water. An easily oxidized substance.<br>Used as an antioxidant in solutions for injections | **Powders:**<br>By the general rules in the rubbed out mortar | ***Physical and chemical: formation of a damp mixture with hexamethylenetetramine, sodium hydrocarbonate*** |
| | | **Solutions for injections:**<br>By the general rules.<br>Stabilize by an antioxidant – sodium sulphite | |
| | | **Ophthalmic drops:**<br>Dissolve in the half amount of the water volume.<br>Isotonate by sodium chloride | |
| 6. | **Atropine sulphate**<br>A poisonous substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Powders:** By the general rules.<br>If the total weight of a medicinal substance is less than 0.05, it is used as trituration (1:100) | ***Physical: adsorption by aluminum hydroxide*** |
| | | **Drops:**<br>If the total weight of a medicinal substance is less than 0.05, it is taken as 1 % water concentrated solution | ***Physical and chemical: sedimentation by tannins*** |
| | | **Ointments on the hydrophobic base:**<br>As a water solution by the type of emulsion | |
| | | **Suppositories (the rolling method):**<br>As a 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 the solution) | |
| | | **Ophthalmic drops:** By the general rules.<br>Dissolve in the half amount of the water volume, isotonate by sodium sulphate | |
| 7. | **Bismuth basic nitrate**<br>Big loses in the pores of the mortar; an amorphous substance.<br>Insoluble in water and in fats | **Powders:**<br>By the general rules in the rubbed out mortar, without additional grinding | |
| | | **Suspensions (the dispersion method):**<br>By the method of "making muddy" | |
| | | **Emulsions:**<br>In the prepared emulsion - as a grinded powder by the type of suspension | |
| | | **Ointments and suppositories:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| 8. | **Boric acid**<br>A coarse-crystalline substance. Soluble in 70 % alcohol, hot water, glycerin | **Homogeneous liquid MF:**<br>*Water solutions*: in hot purified water.<br>*Glycerin solutions* – in the bottle for dispensing while heating.<br>*Alcoholic solutions* – in 70 % ethyl alcohol | |
| | | **Suppositories (the rolling method):**<br>Up to 5 % - dissolve in the minimal quantity of water, more than 5 % – as a grinded powder by the type of suspension, mixing with the part of the base | |
| | | **Suppositories (the casting method):**<br>**On the hydrophobic base (Butyrol) –** as a grinded powder by the type of suspension mixing with the part of the base.<br>**On the hydrophilic base (PEO)** – by the type of solution, dissolving in the melted base | |
| | | **Ophthalmic drops:**<br>By the general rules, dissolve in the half amount of hot water | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 9. | **Bromocamphor**<br>A volatile substance.<br>Readily 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 the primary emulsion | |
| 10. | **Caffeine - sodium benzoate**<br>A strong effective substance (check of doses).<br>Soluble in water | **Homogeneous liquid MF:** used as 10 % concentrated solution | ***Chemical: in the presence of acids a precipitate of benzoic acid is formed, with papaverine hydrochloride – a precipitate of the alkaloid base is formed*** |
| | | **Emulsions:** Dissolve in the part of water for dilution of the primary emulsion | |
| | | **Solutions for injections:** By the general rules.<br>Stabilize by 0.1 M solution of sodium hydroxide (4 ml per 1 liter of the solution) to prevent hydrolysis (caffeine - sodium benzoate – a salt of a strong base and a weak acid) | |
| 11. | **Calcium gluconate**<br>Moderately soluble in cold water, easily soluble in boiling water | **Homogeneous liquid MF:** by the general rules.<br>Dissolve in hot water or heat till complete dissolution | |
| 12. | **Camphor**<br>An aromatic, volatile, poorly powdered substance.<br>Soluble in fats, ethyl alcohol (not less 70 %).<br>A hydrophobic substance with distinctly expressed properties | **Powders:** Add to the powder mixture in the last turn. Grind with ethyl alcohol (10 drops of the alcohol per 1.0 of camphor). Pack in parchment capsules | ***Physical: eutectic with phenylsalicylate, menthol, chloral hydrate*** |
| | | **Homogeneous liquid MF:**<br>Dissolve in a fatty oil while heating (40-50 °C) | |
| | | **Suspensions (the dispersion method):**<br>Add stabilizers in the following quantities:<br>– gelatose = $m_{camphor}$,<br>– 5 % methylcellulose solution = $m_{camphor} \cdot 2$,<br>– Tween-80 = $m_{camphor} : 5$ | |
| | | **Emulsions:**<br>Dissolve in the oil before preparing the primary emulsion | |
| | | **Ointments on the hydrophobic base:**<br>Up to 5 % - dissolve in the equal amount of the liquid suitable by its properties to the base;<br>more than 5 % – dissolve in the equal amount of the base heated to 40 °C | |
| 13. | **Chinosol**<br>Easily soluble in water | **Suppositories (the rolling method):**<br>Dissolve in the minimal quantity of water | |
| 14. | **Chloralhydrate**<br>A strong effective substance (check of doses),<br>Soluble in water and in fatty oils | **Homogeneous liquid MF:** by the general rules.<br>Used as 20 % concentrated solution | |
| | | **Suppositories (the rolling method):** by the type of solution:<br>Up to 5 % - dissolve in the equal amount of a fatty oil,<br>more than 5 % - dissolve in the equal amount of the melted base.<br>In the case of disturbance of plasticity and density of the suppository mass, it is necessary to add special auxiliary substances (beeswax, paraffin, etc.) | ***Physical: eutectic with camphor, menthol, cacao butter*** |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 15. | **Collargol**<br>A colloidal substance. 70 % of silver nitrate. Hard crystals with a metallic glitter. A strong effective, light sensitive substance. Slowly soluble in water | **Homogeneous liquid MF:** Up to 1 % - dissolve in purified water in the bottle for dispensing, if 1 % and more - grind in the mortar adding purified water. Solutions are filtered through glass filters | ***Chemical: oxidation of solution of Adrenalin hydrochloride; coagulation in presence with dimedrol*** |
| | | **Ointments on the hydrophobic base:** regardless of the prescribed amount as a water solution by the type of emulsion mixing up with lanoline | |
| | | **Suppositories (the rolling method):**<br>Regardless of the prescribed amount as a water solution by the type of emulsion mixing up with the base | |
| | | **Ophthalmic drops:** without isotonating and sterilization | |
| 16. | **Copper sulphate**<br>A coarse-crystalline substance with a blue colour (coloured). Slowly soluble in water (poor wetting of crystals) | **Homogeneous liquid MF:**<br>Grind in the mortar with the part of hot water, and then add the remaining quantity of purified water | |
| 17. | **Dermatol**<br>A coloured substance. Insoluble neither in water nor in fats | **Liniments:** dermatol is possible to replace by xeroform while preparing of Vishnevsky liniment – introduce as a grinded powder by the type of suspension, grind with tar | |
| | | **Ointments and suppositories:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| 18. | **Dibazol**<br>A strong effective substance (check of doses).<br>Soluble in water | **Suppositories (the rolling method):**<br>Up to 5 % - dissolve in the minimal quantity of purified water,<br>more than 5 % – as a grinded powder by the type of suspension mixing with the part of the base | |
| | | **Solutions for injections:**<br>By the general rules, stabilize by 0.1 M solution of HCl (10 ml per 1 liter of the solution) to prevent hydrolysis (dibazol – a salt of a strong acid and a weak base) | |
| 19. | **Dicain**<br>A poisonous substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label “To be handled with caution” | **Solutions for injections:**<br>By the general rules.<br>Stabilize by 0.1 M solution of HCl (10 ml per 1 liter of the solution) to prevent hydrolysis (dicain – a salt of a strong acid and a weak base) | |
| | | **Ophthalmic drops:** by the general rules.<br>Dissolve in the half amount of the water volume.<br>Isotonate by sodium chloride | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 20. | **Dimedrol**<br>A strong effective substance (check of doses).<br>Soluble in water | **Ointments on the hydrophobic base:**<br>Up to 5 % - as a water solution by the type of emulsion,<br>more than 5 % - as a grinded powder by the type of suspension grind with the part of the melted base | ***Physical: causes coagulation of solutions of collargol and protargol*** |
| | | **Suppositories (the rolling method):**<br>Up to 5 % - dissolve in the minimal quantity of water, more than 5 % – as a grinded powder by the type of suspension mixing with the part of the base | |
| | | **Suppositories (the casting method):**<br>**On the hydrophobic base (Butyrol) –** as a grinded powder by the type of suspension mixing with the part of the base.<br>**On the hydrophilic base (PEO)** – by the type of solution dissolving in the melted base | |
| | | **Solutions for injections:**<br>By the general rules without stabilization | |
| 21. | **Ephedrine hydrochloride**<br>A strong effective, psychotropic substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Powders:**<br>By the general rules.<br>If the total weight of a medicinal substance is less than 0.05, it is used as trituration | |
| | | **Homogeneous liquid MF:**<br>By the general rules | |
| | | **Ointments on the hydrophobic base:**<br>As a water solution by the type of emulsion | |
| 22. | **Etacridine lactate**<br>A strong effective substance (check of doses), a dyer.<br>Moderately soluble in cold water, soluble in hot water | **Powders:**<br>By the method of "three layers".<br>Pack in parchment capsules | ***Chemical: with sodium chloride the etacridine base precipitates*** |
| | | **Homogeneous liquid MF:**<br>Dissolve in hot water | |
| | | **Ophthalmic drops**:<br>By the general rules.<br>Dissolve in a half amount of the hot water volume, isononate by boric acid | |
| 23. | **Ethylmorphine hydrochloride**<br>A narcotic substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Powders:**<br>By the general rules.<br>If the total weight of a medicinal substance is less than 0.05, it is used as trituration | |
| | | **Homogeneous liquid MF:**<br>By the general rules | |
| | | **Ointments on the hydrophobic base:**<br>As a water solution by the type of emulsion | |
| | | **Ophthalmic drops**: By the general rules.<br>Dissolve in a half amount of the water volume, isononate by sodium chloride | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 24. | **Extract of Belladonna** A strong effective substance (check of doses), HMC with unlimited swelling. Soluble in water and glycerin | **Powders:** Use as a dry extract (1:2), introduce in the double amount to the prescribed quantity of a dense extract. Pack in beeswax, paraffin capsules | ***Physical: absorption by activated carbon*** |
| | | **Homogeneous liquid MF:** use as a solution of the 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: – the dense extract solution (1:2), – dry extract, dissolved in alcoholic-water-glycerin mixture | |
| 25. | **Fatty oils (sunflower, olive, castor, peach)** Hydrophobic liquids | **Emulsions:** If their quantity is not indicated, take 10 % of the emulsion's mass. Emulsifiers are added in such amounts as: - gelatose = $m_{\text{oil phase}} : 2$; - 5 % methylcellulose solution = $m_{\text{oil phase}} \cdot 2$; - Tween-80 = $m_{\text{oil phase}} : 5$ | ***Physical: immiscible with hydrophilic liquids, hydrophilic substances are not soluble in such oils*** |
| 26. | **Furacilin** A strong effective (check of doses), a dyer. Poorly 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 a grinded powder by the type of suspension. Up to 5 % - grind with the liquid suitable by its properties to the base; more than 5 % – grind with the part of the melted base | |
| 27. | **Gelatin** HMC with limited swelling in cold water and unlimited – in hot | **Homogeneous liquid MF:** Add 10-multiple quantity of cold purified water, allow to stand for swelling for 30-40 min, then heat on the water bath. The drug is registered for dispensing by the label "Heat before use" | |
| | | **Solutions for injections:** By the general rules. Should comply with the test for the absence of pyrogens | |
| 28. | **Glucose** Small loses in the pores of mortars. Soluble in water. Glucose is introduced in solutions for infusions with the purpose of providing of the vital functions of the organism's cells and creation of necessary redox | **Powders:** Place to a mortar first 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 of 5 ml per 100 ml of the solution. If necessary – isotonate by sodium chloride. Sterilize immediately after preparation (the minimal time of sterilization by vapour is 60 minutes). The solution of glucose can be depyrogenized by the adsorption method with the help of carbon absorbent | |
| | | **Ophthalmic drops:** by the general rules. Take into account % of humidity; dissolve in the half amount of the water volume. Isotonate by sodium chloride | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 29. | **Hexamethylene tetramine** Soluble in water, a thermolabile 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. Used as 10 % concentrated solution (1:10) | ***Physical and chemical: change of mixture's odour 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 | |
| 30. | **Ichthyol** A colloid, aromatic substance. Ammonium salt of the sulphonic acid shale oil. Soluble in water and glycerin | **Liquid MF:** Weight out in a porcelain cup and dissolve in purified water | |
| | | **Ointments on the hydrophobic base, Suppositories (the rolling method):** Mix with the base | |
| | | **Suppositories (the casting method):** Add to the melted base | |
| 31. | **Iodine** A strong effective substance (check of doses), volatile, poorly powdered. Soluble in the concentrated solution of potassium iodide, 96 % alcohol, chloroform | **Powders:** Grind with ethyl alcohol (10 drops of the alcohol per 1.0 of iodine) | |
| | | **Homogeneous liquid MF:** *Water solutions* (Lugol solution) – dissolve in the concentrated solution of potassium iodide (formation of a soluble complex); *Non-aqueous solutions* – by the general rules | |
| 32. | **Levomycetin** Antibiotic. Poorly soluble in cold water. A thermostable substance up to 110 °C | All MF with levomycetin are prepared in aseptic conditions | |
| | | **Ophthalmic drops:** Dissolve in the half amount of the hot water volume, sterilize only by vapour (100 °C – 30 min). Isotonate by sodium chloride | |
| 33. | **Magnesium oxide** An amorphous, spraying substance. Insoluble in water and in fats | **Powders:** Add to the powder mixture in the last turn without additional grinding | |
| | | **Suspensions (the dispersion method):** Without stabilizing (a hydrophilic substance) | |
| | | **Emulsions:** In the prepared emulsion - as a grinded powder by the type of suspension | |
| | | **Ointments and suppositories:** As a grinded powder by the type of suspension: Up to 5 % - grind with the liquid suitable by its properties to the base; more than 5 % – grind with the part of the melted base | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 34. | **Menthol**<br>An aromatic, volatile, poorly powdered substance.<br>Soluble in fats, ethyl alcohol. Insoluble in water, glycerin.<br>A hydrophobic substance with distinctly expressed properties | **Powders:**<br>Add to the powder mixture in the last turn. Grind with ethyl alcohol (10 drops of the alcohol per 1.0 of menthol).<br>Pack in parchment capsules | ***Physical: eutectic with phenylsalicylate, camphor, chloral hydrate*** |
| | | **Homogeneous liquid MF:**<br>Dissolve in a fatty oil while heating (40-50 °C) | |
| | | **Suspensions (the dispersion method):**<br>Add stabilizers in the following quantities:<br>– gelatose = $m_{menthol}$,<br>– 5 % methylcellulose solution = $m_{menthol} \cdot 2$,<br>– Tween-80 = $m_{menthol} : 5$ | |
| | | **Emulsions:**<br>Dissolve in the oil before preparing of the primary emulsion | |
| | | **Ointments on the hydrophobic base:**<br>Up to 5 % - dissolve in the equal amount of the liquid suitable by its properties to the base;<br>more than 5 % – dissolve in the equal amount of the base heated to 40 °C | |
| 35. | **Mercury yellow oxide**<br>A strong effective substance. Insoluble in water and in fats | **Ophthalmic ointments:**<br>As a grinded powder by the type of suspension mixing with a sterile vaseline oil, and then with a sterile base (5 parts of vaseline and 1 part of anhydrous lanoline) | |
| 36. | **Methylcellulose**<br>HMC with limited swelling in hot water and unlimited while cooling | **Homogeneous liquid MF:**<br>Pour by hot purified water (the half amount of the total volume of the solution), after cooling up to the room temperature add the rest quantity of cold water and leave in refrigerator for 10-13 hours for complete dissolution | |
| 37. | **Methylene blue**<br>A dyer. Soluble in 60 % alcohol | **Powders:**<br>Use the method of “three layers”.<br>Pack in parchment capsules | |
| 38. | **Norsulphazol**<br>Insoluble in water and in fats.<br>A hydrophobic substance with poorly expressed properties | **Suspensions (the dispersion method):**<br>Add stabilizers in the following quantities:<br>– gelatose = $m_{norsulphazol}$,<br>– 5 % methylcellulose solution = $m_{norsulphazol} \cdot 2$,<br>– Tween-80 = $m_{norsulphazol} : 5$ | |
| | | **Emulsions:**<br>As a grinded powder by the type of suspension in the prepared emulsion | |
| | | **Ointments and suppositories:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| | | **Ophthalmic ointments:**<br>As a grinded powder by the type of suspension, grind with the part of the melted base (9:1) | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 39. | **Novocain**<br>A strong effective substance (check of doses). Soluble in water | **Homogeneous liquid MF:** By the general rules | |
| | | **Ointments on the hydrophobic base:** Up to 5 % - as a water solution by the type of emulsion, more than 5 % - as a grinded powder by the type of suspension, grind with the part of the melted base | |
| | | **Suppositories (the rolling method):**<br>Up to 5 % - dissolve in the minimal quantity of purified water,<br>more than 5 % - as a grinded powder by the type of suspension, grind with the part of the base | |
| | | **Suppositories (the casting method):**<br>**On the hydrophobic base (Butyrol) –** as a grinded powder by the type of suspension mixing with the part of the base.<br>**On the hydrophilic base (PEO)** – by the type of solution dissolving in the melted base | |
| | | **Solutions for injections:** by the general rules.<br>Stabilize by 0.1 M solution of HCl to prevent hydrolysis (novocain – a salt of a strong acid and a weak base).<br>The quantity of a stabilizer depends on the concentration of novocain: per 1 liter 0.25 % solution add 3 ml; 0.5 % - 4 ml; 1 % - 9 ml; 2 % - 12 ml | |
| 40. | **Osarsol**<br>A poisonous substance (check of doses). Soluble in the alkaline medium. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Powders:**<br>By the general rules in the rubbed out mortar | |
| | | **Homogeneous liquid MF:**<br>Dissolve in the presence of sodium hydrocarbonate (0.61 g per 1.0 g of osarsol) | |
| | | **Suppositories:**<br>As a grinded powder by the type of suspension, grind with the part of the melted base | |
| 41. | **Papaverine hydrochloride**<br>A strong effective substance (check of doses). Soluble in water | **Powders:** by the general rules | ***Physical: absorption by activated carbon.***<br>***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 (the rolling method):**<br>Up to 5 % - dissolve in the minimal quantity of purified water,<br>more than 5 % - as a grinded powder by the type of suspension, grind with the part of the base | |
| | | **Suppositories (the casting method):**<br>**On the hydrophobic base (Butyrol) –** as a grinded powder by the type of suspension mixing with the part of the base.<br>**On the hydrophilic base (PEO)** – by the type of solution dissolving in the melted base | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 42. | **Pepsin**<br>HMC with unlimited swelling | **Homogeneous liquid MF:**<br>Dissolve in purified water, previously acidified by the solution of hydrochloric acid | |
| 43. | **Phenylsalicylate**<br>A poorly powdered substance. Soluble in fats, Insoluble in water. A hydrophobic substance with poorly expressed properties | **Powders:** By the general rules.<br>Grind with ethyl alcohol (per 1.0 – 10 drops) | ***Physical: eutectic with camphor, menthol*** |
| | | **Suspensions (the dispersion method):**<br>Add stabilizers in the following quantities:<br>– gelatose = $m_{phenylsalicylate}$: 2,<br>– 5 % methylcellulose solution = $m_{phenylsalicylate}$ ,<br>– Tween-80 = $m_{phenylsalicylate}$ : 10 | |
| | | **Emulsions:**<br>As a grinded powder by the type of suspension in the prepared emulsion (to intensify of the pharmacological activity) | |
| 44. | **Pilocarpine hydrochloride**<br>A poisonous substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Ophthalmic drops:** By the general rules, dissolve in the half amount of the water volume, isotonate by sodium chloride | |
| | | **Ophthalmic ointments:**<br>As a water solution by the type of emulsion mixing with a sterile base (9:1) | |
| 45. | **Platiphyllin hydrotartrate**<br>A poisonous substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Powders:** By the general rules in the rubbed out mortar.<br>If the total weight of a medicinal substance is less than 0.05, it is used as trituration (1:10) | |
| | | **Homogeneous liquid MF:** by the general rules | |
| | | **Suppositories (the rolling method):**<br>As a water solution by the type of emulsion | |
| 46. | **Potassium iodide**<br>Soluble in water | **Ointments on the hydrophobic base:**<br>up to 5 % - as a water solution by the type of emulsion,<br>more than 5 % - as a grinded powder by the type of suspension, grind with the base | |
| | | **Ophthalmic drops:** By the general rules.<br>Introduce potassium iodide in aseptic conditions in the presence with ascorbic acid, after sterilization of the prepared drops | ***Chemical: with ascorbic acid*** |
| 47. | **Potassium permanganate**<br>A dyer.<br>Soluble in water | **Homogeneous liquid MF:**<br>Dissolve in fresh-distilled, filtrated water:<br>up to 1 % - in the bottle for dispensing, if 1 % and more – grind in a mortar adding hot water.<br>Solutions are filtered through glass filters | ***Chemical: redox reaction with hydrogenium peroxide*** |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 48. | **Protargol**<br>A colloidal substance (contains 8 % of silver oxide), soluble in water, glycerin | **Homogeneous liquid MF:**<br>Pour by a thin layer on the surface of the water to complete dissolution. If there is glycerin in the prescription, grind protargol with glycerin, then add water.<br>Solutions are filtered through glass filters | |
| | | **Ointments on the hydrophobic base:**<br>Mix with glycerin (6-8 drops per 1 g of protargol), and then add water and emulsify by lanoline | |
| | | **Suppositories (the rolling method):**<br>Mix with glycerin, and then add water and cacao butter by parts | |
| | | **Suppositories (the casting method):**<br>Introduce in the gelatin-glycerin base after previous mixing with glycerin and dissolving in water | |
| | | **Ophthalmic drops:** By the general rules.<br>Without sterilization and isotonation | |
| 49. | **Resorcin**<br>Soluble in water, 70 % alcohol | **Homogeneous liquid MF:**<br>By the general rules.<br>*Alcoholic solutions* – in 70 % ethyl alcohol | |
| | | **Dermatological ointments on the hydrophobic base:**<br>As a grinded powder by the type of suspension.<br>Up to 5 % - grind with the liquid suitable by its properties to the base; more than 5 % – grind with the part of the melted base | |
| | | **Ophthalmic drops:**<br>Introduce in aseptic conditions after sterilization of the prepared drops | |
| | | **Ophthalmic ointments:**<br>As a water solution by the type of emulsion mixing with a sterile base (9:1) | |
| 50. | **Riboflavin**<br>A dyer.<br>Soluble in water | **Powders:**<br>By the method of "three layers". Pack in parchment capsules | |
| | | **Ophthalmic drops:** as a concentrated solution 0.02 % | |
| 51. | **Salicylic acid**<br>A coarse-crystalline substance.<br>Insoluble in water and in fats.<br>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:**<br>*Alcoholic solutions* – in 70 % ethyl alcohol | |
| | | **Ointments on the hydrophobic base:** As a grinded powder by the type of suspension: up to 5 % - grind with the liquid suitable by its properties to the base; more than 5 % – grind with the part of the melted base | |
| 52. | **Scopolamine hydrobromide**<br>A poisonous substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Powders:** By the general rules.<br>If the total weight of a medicinal substance is less than 0.05, it is used as trituration | |
| | | **Solutions for injections:**<br>By the general rules.<br>Stabilize by 0.1 M solution of HCl (10 ml per 1 liter of the solution) to prevent hydrolysis (scopolamine – a salt of a strong acid and a weak base) | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 53. | **Silver nitrate**<br>A poisonous substance (check of doses). Soluble in water. The medicine is sealed up, registered for dispensing by the signature and additional label "To be handled with caution" | **Homogeneous liquid MF:**<br>By the general rules.<br>Dissolve in a fresh distilled purified water and filter through glass filters (a strong oxidizing agent) | |
| | | **Ophthalmic drops**:<br>By the general rules.<br>Isononate by sodium chloride | |
| 54. | **Sodium chloride**<br>Soluble in water | **Solutions for injections:**<br>Sort "chemically pure", depyrogenize in the dry heat oven 180 º C for 2 hours | |
| 55. | **Sodium hydrocarbonate**<br>Soluble in water | **Powders:** By the general rules.<br>In the presence with citric acid "sparkling" powders are formed | ***Physical and chemical: formation of a damp mixture with ascorbic acid*** |
| | | **Homogeneous liquid MF:** By the general rules.<br>Used as 5 % concentrated solution | ***Physical and chemical: precipitation of alkaloids*** (***codeine base) in the presence with codeine phosphate*** |
| | | **Suspensions (the condensation method):** As a result of neutralization with the solution of calcium chloride insoluble compound - calcium carbonate is formed | |
| | | **Solutions for injections:**<br>— sodium hydrocarbonate should be of a sort "chemically pure" or "pure for analysis";<br>— do not stabilize;<br>— $t_{dissolution}$ =15-20 ºC without intensive mixing;<br>— bottles for dispensing are filled on the 2/3 of volume or 80 %;<br>— sterilize in a horizontal or upside down position;<br>— cool for 2-3 hours mixing occasionally | |
| 56. | **Sodium tetraborate**<br>A poorly powdered substance.<br>Soluble in hot water, glycerin | **Powders:**<br>By the general rules.<br>Grind with ethyl alcohol (5 drops of the alcohol per 1.0 of sodium tetraborate) | |
| | | **Homogeneous liquid MF:**<br>*Water solutions*: in hot purified water.<br>*Glycerin solutions* – in the bottle for dispensing while heating | |
| 57. | **Sodium thiosulphate**<br>Soluble in water | **Solutions for injections:**<br>Stabilize by sodium hydrocarbonate.<br>Sodium thiosulphate can be used as a stabilizer in solutions of other oxidizing agents | |
| 58. | **Solution of Adrenaline hydrochloride**<br>A strong effective substance. Thermolabile | **Ointments on the hydrophobic base:**<br>By the type of emulsion mixing with lanoline | ***Chemical: with Collargol oxidizing of adrenaline hydrochloride and coagulation of collargol*** |
| | | **Ophthalmic drops:**<br>Introduce in aseptic conditions after sterilization of the prepared drops | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 59. | **Solution of Citral**<br>Thermolabile | **Liquid MF:**<br>Mix in a separate vessel with the equal amount of the prepared mixture or with a simple syrup (if it is prescribed), then add into the bottle for dispensing.<br>Condensation methods of obtaining suspensions as the result of replacement of the solvent – "muddy" mixtures are formed | |
| | | **Ophthalmic drops:**<br>Introduce in aseptic conditions after sterilization of the prepared drops | |
| 60. | **Starch**<br>An amorphous substance. HMC with the limited swelling in cold water and unlimited in hot | **Powders:**<br>By the general rules - add to the powder mixture in the last turn without additional grinding | |
| | | **Homogeneous liquid MF:**<br>1 part of starch mix with 4 parts of cold water, add the muddy mixture obtained to the 45 parts of boiling water and boil for 1-2 min | |
| 61. | **Streptocide**<br>A strong effective substance (check of doses), poorly powdered. Insoluble in water and in fats. Soluble in PEO. A hydrophobic substance with poorly expressed properties | **Powders:** By the general rules.<br>Grind with ethyl alcohol (per 1.0 – 5 drops) | |
| | | **Suspensions (the dispersion method):**<br>Add stabilizers in the following quantities:<br>– gelatose = $m_{streptocide}$: 2,<br>– 5 % methylcellulose solution = $m_{streptocide}$ ,<br>– Tween-80 = $m_{streptocide}$ : 10 | |
| | | **Emulsions:**<br>As a grinded powder by the type of suspension in the prepared emulsion | |
| | | **Liniments:** As a grinded powder by the type of suspension | |
| | | **Ointments on the hydrophobic base:**<br>As a grinded powder by the type of suspension.<br>Up to 5 % - grind with the liquid suitable by its properties to the base; more than 5 % – grind with the part of the melted base | |
| | | **Ointments and suppositories on the PEO base:**<br>By the type of solution dissolving in the melted base | |
| | | **Suppositories (the rolling method):**<br>As a grinded powder by the type of suspension mixing with cacao butter | |
| | | **Suppositories (the casting method) on the hydrophobic base (Butyrol) –** as a grinded powder by the type of suspension mixing with the part of the base | |
| 62. | **Sulphur**<br>A coloured substance. Insoluble in water, moderately in fats. A hydrophobic substance with distinctly expressed properties | **Powders:** By the general rules | |
| | | **Suspensions (the dispersion method):**<br>Add a stabilizer ***(potassium green soap)*** in the amount of 0.2 g per 1 g of sulphur | |
| | | **Ointments:** as a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base; more than 5 % – grind with the part of the melted base | |
| 63. | **Tannin**<br>A semi-colloidal substance, soluble in water | **Homogeneous liquid MF:** By the general rules | |
| | | **Ointments on the hydrophobic base:**<br>Regardless of the prescribed amount as a water solution by the type of emulsion mixing with lanoline | |

| № | Name, properties | Peculiarities of introduction into medicinal forms | *Incompatibilities* |
|---|---|---|---|
| 64. | **Terpinhydrate**<br>Insoluble in water and in fats. A hydrophobic substance with poorly expressed properties | **Suspensions (the dispersion method):**<br>Add stabilizers in the following quantities:<br>– gelatose = $m_{terpinhydrate}$: 2,<br>– 5 % methylcellulose solution = $m_{terpinhydrate}$ ,<br>– Tween-80 = $m_{terpinhydrate}$ : 10 | |
| | | **Emulsions:**<br>As a grinded powder by the type of suspension in the prepared emulsion | |
| 65. | **Tripsin**<br>HMC with the unlimited swelling | **Homogeneous liquid MF:**<br>Dissolve in water previously acidified by the solution of hydrochloric acid | |
| | | **Ophthalmic drops**:<br>By the general rules.<br>Without thermal sterilization | |
| 66. | **Xeroform**<br>An aromatic substance. Insoluble in water and in fats | **Powders:**<br>Add to the powder mixture in the last turn. Pack in parchment capsules | |
| | | **Vishnevsky liniment** – as a grinded powder by the type of suspension, grind with tar | |
| | | **Ointments and suppositories:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| 67. | **Zinc oxide**<br>An amorphous substance.<br>Insoluble in water and in fats.<br>A hydrophilic substance | **Powders:** By the general rules | |
| | | **Suspensions (the dispersion method):**<br>Without stabilizing | |
| | | **Emulsions:**<br>In the prepared emulsion - as a grinded powder by the type of suspension | |
| | | **Ointments and suppositories:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| 68. | **Zinc sulphate**<br>Soluble in water | **Dermatological ointments on the hydrophobic basis:**<br>As a grinded powder by the type of suspension:<br>Up to 5 % - grind with the liquid suitable by its properties to the base;<br>more than 5 % – grind with the part of the melted base | |
| | | **Ophthalmic drops**:<br>By the general rules.<br>Dissolve in the half amount of the water volume; isononate by sodium sulphate | |
| | | **Ophthalmic ointments:**<br>As a water solution by the type of emulsion mixing with a sterile base (9:1) | |

***AUXILIARY SUBSTANCES USED IN FORMULATION OF DIFFERENT MEDICINAL FORMS***

| № | Name and properties | Application |
|---|---|---|
| | ***POWDERS*** | |
| 1. | **Lactose (lactic sugar)** Non-hygroscopic, its density is similar to the density of many alkaloids | An auxiliary substance (filler) for preparing trirurations |
| | ***LIQUID MF*** | |
| 2. | **Alcoholic-water-glycerin mixture** | **Composition:** alcohol -1 part<br>glycerin - 3 parts<br>water – 6 parts.<br>The solvent for obtaining solutions of dense extracts (Belladonna, Glycyrrhiza, etc.) |
| 3. | **Glycerin** Non-aqueous solvent | A component of the solvent for obtaining a solution of Belladonna dense extract.<br>Antiflocculant for dissolving Protargol.<br>**Suspensions*:*** Increases the viscosity of the medium increasing the stability of the suspension |
| 4. | **Gelatose** | **Used as:**<br>– stabilizers in suspensions;<br>– 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 the suspension |
| | **OINTMENTS** | |
| 8. | **Anhydrous lanoline** (obtained from the scouring water of sheep wool). Diphilic base. Absorbs 250 % of water | **Ointments:**<br>The emulsifying agent while introducing water solutions of medicinal substances into hydrophobic bases.<br>**Ophthalmic ointments:**<br>A component of the base for ophthalmic ointments.<br>**Ointments with antibiotics:**<br>A component of the base for ointments with antibiotics. The base is sterilized by dry heat |
| 9. | **Base for ointments with antibiotics** (sterile) | 6 parts of vaseline and 4 parts of anhydrous lanoline.<br>The base is sterilized by dry heat (180 °C for 2 hours) |
| 10. | **Base for ophthalmic ointments** (sterile) | 9 parts of vaseline for ophthalmic ointments and 1 part of anhydrous lanoline.<br>Reducing agents are absent in vaseline for ophthalmic ointments. The base is sterilized by dry heat (180 °C for 2 hours) |
| 11. | **Beeswax** Diphilic base. The melting temperature is 63-65 °C | A component of ointment and suppository bases.<br>Used for increasing of the melting temperature and viscosity of hydrophobic bases |
| 12. | **Bentonite** Inorganic HMC. Hydrophilic base | While mixing with water gel is formed |
| 13. | **Kutumova base** Emulsion base of w/o type | Composition: vaseline, emulsifying agent T-2, water |

| № | Name and properties | Application |
|---|---|---|
| 14. | **Paraffin**<br>Hydrophobic carbon base (product of petroleum processing). The melting temperature is 50-57 °C | A component of ointment and suppository bases.<br>Used to increase the melting temperature and viscosity of hydrophobic bases |
| 15. | **PEO base**<br>Hydrophilic base – the alloy of solid and liquid PEO | Possesses a high osmotic activity, clears wounds |
| 16. | **Vaseline**<br>Hydrophobic carbon base (a product of petroleum processing). The melting temperature is 37-50 °C | The Pharmacopoeian base (is used if the base is not specified in the prescription).<br>Ointments on vaseline have a surfactant effect.<br>Immiscible with castor oil |
| 17. | **Vaseline oil (liquid paraffin)**<br>Hydrophobic carbon base (a product of petroleum processing). Immiscible with water, easily mixed with vegetable oils (except castor oil) | Used to decrease the melting temperature of hydrophobic bases.<br>A component of oil gels |
| 18. | **Water lanoline**<br>Diphilic base. Contains 30 % of water, 70 % of anhydrous lanoline | The emulsifying agent while introducing water solutions of medicinal substances in hydrophobic bases. Absorbs 150 % of water |
| | **SUPPOSITORIES** | |
| 19. | **Anhydrous lanoline** (obtained from the scouring water of sheep wool).<br>Diphilic base. Absorbs 250 % of water | **Suppositories on cacao butter:**<br>Used as a plasticizer for suppository bases (1-1.5 g per 30.0 of suppository mass) |
| 20. | **Butyrol**<br>Hydrophobic (fat) suppository base.<br>The melting temperature is 37 °C | ***Composition:*** cacao butter (30 %), paraffin (20 %), hydrogenated fats (50 %).<br>Used while preparing suppositories by the ***casting method.***<br>The nests of forms are moisten by a soapy alcohol |
| 21. | **Cacao butter** (obtained from seeds of Cacao tree).<br>Hydrophobic base.<br>The melting temperature is 30-34 °C | Used while preparing suppositories by the ***rolling method.***<br>The Pharmacopoeian base (is used if the base is not specified in the prescription).<br>Emulsifies water and water solutions (4-5 %) |

| № | Name and properties | Application |
|---|---|---|
| 22. | **Gelatin-glycerin base** Hydrophilic base. Subjected to drying out and microbial contamination | 1. **Composition** (parts): gelatin 1; glycerin 5; water 2.<br>2. **Technology**: add purified water to gelatin and allow it to stand for swelling for 30-40 min, and then add glycerin, heat on the water bath while mixing to obtain the transparent mass.<br>3. When calculating the amount the calculation coefficient that equals 1.21 is used.<br>4. It is used only to prepare vaginal suppositories |
| 23. | **Soapy alcohol** | Used to moisten the form's nests while preparing suppositories on the hydrophobic bases |
| 24. | **Soapy-glycerin base** Hydrophobic suppository base | **Composition:** glycerin, sodium carbonate, stearinic acid.<br>**Processes** a purgative action |
| 25. | **Vaseline oil** Hydrophobic | Used to moisten the form's nests while preparing suppositories on the hydrophilic bases |
| 26. | **Vitepsol** Hydrophobic suppository base | Used while preparing suppositories by the casting method |
| **SOLUTIONS FOR INJECTIONS** | | |
| 27. | **Sodium metabisulphite** | A stabilizer for solutions of easily oxidized substances – direct antioxidant |
| 28. | **Solution of hydrochloric acid 0.1 M** | A stabilizer for solutions of salts formed by a strong acid and a weak base |
| 29. | **Solution of sodium hydroxide 0.1 M** | A stabilizer for solutions of salts formed by a strong base and a weak acid |
| 30. | **Weybel liquid** | **Composition**: sodium chloride, solution of hydrochloric acid, water for injections.<br>A stabilizer for solutions of glucose (5 % from the volume of the solution regardless of its concentration) |
| **OPHTHALMIC DROPS** | | |
| 31. | **Benzalkonium chloride** | Organic preservatives |
| | **Benzyl alcohol** | |
| 32. | **Merthiolate** | Metal organic preservative |
| 33. | **Polyvinyl alcohol** | Prolongation agents |
| | **Methylcellulose** | |

## PHARMACOPEIAN PRESCRIPTIONS OF EXTEMPORANEOUS MEDICINES

| Pharmacopeian name | Composition, formulation |
|---|---|
| **Ammonium liniment (volatile)**<br>Liniment – emulsion of o/w type | **Composition**: oleic acid, sunflower oil, 10 % ammonium solution.<br>**Technology:** Into the bottle for dispensing weight sunflower oil, add oleic acid (in drops) and mix. Then add ammonium solution, cork and shake.<br>The emulsifier is ammonium oleate, which is formed as a result of the neutralization reaction |
| **Lassar paste** | **Composition**: zinc oxide, salicylic acid, starch and vaseline.<br>**Technology:** Melt the whole quantity of vaseline. Disperse zinc oxide and salicylic acid in a warm mortar with the melted vaseline. Introduce starch is into the cool mixture |
| **Lugol solution** | **Composition**: iodine, potassium iodide and water.<br>For internal use -5 %<br>For external use -1 %<br>**Technology:** Dissolve potassium iodide in equal amount of purified water, in obtain potassium iodide solution dissolve iodine (complex-forming), add the remaining quantity of water |
| **Yellow mercury ointment (ophthalmic)**<br>Ointment- suspension | **Composition:** mercury yellow oxide, sterile vaseline oil, sterile vaseline (for ophthalmic ointments) and anhydrous lanoline in the ratio of 5:1<br>**Technology:** In aseptic conditions grind mercury yellow oxide with a sterile vaseline oil (according to Deryagin rule), add sterile vaseline (for ophthalmic ointments) and anhydrous lanoline |
| **Rosenthal paste (liniment)**<br><br>Liniment –solution in the moment of preparation and use | **Composition:** paraffin, 95 % alcohol, chloroform, iodine.<br>**Technology:** Into the bottle for dispensing place iodine, powdered paraffin, chloroform. Loosely cork and heat on the warm water bath (temperature 40-50 ° C) until dissolution. To the cool mass add 95 % alcohol<br>**or**<br>**Composition**: paraffin, 70 % alcohol, chloroform, iodine, potassium iodide.<br>**Technology:** In the dark glass bottle for dispensing dissolve paraffin in chloroform while heating. In a vessel dissolve potassium iodide in the calculated amount of purified water, dissolve iodine in the obtained solution of potassium iodide, add the calculated amount of 95 % alcohol, transfer into the bottle for dispensing |
| **Vishnevsky liniment**<br>Liniment– suspension | **Composition**: xeroform (or dermatol), tar (or vinylene), castor oil (or cod liver oil)<br>**Technology:** grind xeroform in a dry state, mix with a half amount of tar by drops (according to Deryagin rule), add the rest tar and castor oil |

**STANDARD PHARMACOPEIAN LIQUIDS**

| Conditional name | Chemical name | Average concentration, % |
|---|---|---|
| Burov liquid | Solution of aluminum acetate, basic | 8 |
| Potassium acetate liquid | Solution of potassium acetate | 34 |
| Formalin | Solution of Formaldehyde | 37 |
| Perhydrol | Solution of hydrogen peroxide, concentrated | 30 |
| | Solution of hydrogen peroxide | 3 |
| | Solution of Ammonium | 10 |
| | Acetic acid | 3; 30; 98 |
| Hydrochloric acid | | 25 |
| Diluted hydrochloric acid | | 8.3 |

If a liquid is prescribed under the conditional name in the prescription, in calculations the concentration of the standard solution is taken for a unit (100%).

| Test | Calculation |
|---|---|
| A pharmacist prepared 100 ml of 20 % formalin solution. Specify the necessary amount of the standard solution of formaldehyde:<br>**A** *20 ml<br>**B** 60 ml<br>**C** 10 ml<br>**D** 80 ml<br>**E** 40 ml | A standard pharmacopeia liquid is written under the conditional name.<br>37 % formaldehyde solution:<br>$\frac{20\% \cdot 100ml}{100\%} = 20ml$ |

If the chemical name is indicated in the prescription, in calculations the actual content of substances in standard solutions is taken using the following formula: $X = \frac{Vsol \cdot \%sol(acc.prescr.)}{\%s\,\text{tan}\,dard\_sol}$

The amount of water in both cases is calculated by the difference between the total volumes of the solution prepared and the amount of the standard liquid calculated.

| Test | Calculation |
|---|---|
| A pharmacist prepared 100 ml of 1 % ammonia solution. Specify what amount of 10 % ammonia solution and water did he use?<br>***A*** * 10 ml и 90 ml<br>***B*** 5 ml и 95 ml<br>***C*** 15 ml и 85 ml<br>***D*** 20 ml и 80 ml<br>***E*** 5 ml и 100 ml | A standard pharmacopeian liquid is written under the chemical name .<br>10% ammonia solution:<br>$\frac{100ml \cdot 1\%}{10\%} = 10ml$<br>Purified water:<br>100 -10 = 90 ml |

**PLANT RAW MATERIAL USED IN FORMULATION OF INFUSIONS AND DECOCTIONS**

| Latin name of the plant | English name of the plant |
|---|---|
| Achillea millefolium<br>(Herba Millefolii) | Common Yarrow, milfoil, nosebleed |
| Adonis vernalis<br>(Herba Adonidis) | Spring Adonis |
| Althaea officinalis<br>(Radices Althaeae) | Marshmallow, Mortification root, Sweat weed |
| Artostaphylos Uva-ursi<br>(Folia Uvae-ursi) | Bearberry |
| Berberis vulgaris<br>(Folia Berberidis) | Barberry, Pepperidge tree |
| Casia senna<br>(Folia Sennae) | Alexander senna, Khartoum senna |
| Chamomilla recutita<br>(Flores Chamomillae) | Matricaria, Wild chamomile, German chamomile |
| Convallaria majalis<br>(Herba Convallariae) | Lily-of-the-valley, May lily |
| Digitalis purpurea<br>(Folia Digitalis) | Purple foxglove, Cowlflap |
| Frangula alnus<br>(Cortex Frangulae) | Alder buckthorn, Black dogwood |
| Leonurus cardiaca<br>(Herba Leonuri) | Common motherwort, Motherwort |
| Mentha piperita<br>(Folia Menthae) | Peppermint, Mint |
| Plantago major<br>(Folia Plantaginis) | Common plantain, lamb’s foot, greater plantain |
| Quercus robur<br>(Cortex Quercus) | Oak, English oak |
| Rosae majalis<br>(Fructus Rosae) | Cinnamon rose, Bird brier, Dog rose |
| Salvia officinalis<br>(Folia Salvia) | Sage, garden sage |
| Termopsis lanceolata<br>(Herba Termopsidis) | Bush pea, dupine false |
| Valeriana officinalis<br>(Rhizomata cum radicibus Valerianae) | Common valerian, cat’s valerian, garden heliotrope, setwell, vandal root |

*Appendix*

**AN EXAMPLE OF FILLING A WORKBOOK**

| Test | Explanation |
|---|---|
| **1. A pharmacist-technologist prepared 20.0 g of Scopolamine hydrobromide trituration (1:100). Calculate the necessary amount of a poisonous substance and a filler:**<br>**A** 1.00 and 19.00<br>**B** 2.00 and 18.00<br>**C** 0.02 and 19.98<br>**D** 20.0 and 0.20<br>**E** 0.20 and 19.80 | The mass (pois. s.) 20:100=0.2<br>The mass (filler) 20-0.2=19.8 |
| **2. Medicinal substances are introduced in the combined ointments depending on their properties. How should a pharmacist introduce novocain in the vaseline-lanoline base?**<br>**A** Grind with alcohol or ether<br>**B** Grind with glycerin<br>**C** Dissolve previously in the minimal quantity of water<br>**D** Grind with the part of the melted base<br>**E** Dissolve in the melted base | Novocain is soluble in water, therefore it is introduced in the vaseline-lanoline base by preliminary dissolution in a minimal quantity of water |
| **3. A pharmacist prepared an ointment on the hydrophilic base. Specify the base, possessing the osmotic effect and clearing wounds:**<br>**A** PEO<br>**B** Gelatin-glycerin<br>**C** Vaseline<br>**D** Spermaceti<br>**E** Hydrogenated fats | It is necessary to know the assortment of ointment bases, their classification, physical, chemical and pharmacological properties |
| **4. To prepare non-sterile medicinal forms in a chemist's shop purified water is used. Specify the term of its storage.**<br>**A** 1 day<br>**B** 1 shift<br>**C** 3 days<br>**D** 1 week<br>**E** 5 days | Requirements of the order of the Ministry of Public Health of Ukraine 626 from 15.12.2004 "About approval of the Rules of preparing medications in the conditions of a chemist's shop" |
| **5. A pharmacist revealed a chemical incompatibility in a prescription.**<br>**Rp.: Sol. Kalii permanganatis 0.1% 100 ml**<br>**Sirupi simplicis 5 ml**<br>**M.D.S. Use 1 tea-spoon 3 times a day**<br>**Specify a process that occurs in combination of ingredients in the prescription:**<br>**A** Oxidization-reduction<br>**B** Neutralization<br>**C** Non-mixing of liquids<br>**D** Hydrolysis<br>**E** Insolubility | The answer is based on the knowledge of chemical properties of substances. Potassium permanganate is a strong oxidant which has a redox-reaction with organic compounds |

| Test | Explanation |
|---|---|
| **6. It is necessary to prepare a suspension by the dispersion method. Specify the optimum amount of the liquid, which should be added by Deryagin's rule when grinding 10.0 of zinc oxide.**<br>**A** 1 ml<br>**B** 10 ml<br>**C** 2 ml<br>**D** 5 ml<br>**E** 0,5 ml | Deryagin rule – for the finest grinding of a solid powdered medicinal substance the liquid is taken in a half amount of its weight:<br>10.0 $_{\text{zinc oxide}}$: 2= 5 ml of a liquid |
| **7. A pharmacist prepared 200 ml of the Bush pea herb infusion. How many ml of purified water must he take for this purpose?**<br>**A** 400 ml<br>**B** 200 ml<br>**C** 220 ml<br>**D** 150 ml<br>**E** 250 ml | Infusions from the Bush pea herb are prepared in the ratio of 1:400.<br>1.0 -400<br>x - 200 x=0.5<br>If the weight of the herb is less than 1.0, then K is not taken into account, consequently 200 ml of water is to be taken |
| **8. A chemist's shop has Protargol. Specify the content of silver oxide in it?**<br>**A** 30 %<br>**B** 8 %<br>**C** 93 %<br>**D** 70 %<br>**E** 73 % | It is necessary to know the properties of colloid substances |
| **9. A pharmacist revealed the incompatibility in the prescription. Choose medicinal substances which form an eutectic:**<br>**A** Antipyrine + Analgin<br>**B** Chloral hydrate + Camphor<br>**C** Calcium carbonate + Magnesium oxide<br>**D** Calcium chloride + Sodium chloride<br>**E** Platiphyllin hydrotartrate + Dibazol | An eutectic mixture is formed, its melting temperature is below of the melting temperature of separate components and below than the room temperature |
| **10. The solution of Burov liquid is prescribed for a patient as a wash:**<br>**Rp.: Sol. Liquoris Burovi 10% 100 ml**<br>**Da. Signa. For wahings.**<br>**What volume of Burov liquid and purified water is it necessary to take for preparing this medicine:**<br>**A** 80 ml and 20 ml<br>**B** 90 ml and 10 ml<br>**C** 20 ml and 80 ml<br>**D** 10 ml and 90 ml<br>**E** 50 ml and 50 ml | The standard pharmacopeia liquid is written under the conditional name, therefore, in calculations its standard concentration is accepted for 1 or 100 %:<br>Burov liquid: $\frac{10\% \cdot 100ml}{100\%} = 10ml$<br>Purified water:<br>100-10=90 ml |

У довідкових матеріалах наведена таблиця лікарських речовин, які найбільш часто зустрічаються в екстемпоральних прописах, із зазначенням їх фізико-хімічних властивостей та способів введення у різноманітні лікарські форми. В матеріалах наведено зразок заповнення робочого журналу. Засвоєння тестів з використанням даних Матеріалів допоможе студентам при підготовці до ліцензійного іспиту з аптечної технології ліків.

Довідкові матеріали призначені для самостійної і позааудиторної роботи студентів спеціальності «Фармація» з аптечної технології ліків.

*Довідкове видання*

# REFERENCE MATERIALS for preparation to the licensed examination “CROCK-2” on Chemist’s Technology of Drugs

Англійською мовою

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