«ԵՐԵՎԱՆԻ ՄԽԻԹԱՐ ՀԵՐԱՑՈՒ ԱՆՎԱՆ ՊԵՏԱԿԱՆ ԲԺՇԿԱԿԱՆ ՀԱՄԱԼՍԱՐԱՆ» ՀԻՄՆԱԴՐԱՄ

"YEREVAN STATE MEDICAL UNIVERSITY AFTER MKHITAR HERATSI" FOUNDATION

ԴԵՂԵՐԻ ՏԵԽՆՈԼՈԳԻԱՅԻ ԱՄԲԻՈՆ
DEPARTMENT OF DRUG TECHNOLOGY

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Bachelor state examination
Questionnaire of Pharmaceutical Technology
2024-2025

1. Introduction to pharmaceutical technology. Prescription and medication orders. Discovering inappropriate prescription or medication orders.
2. Medical abbreviations. Compounding and manufacturing. Basic steps to follow in compounding drug products. Labels for outpatient prescriptions and inpatient drug orders. Auxiliary labels of medicines.
3. Controlled substances. DEA registration number. Weighing: most important terms, prescription balances, weights, recommended weighing procedures. Volumetric measuring: selection and use of volumetric apparatus. Most important conversions.
4. Powders as dosage forms. Classification: bulk powders for internal and external use. Unit dose powders. Desired properties of powders.
5. Principles of compounding for powders: particle size reduction and blending. Powders with dye ingredients.
6. Solitions as dosage forms. Definition. Characteristics. Advantages and disadvantages of solutions over other dosage forms. Classification. Principles of compounding solutions. Solvents. Miscibility of liquids. Noyes-Whitney and Stokes-Einstein equations.
7. True solutions. Classification. Standard solutions. Preparation of liquid dosage forms with concentrsted solutions.
8. Non-aqueous solutions. Classification. Preparation of non aqueous solution with volatile and non-volatile substances.
9. Colloids. Properties of colloids. Stability of colloids. Classification. Preparation of protective colloids.
10. Suspensions as dosage forms. Definitions. Characteristics. Uses of suspensions. Desired properties of a suspension.
11. Factors affecting the properties of a pharmaceutical suspensions. Stokes' law. Sedimentation. Suspending agents.
12. Emulsions as dosage forms. Definitions. Characteristics. Uses of emulsions. Emulsion types. Determination emulsion types.
13. Principles of compounding basic emulsion types: Acacia emulsions; Nascent soap emulsions. Emulsifying agents. Mechanism of action of emulsifying agents.
14. Infusions and decoctions. Collection, preservation and drying of plant material. Sizes of plant materials. Temperature and duration of the extraction process.

15. The peculiarities of the formulation of water extractions from the plant raw material containing mucilage; volatile oils, tannins.
16. Liniments as dosage form. Characteristics. Classification. Advantages and disadvantages. The common rules for preparing liniment.
17. Ointments as dosage forms. Definitions. Advantages and disadvantages. Classification. Ointment bases. Classification. Principles of compounding of ointments. Incorporation of ingredients into ointments.
18. Suppositories as dosage forms. Advantages and disadvantages. Classification. Suppository bases: classification, description, advantages and disadvantages.
19. Compounding of suppositories in pharmacy condition. Methods of compounding. Advantages and disadvantages.
20. Displacement values. Suppository moulds. Moulds lubrication.
21. Industrial production of medicines. Quality management in pharmaceutical industry. The principles of quality assurance.
22. Good Manufacturing Practice as a part of Quality assurance. GMP requirements for personnel. GMP requirements for premises and equipment. Cross contamination. Documentation.
23. GMP requirements for production. Qualification and Validation. GMP requirements for Quality control. Complains and product recall. Inspections
24. GMP manufacturing environment. Personnel, product and environment protection.
25. Basic concepts of pharmaceutical manufacturing. Classification of technological processes. Material balances. Types of balances. The mass balance equation. Master formula and Standard Operation Procedures.
26. Particle size reduction. Objectives and disadvantages of size reduction. Classification of size reduction equipment's and selection of particle size reduction method.
27. Aim of particle size separation. Sieving methods of particle size separation. Sieves and sieving equipment. Particle size separation by fluid and air separation.
28. Mixing. Definition and objectives of mixing. Types of mixtures. Mixers. Vortex suppression methods.
29. Clarification. Sedimentation. Centrifugation. Filtration. Types and mechanisms of filtration. Filter materials. Factors affecting the rate of filtration. Filtration equipment.
30. Thermal processes. Heat transfer. Heat transfer by conduction and convection. Heat transfer by radiation. Heat transfer through multiple layers. Steam as a heating medium. Effect of pressure on steam properties
31. Evaporation. Practical considerations in evaporators. The single effect evaporator. Heat transfer in evaporators. Condensers.
32. Drying. Moisture content of wet solids. Equilibrium moisture content. Moisture content of air. Relative and absolute humidity of air. Wet-bulb and dry-bulb temperature
33. Types of drying methods. Convective drying of wet solids. Tray dryers. Rate of drying in fixed beds. Fluidized bed dryers. Advantages and disadvantages.
34. Conductive dryers of wet solids. Vacuum oven. Driers for dilute solutions and suspensions. Drum drier. Spray dryers. Advantages and disadvantages. Adsorption drying.
35. Freeze drying. Stages of freeze-drying process. Advantages and disadvantages. Radiation

drying of wet solids. The use of microwave radiation.

36. Technological and physicochemical properties of powders. Adhesion and cohesion. Particle properties and bulk flow.
37. Particle size- effects. Particle true density. Packing geometry. The bulk density of a powder.
38. Factors affecting particles' packing geometry. Process condition. Hopper design. Characterization of powder flow. Indirect methods. Direct methods. Improvement of powder flowability.
39. Tablets as a dosage form. Advantages. Disadvantages. Types of tablets. Molded tablets.
40. Tablet manufacturing by compression. Stages in tablet formation. Single punch press. Rotary press. Computerized hydraulic press. Technical problems during tabletting.
41. Tabletting methods. Tablet production by direct compaction. Advantages and disadvantages of direct compaction. Quality attributes of tablets. Tablet testing. Disintegration test.. Dissolution test. Tests of mechanical strength.
42. Tablet excipients. Filler. Disintegrant. Binder. Glidant. Lubricant. Antiadherant.
43. Tablet production via granulation. Objectives of granulation. Wet granulation stages. Wet granulation equipment. Shear granulators. Oscillating granulators. High speed mixer/granulators.
44. Fluidized bed granulators. Spray dryers. Advantages and disadvantages. Spheronization. Dry granulation. Dry granulators.
45. Fundamental aspects of the compression and compaction of powders.
46. Coating of tablets. Reasons for coating tablets. Sugar coating methods of tablets. Press coating methods of tablets. Film coating methods of tablets. Types of film coating. Functional coatings.
47. Capsules. Advantages. Disadvantages. Types of capsules'. Hard gelatin capsules. Raw materials for capsules. Gelatin. Preparation of raw materials. Capsule manufacturing. Soft gelatin capsules. Manufacturing of softgels.
48. Clean rooms for the production of pharmaceutical products, Premises, Design and construction. Surfacing materials. Services. Air supply of clean rooms. Environmental monitoring of clean rooms. Cleaning of clean rooms. Isolators.
49. Parenteral preparations. Definition. The parenteral container systems. Ampoules. Vials. Bottles. Properties of glass. Glass containers
50. Water for pharmaceutical use. Purified and highly purified water. Water for injections. Production. Water pretreatment and treatment complex. Water softening. Electrodialysis. Goal of Electrodialysis. Advantages and disadvantages.
51. Reverse osmosis. Pyrogens. Depyogenation. Distillation of water for injection. Water for injection. Tests and specifications. Pyrogen detection. Water storage and distribution system.
52. Cleaning containers and equipment for sterile production. Injection, vacuum and ultrasound method of ampoules washing.
53. Providing biological/ antimicrobial/, chemical and physical stability of parenteral solutions. Filtration of injection solutions. Filling of injection solutions. Preservatives incorporated into parenteral formulations.

54. Sealing of ampoules. Sterility and sterilization. The terms used in connection with sterile pharmaceutical products'. Validation and monitoring of sterilization process.
55. Methods of sterilization. Thermal destructions of microorganisms. Principles of sterilization by steam under pressure. Advantages and disadvantages. Dry heat sterilization. Advantages and disadvantages.
56. Gaseous sterilization. Advantages and disadvantages. Radiation methods of sterilization. Filtration method of sterilization.
57. Quality assurance and control of parenteral preparation. Pyrogen tests. Quality assurance and control of parenteral preparation. Particulate evaluation. Container/ closer integrity test. Aseptic techniques. Large volume parenteral products.
58. Aerosols. Pharmaceutical aerosols. Canister for aerosols. Classifications of Aerosol Products. Clinical application of aerosols. Inhalation aerosols.
59. Human airways. Particle disposition in the airway. Internal or inertial impaction mechanisms. Particle disposition in the airway. Sedimentation, diffusion and other mechanisms.
60. Aerosol formulation. Propellants for aerosols. Classification. Advantages and disadvantages. Containers for aerosols. Filing methods of aerosols.

Literature

1.Lectures

2. Aulton's Pharmaceutics. The design and Manufacture of Medicines. Edited by Michael E. Aulton, Kevin M.G. Taylor. 5th edition, 2018

3.Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, 10th edition, 2014

The head of the department of Pharmaceutical Technology *Topchyan H.V.*