«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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State examination
Questionnaire of Pharmaceutical Technology

2025-2026

1. Introduction to biopharmaceutics. Concept of bioavailability. Concept of biopharmaceutics.
2. Physicochemical and physiological factors influencing bioavailability. Dissolution and solubility. Physiological factors affecting the dissolution rate of drugs.
3. Drug factors affecting dissolution rate. Surface area and particle size. Solubility in the diffusion layer. Salts.
4. Cristal form influencing bioavailability. Solvates. Factors affecting the concentration of drug in solution in the gastrointestinal fluids. Complexation. Micellar solubization.
5. Factors affecting the concentration of drug in solution in the gastrointestinal fluids. Adsorption. Chemical stability of the drug in the gastrointestinal fluids. Poorly soluble drugs.
6. Drug absorption. Drug dissociation and lipid solubility. pH-partition hypothesis of drug absorption. Limitations of the pH-partition hypothesis.
7. Drug absorption and their lipid solubility. Molecular size and hydrogen bonding
8. Dosage form factors influencing bioavailability. Influence of the type of dosage form. Aqueous solutions and suspensions.
9. Dosage form factors influencing bioavailability. Liquid- filled capsules. Powder- filled capsules.
10. Dosage form factors influencing bioavailability. Uncoated tablets.
11. Dosage form factors influencing bioavailability. Coated tablets. Enteric coated tablets.
12. Influence of excipients for conventional dosage forms. Diluents. Surfactants.
13. Influence of excipients for conventional dosage forms. Lubricants. Disintegrants. Viscosity-enhancing agents.
14. Assessment of bioavailability. Plasma concentration-time curves.
15. The use of plasma concentration-time curves in bioavailability studies.
16. Absolut and relative bioavailability. Bioequivalence.
17. Bioequivalence. Plasma concentration-time curves for two chemically equivalent drug products.
18. Bioequivalence. The biopharmaceutical classification scheme
19. Principles of dosage form design. Biopharmaceutical aspects of dosage form design.
20. Principles of dosage form design. Routes of drug administration. Oral route.
21. Biopharmaceutical aspects of dosage form design. Rectal, Parenteral, Topical and Respiratory routs of administration.

22. Drug factors in dosage form design. Particle size and surface area. Solubility. Dissolution.
23. Drug factors in dosage form design. Partition coefficient and pKa. Crystal properties: polymorphism.
24. Drug factors in dosage form design. Stability. Therapeutic considerations in dosage form design.
25. Time -controlled drug delivery systems. Advantages for a pharmaco-treatment.
26. Diffusion controlled drug delivery systems. Reservoir devices with non-constant activity source and constant activity source.
27. Diffusion controlled drug delivery systems. Matrix systems. Miscellaneous systems.
28. Swelling -controlled drug delivery systems.
29. 29.Osmotic controlled drug delivery systems.
30. Degradation/ erosion controlled drug delivery systems.
31. Responsive Drug Delivery System. Open and closed loop systems. Microchip based DDS.
32. Classification of tablets. Disintegrating tablets.
33. Chewable tablets, Lozenges, Sublingual and buccal tablets.
34. Effervescent tablets. Advantages. Possible Drawbacks.
35. Effervescent tablets. Applications of Effervescent Tablets. Drugs and drug compositions used as effervescent products. Storage. Labelling.
36. Fast dissolving tablets. Advantages. Characteristics of ideal fast dissolving tablets. Techniques for Preparing Fast dissolving Tablets.
37. Fast dissolving tablets. Mechanism of Superdisintegrants. Important Patented Technologies for Fast Dissolving Tablets.
38. Extended-release tablets. Classification of extended-release tablets. Diffusion-controlled release systems.
39. Extended-release tablets. Classification. Reservoir systems and matrix systems.
40. Extended-release tablets. Classification. Dissolution-controlled release systems. Erosion-controlled release systems.
41. Osmosis-controlled release tablets. Gastroretentive dosage forms (GRDF).
42. Pulsative drug delivery systems. Ideal Pulsatile Drug Delivery System. Advantages of pulsative DDS
43. Methodologies for pulsatile drug delivery. Time Controlled/Pulsatile Drug Delivery Systems. Drug delivery systems with eroding or soluble barrier coatings
44. Time Controlled/Pulsatile Drug Delivery Systems. Drug delivery systems with rupturable coatings. Multiarticulate Pulsatile Drug Delivery Systems. Stimuli induced pulsatile systems
45. Time Controlled/Pulsatile Drug Delivery Systems. Capsular shaped systems
46. Microencapsulation. Techniques to manufacture microcapsules. Physical methods.
47. Chemical methods of microcapsule manufacturing. Application of microencapsulation in medicine and pharmacy
48. Physicochemical methods of microcapsule manufacturing. Release methods and patterns.
49. Transdermal Therapeutic systems. Advantages. Disadvantages. Monolith or matrix TDS. Device design Future trends. General conclusions on the usage of transdermal patches.
50. Transdermal Therapeutic systems. Clinical patches.
51. Factors affecting percutaneous absorption. Percutaneous absorption enhancers. Iontophoresis and sonophoresis.
52. Percutaneous absorption enhancers. Electroporation. Microneedles. Velocity based devices. Thermal approaches.

53. Targeted drug delivery. Principal schemes of targeted drug delivery.
54. Direct application of drugs. Passive drug targeting.
55. Physical targeting of drugs. Targeting moieties.
56. Drug delivery carriers. Nanoparticles. Micelles. Dendrimers. Fullerenes. Carbone nanotubes. Quantum dots. Metallic nanoparticles.
57. Liposomes as drug delivery systems. Structure. Types of liposomes. Advantages.
58. Types of release through liposomes. In Vivo Fate of Liposomes.
59. Liposome–cell interaction. Liposome production.
60. Methods of drug incorporating into liposomes.
61. Types of skin. Determination of skin type. Permeation of substances through the skin.
62. Excipients in cosmetic formulations: animal fats, waxes (animal, plant, synthetic), hydrocarbon bases and gelling agents. Emollients, emulsifiers, fragrances, dye and pigment ingredients. The role of antioxidants and preservatives in cosmetic products.
63. Cosmetic powders. Classification. Ingredients applied in cosmetic powders. Cosmetic lotions. Classification. Hygenic, medical prophylactic, sun screen and acid lotions. Ingredients used for preparation this lotions. Addition of fragrance (flavor) and dye ingredients in lotions.
64. Semisolid cosmetic preparations. Fillers in composition of heterogeneous cosmetic products. Classification and effects on skin. Emulsion cosmetic creams and classification. Moisturizing, nutrient, protective and winter creams.
65. Cosmetic masks. Classification. Bases and active ingredients used in cosmetic masks. Wax or paraffin masks. Cosmetic scrubs. Classification. Abrasives and keratolytic ingredients etc.
66. Cosmetic preparations for teeth and oral cavity. Tooth powders and mouthwashes. Ingredients used for them and quality control. Toothpastes and applied ingredients in composition of them.
67. Deodorants. Classification. Characterization of biologically active substances. Antiperspirants. Characterization of active substances. Disadvantages. Types of antiperspirants.
68. Reasons for usage of multicomponent drug dosage forms. Rational and non-rational prescriptions in compounding. Prescriptions representing difficulties and the ways to overcome them. Preparation of dosage forms by prescriptions representing difficulties without consultation with physician.
69. Incompatibility of dosage forms in prescriptions. Classification of incompatibility. Physical or physicochemical incompatibility. Damping and liquefaction of solid powders as an example of incompatibility. Eutectic mixtures. Immiscibility of ingredients and deterioration in the terms of solubility as an examples of incompatibility.
70. Coagulations of colloid and macromolecular solutions as an example of incompatibility. Lamination of emulsions. Absorption as an example of incompatibility.
71. Chemical incompatibility, definition and classification. “Seeming” chemical incompatibilities. Examples. Formation of precipitates as an example of chemical incompatibility. Causes of precipitation. Sedimentation of cardiac glycosids. Examples.
72. Incompatibility, which is accompanied with color changes, emissions of gases and odorous compounds as an example of chemical incompatibility.
73. Expression systems used in biotechnology: bacteria, yeasts, plant cells, animal cells. Comparison of each expression system advantages and drawbacks. Post-translational modifications.
74. Animal cells, primary culture, cell lines. Immortalization of cells. Comparison of somatic (diploid) and transformed cells (continuous cell line).
75. Systems (vector) for heterogonous expression in animals. Culture media for animal cells. Cultivating conditions. Cell storage. Animal cell lines in biotechnology.

76. Transgenic animals. Knock-out mice. Microinjection of DNA into the pronucleus. Production of transgenic animals. Application.
77. Plant expression system. Callus and somatic embryo culture. Plant cell and tissue culture. Bioreactors for plant biotechnology. Biobalistic method.
78. Plant expression system. Agrobacterium tumefaciens. Ti-plasmid. Promoters used in plant biotechnology. Comparison of transformation in genome and chloroplast.
79. Monoclonal antibodies (MAB). MAB manufacturing. Hybridoma technology. Bioreactors used for MAB manufacturing.
80. Monoclonal antibodies (MAB). Cell lines used for MABs production. Structure of MABs. Key structural components of MABs. MAB generations: Murine, Chimeric, Humanized and human MABs.

Main references

1. Lectures and handouts of manufacturing drug dosage forms.
2. Zoe Diana Draelos. "Cosmetic formulation of skin care products"

Additional references

1. C. Longley, D. Belcher "Pharmaceutical Compounding and dispensing", Pharmaceutical Press 2008.
2. Aulton's Pharmaceutics. The design and Manufacture of Medicines. Edited by Michael E. Aulton, Kevin M.G. Taylor. 5th edition, 2018

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