

1. Which of the following is a disadvantage of hard gelatin capsules compared to tablets?

- A) Faster disintegration
- B) Less stable in high humidity
- C) Better for moisture-sensitive drugs
- D) Easier to manufacture

2. A suspension has a sedimentation volume (F) of 0.8. What does this indicate?

- A) The suspension is highly flocculated
- B) The sediment is compact and difficult to redisperse
- C) The suspension is poorly formulated
- D) The suspension is likely to cake

3. Which dissolution apparatus (USP) is most suitable for transdermal patches?

- A) USP Type I (Basket)
- B) USP Type II (Paddle)
- C) USP Type IV (Flow-through cell)
- D) USP Type VII (Reciprocating cylinder)

4. A drug follows first-order kinetics with a half-life of 4 hours. What percentage of the drug remains after 12 hours?

- A) 6.25%
- B) 12.5%
- C) 25%
- D) 50%

5. Which excipient combination would be most suitable for formulating a controlled-release matrix tablet?

- A) Lactose + Magnesium stearate
- B) HPMC + Ethyl cellulose
- C) Talc + Sodium starch glycolate
- D) Sucrose + Povidone

6. Bioavailability is best defined as:

- A) The rate of drug absorption
- B) The fraction of drug reaching systemic circulation unchanged
- C) The total amount of drug excreted unchanged
- D) The rate of drug metabolism

7. Which particle size reduction method is suitable for thermolabile drugs?

- A) Ball milling
- B) Fluid energy milling (Jet milling)
- C) Hammer milling
- D) Mortar and pestle

8. A zero-order release system is characterized by:

- A) Release rate dependent on drug concentration
- B) Constant release rate over time
- C) Release rate proportional to the square root of time
- D) Burst release followed by slow release

9. Which sterilization method is inappropriate for heat-labile solutions?

- A) Autoclaving
- B) Filtration (0.22 μm)
- C) Gamma irradiation
- D) Ethylene oxide gas

10. For a lipophilic drug with poor solubility, which formulation approach would enhance oral bioavailability?

- A) Converting to a salt form
- B) Using a co-solvent system
- C) Formulating as a hard gelatin capsule
- D) Increasing particle size

11. The primary mechanism of drug release from hydrophilic matrix tablets is:

- A) Diffusion
- B) Osmosis
- C) Erosion
- D) Ion exchange

12. Which test is used to evaluate the content uniformity of tablets?

- A) Friability test
- B) Disintegration test
- C) Weight variation test
- D) Dissolution test

13. A micelle-forming surfactant is used in drug delivery primarily to:

- A) Increase viscosity
- B) Enhance solubility of hydrophobic drugs
- C) Reduce surface tension
- D) Stabilize emulsions

14. Which parameter is most critical in determining the stability of an emulsion?

- A) Viscosity
- B) Interfacial tension
- C) Particle size
- D) Zeta potential

74. Which combination would be best for formulating a fast-dissolving oral film?

- A) HPMC + Glycerin
- B) Ethyl cellulose + Talc
- C) PVP + Magnesium stearate
- D) Lactose + Colloidal silica

15. Lyophilization is used primarily to:

- A) Increase drug solubility
- B) Improve drug stability
- C) Enhance drug absorption
- D) Reduce particle size

16. A powder blend has poor flow properties. Which glidant would be most effective?

- A) Talc
- B) Magnesium stearate
- C) Colloidal silicon dioxide
- D) Sodium lauryl sulfate

17. Which factor does NOT influence drug absorption via the oral route?

- A) Gastric emptying time
- B) Blood flow at the absorption site
- C) Particle size of the drug
- D) Molecular weight of the excipients

125. Which type of polymer is most suitable for colon-targeted drug delivery?

- A) pH-sensitive (Eudragit S100)
- B) Enzyme-sensitive (Pectin)
- C) Thermosensitive (Poloxamer)
- D) Mucoadhesive (Carbopol)

18. For a topical gel, which rheological modifier would provide thixotropic behavior?

- A) Xanthan gum
- B) Carbomer
- C) HPMC
- D) PVP

19. The Higuchi equation describes drug release from:

- A) Reservoir systems
- B) Matrix systems
- C) Osmotic pumps
- D) Liposomes

20. A suspension shows caking. Which stabilizer should be added?

- A) Surfactant
- B) Flocculating agent
- C) Preservative
- D) Antioxidant

21. Which PK parameter is most affected by changes in protein binding?

- A) Clearance
- B) Volume of distribution
- C) Half-life
- D) Bioavailability

22. Which granulation method is best for heat-sensitive drugs?

- A) Wet granulation
- B) Dry granulation
- C) Fluid-bed granulation
- D) High-shear granulation

23. To design a floating drug delivery system, which approach is most effective?
- A) Coating with ethyl cellulose
 - B) Using effervescent agents (NaHCO_3)
 - C) Increasing tablet hardness
 - D) Adding disintegrants
24. Which functional group is essential for the activity of penicillin antibiotics?
- A) β -lactam ring
 - B) Thiazolidine ring
 - C) Carboxylate group
 - D) Aromatic ring
25. A drug has a pK_a of 8.4. At pH 7.4, what percentage of the drug will be in its ionized form (weak base)?
- A) 10%
 - B) 50%
 - C) 90%
 - D) 99%
26. Which structural modification would increase the lipophilicity of a drug molecule?
- A) Adding a hydroxyl group ($-\text{OH}$)
 - B) Replacing $-\text{COOH}$ with $-\text{COOCH}_3$
 - C) Introducing a sulfonate group ($-\text{SO}_3^-$)
 - D) Adding an amino group ($-\text{NH}_2$)
27. Which drug discovery approach is used when modifying a natural lead compound to improve potency?
- A) Combinatorial chemistry
 - B) Structure-activity relationship (SAR) studies
 - C) High-throughput screening (HTS)
 - D) De novo drug design
28. Which bioisostere replacement would be most suitable for a carboxylic acid ($-\text{COOH}$) to reduce ionization while retaining similar sterics?
- A) Tetrazole
 - B) Ester ($-\text{COOR}$)
 - C) Sulfonamide ($-\text{SO}_2\text{NH}_2$)
 - D) Hydroxamic acid ($-\text{CONHOH}$)
29. The prodrug approach is primarily used to:
- A) Increase metabolic stability
 - B) Enhance target specificity
 - C) Improve solubility or absorption
 - D) All of the above
30. Which CYP450 enzyme is most involved in the metabolism of warfarin?
- A) CYP1A2
 - B) CYP2C9
 - C) CYP2D6
 - D) CYP3A4

31. A drug shows competitive inhibition of an enzyme. How does this affect K_m and V_{max} ?

- A) $\uparrow K_m$, no change in V_{max}
- B) $\downarrow K_m$, $\downarrow V_{max}$
- C) No change in K_m , $\downarrow V_{max}$
- D) $\uparrow K_m$, $\uparrow V_{max}$

32. Which drug class acts by inhibiting dihydrofolate reductase (DHFR)?

- A) Sulfonamides
- B) Quinolones
- C) Trimethoprim
- D) β -lactams

33. To design a CNS-active drug, which property should be optimized?

- A) High molecular weight (>500 Da)
- B) Low lipophilicity ($\text{LogP} < 2$)
- C) Ability to cross the blood-brain barrier (BBB)
- D) High plasma protein binding

34. Bioactivation of a drug can lead to:

- A) Increased toxicity
- B) Enhanced therapeutic effect
- C) Prodrug conversion
- D) All of the above

35. Which metabolic reaction converts codeine to morphine?

- A) Oxidation
- B) Reduction
- C) Hydrolysis
- D) O-demethylation

36. Which structural feature is critical for the activity of ACE inhibitors like enalapril?

- A) Thiol group ($-\text{SH}$)
- B) Carboxylate group ($-\text{COO}^-$)
- C) Phosphonate group ($-\text{PO}_3^{2-}$)
- D) Hydroxyl group ($-\text{OH}$)

37. Which drug is a selective COX-2 inhibitor?

- A) Aspirin
- B) Ibuprofen
- C) Celecoxib
- D) Paracetamol

38. To reduce first-pass metabolism of an oral drug, which strategy is most effective?

- A) Increasing lipophilicity
- B) Formulating as a prodrug
- C) Using a sustained-release dosage form
- D) Administering via sublingual route

39. QSAR (Quantitative SAR) studies primarily involve:

- A) Measuring drug-receptor binding kinetics
- B) Correlating chemical structure with biological activity
- C) Determining drug solubility
- D) Analyzing pharmacokinetic parameters

40. Which amino acid is a precursor for dopamine synthesis?

- A) Tryptophan
- B) Tyrosine
- C) Phenylalanine
- D) Glutamate

41. A drug with high plasma protein binding will likely have:

- A) Increased volume of distribution (V_d)
- B) Prolonged half-life ($t_{1/2}$)
- C) Rapid renal excretion
- D) Low tissue penetration

42. Which antiviral drug acts as a reverse transcriptase inhibitor?

- A) Acyclovir
- B) Zidovudine (AZT)
- C) Oseltamivir
- D) Ribavirin

43. To improve metabolic stability of a drug prone to CYP3A4 oxidation, which modification is best?

- A) Introducing a fluorine atom
- B) Adding a methyl group
- C) Replacing an aromatic ring with a cyclohexane
- D) Converting a secondary amine to an amide

44. Chirality in drugs is important because:

- A) Enantiomers may have different pharmacological effects
- B) Racemic mixtures are always more potent
- C) All drugs must be optically active
- D) Only one enantiomer is ever biologically active

45. Which functional group is present in proton pump inhibitors (PPIs) like omeprazole?

- A) Sulfoxide ($-S=O$)
- B) Thiol ($-SH$)
- C) Nitro ($-NO_2$)
- D) Amide ($-CONH-$)

46. Which drug class acts by inhibiting bacterial cell wall synthesis?

- A) Macrolides
- B) Tetracyclines
- C) Cephalosporins
- D) Quinolones

47. A drug shows non-linear pharmacokinetics. What is the most likely cause?
- A) Saturation of metabolic enzymes
 - B) First-order elimination
 - C) Low protein binding
 - D) Rapid absorption
48. To design a selective serotonin reuptake inhibitor (SSRI), which pharmacophore is essential?
- A) A basic amine and an aromatic ring
 - B) A carboxylic acid and a hydroxyl group
 - C) A sulfhydryl group and a ketone
 - D) A phosphate group and an ester
49. Alkaloids are most commonly characterized by the presence of:
- A) Nitrogen in a heterocyclic ring
 - B) A glycosidic linkage
 - C) A steroid nucleus
 - D) A phenolic hydroxyl group
50. Which extraction method is best for thermolabile volatile oils?
- A) Soxhlet extraction
 - B) Steam distillation
 - C) Maceration
 - D) Decoction
51. A plant extract shows antioxidant activity in vitro. Which phytochemical class is most likely responsible?
- A) Terpenoids
 - B) Flavonoids
 - C) Alkaloids
 - D) Tannins
52. Which crude drug is a source of the cardioactive glycoside digoxin?
- A) *Rauwolfia serpentina*
 - B) *Digitalis purpurea*
 - C) *Cinchona officinalis*
 - D) *Atropa belladonna*
53. To isolate water-soluble polar compounds (e.g., saponins) from a plant, which solvent system would be most effective?
- A) Hexane
 - B) Chloroform
 - C) Ethanol-water (70:30)
 - D) Petroleum ether
54. Resins are classified as:
- A) Volatile oils
 - B) Solid amorphous products of high molecular weight
 - C) Glycosides
 - D) Polysaccharides

55. Which test confirms the presence of anthraquinone glycosides in senna leaves?

- A) Bornträger's test
- B) Keller-Killiani test
- C) Dragendorff's test
- D) Liebermann-Burchard test

56. Taxol (Paclitaxel), an anticancer drug, is derived from:

- A) Bark of *Taxus brevifolia*
- B) Leaves of *Catharanthus roseus*
- C) Roots of *Podophyllum peltatum*
- D) Seeds of *Vinca minor*

57. Which plant-derived compound acts as a cholinergic agonist?

- A) Atropine
- B) Pilocarpine
- C) Quinine
- D) Codeine

58. To standardize turmeric extract for curcumin content, which analytical technique is most suitable?

- A) Thin-layer chromatography (TLC)
- B) High-performance liquid chromatography (HPLC)
- C) Gas chromatography (GC)
- D) UV-Vis spectrophotometry

59. Gums are:

- A) Secondary metabolites soluble in organic solvents
- B) Polysaccharides that form viscous solutions in water
- C) Proteinaceous exudates from plants
- D) Essential oils with high volatility

60. Which part of the plant contains the highest concentration of vinca alkaloids (e.g., vinblastine)?

- A) Roots
- B) Leaves
- C) Flowers
- D) Seeds

61. A crude drug shows bitter taste, antimalarial activity, and fluorescence under UV light. It is likely:

- A) Cinchona bark
- B) Opium latex
- C) Belladonna root
- D) Senna pods

62. Which compound is responsible for the antiplatelet activity of garlic?

- A) Allicin
- B) Curcumin
- C) Capsaicin

D) Silymarin

63. To enhance the bioavailability of resveratrol (a polyphenol from grapes), which formulation strategy is best?

- A) Complexation with cyclodextrins
- B) Conversion to a glycoside
- C) Extraction using non-polar solvents
- D) Lyophilization

64. Tannins are used therapeutically for their:

- A) Antihypertensive effects
- B) Astringent and antimicrobial properties
- C) Analgesic effects
- D) Antiviral activity

65. Which chemical test detects terpenoids in a plant extract?

- A) Fehling's test
- B) Salkowski test
- C) Molisch's test
- D) Biuret test

66. Artemisinin, an antimalarial drug, is derived from:

- A) *Artemisia annua*
- B) *Cephaelis ipecacuanha*
- C) *Ephedra sinica*
- D) *Glycyrrhiza glabra*

67. Which plant toxin causes irreversible inhibition of acetylcholinesterase?

- A) Atropine
- B) Physostigmine
- C) Nicotine
- D) Strychnine

68. To differentiate between saponins and flavonoids in an extract, which test combination is optimal?

- A) Foam test + Shinoda test
- B) Liebermann-Burchard test + Bornträger's test
- C) Dragendorff's test + Molisch's test
- D) Biuret test + Fehling's test

69. Fixed oils differ from volatile oils in that they:

- A) Evaporate at room temperature
- B) Leave a permanent stain on paper
- C) Are primarily terpenes
- D) Are soluble in water

70. Which pharmacognostic parameter is used to assess purity of powdered ergot?

- A) Ash value
- B) Extractive value

- C) Foreign organic matter
- D) Moisture content

71. A plant extract shows adaptogenic activity. It likely contains:

- A) Ginsenosides
- B) Berberine
- C) Morphine
- D) Caffeine

72. Which marine-derived compound is used as an antiviral agent?

- A) Tetrodotoxin
- B) Ara-C (Cytarabine)
- C) Ziconotide
- D) Bryostatin

73. To preserve the stability of essential oils in a formulation, which additive is most effective?

- A) Sodium benzoate
- B) Ascorbic acid
- C) Propylene glycol
- D) Antioxidants (e.g., BHT)

76. Which drug inhibits bacterial cell wall synthesis by binding to penicillin-binding proteins (PBPs)?

- A) Ciprofloxacin
- B) Tetracycline
- C) Amoxicillin
- D) Erythromycin

77. A patient with hypertension and asthma should avoid which antihypertensive agent?

- A) Lisinopril
- B) Propranolol
- C) Nifedipine
- D) Hydrochlorothiazide

78. Which route of administration bypasses first-pass metabolism?

- A) Oral
- B) Intravenous
- C) Sublingual
- D) Rectal

79. Which drug is contraindicated in a patient taking warfarin due to a pharmacokinetic interaction?

- A) Omeprazole
- B) Rifampin
- C) Cimetidine
- D) Phenytoin

80. A patient with Parkinson's disease experiences "wearing-off" symptoms. Which drug prolongs levodopa's effect?

- A) Selegiline

- B) Benztropine
- C) Entacapone
- D) Pramipexole

81. Which antibiotic causes dose-dependent ototoxicity and nephrotoxicity?

- A) Gentamicin
- B) Azithromycin
- C) Doxycycline
- D) Clindamycin

82. Which drug reduces heparin's anticoagulant effect by binding to it?

- A) Vitamin K
- B) Protamine sulfate
- C) Fresh frozen plasma
- D) Phytonadione

83. A patient with myasthenia gravis develops cholinergic crisis. Which drug is responsible?

- A) Neostigmine
- B) Atropine
- C) Edrophonium
- D) Pralidoxime

84. Which statin requires dose adjustment in severe renal impairment?

- A) Atorvastatin
- B) Rosuvastatin
- C) Simvastatin
- D) Pravastatin

85. Which drug treats digoxin toxicity by binding extracellular digoxin?

- A) Activated charcoal
- B) Digoxin immune Fab
- C) Potassium chloride
- D) Lidocaine

86. A patient on long-term phenytoin develops megaloblastic anemia. Which supplement is needed?

- A) Vitamin B12
- B) Folic acid
- C) Iron
- D) Vitamin D

87. Which drug causes "red man syndrome" with rapid IV infusion?

- A) Vancomycin
- B) Ceftriaxone
- C) Amphotericin B
- D) Acyclovir

88. Which diuretic inhibits the Na⁺/K⁺/2Cl⁻ cotransporter in the loop of Henle?

- A) Furosemide

- B) Hydrochlorothiazide
- C) Spironolactone
- D) Acetazolamide

89. Which drug is a direct-acting vasodilator used in hypertensive emergencies?

- A) Nitroprusside
- B) Losartan
- C) Metoprolol
- D) Verapamil

90. Which SSRI is least likely to cause CYP450-mediated drug interactions?

- A) Fluoxetine
- B) Paroxetine
- C) Citalopram
- D) Sertraline

91. Which anticoagulant directly inhibits thrombin?

- A) Warfarin
- B) Dabigatran
- C) Enoxaparin
- D) Clopidogrel

92. Which drug treats opioid overdose by competitively binding μ -receptors?

- A) Flumazenil
- B) Naloxone
- C) Acetylcysteine
- D) Atropine

93. Which antineoplastic agent inhibits topoisomerase II?

- A) Vincristine
- B) Doxorubicin
- C) Paclitaxel
- D) Methotrexate

94. Which drug is contraindicated in acute angle-closure glaucoma?

- A) Timolol
- B) Atropine
- C) Pilocarpine
- D) Latanoprost

95. Which insulin has the fastest onset and shortest duration?

- A) Glargine
- B) Lispro
- C) NPH
- D) Detemir

96. Which antifungal binds ergosterol, forming membrane pores?

- A) Fluconazole
- B) Amphotericin B

- C) Terbinafine
- D) Caspofungin

97. Which drug treats metformin-associated lactic acidosis?

- A) Sodium bicarbonate
- B) Hemodialysis
- C) Insulin
- D) Acetylcysteine

98. Which drug causes “disulfiram-like reaction” with alcohol?

- A) Metronidazole
- B) Amoxicillin
- C) Doxycycline
- D) Ciprofloxacin

99. Which NSAID selectively inhibits COX-2?

- A) Ibuprofen
- B) Celecoxib
- C) Aspirin
- D) Naproxen

100. Which drug treats absence seizures by blocking T-type calcium channels?

- A) Phenytoin
- B) Ethosuximide
- C) Carbamazepine
- D) Valproate

101. Which principle ensures that pharmaceutical products are consistently produced and controlled according to predefined quality standards?

- A) GLP (Good Laboratory Practice)
- B) GMP (Good Manufacturing Practice)
- C) GCP (Good Clinical Practice)
- D) GDP (Good Distribution Practice)

102. In HPLC, which parameter refers to the time taken for an analyte to travel from the column inlet to the detector?

- A) Void time
- B) Retention time
- C) Run time
- D) Elution time

103. Which regulatory document outlines stability testing requirements for new drug substances?

- A) ICH Q1A(R2)
- B) ICH Q2(R1)
- C) ICH Q3C
- D) ICH Q8

104. A change in the manufacturing site of an approved drug product requires prior approval via which regulatory submission?

- A) PAS (Prior Approval Supplement)

- B) CBE-30 (Changes Being Effected in 30 Days)
- C) Annual Report
- D) ANDA (Abbreviated New Drug Application)

105. Which analytical method is most suitable for quantifying trace-level impurities in a drug product?

- A) Titration
- B) UV-Vis Spectroscopy
- C) HPLC with UV detection
- D) GC-MS

106. Which parameter in method validation evaluates the ability to detect small changes in analyte concentration?

- A) Accuracy
- B) Linearity
- C) Sensitivity
- D) Robustness

107. A pharmaceutical company identifies a batch of tablets with incorrect dissolution profiles. Which quality system addresses this issue?

- A) CAPA (Corrective and Preventive Action)
- B) SOP (Standard Operating Procedure)
- C) FMEA (Failure Mode and Effects Analysis)
- D) HACCP (Hazard Analysis Critical Control Point)

108. Which USP chapter outlines requirements for analytical instrument qualification?

- A) USP <1058>
- B) USP <711>
- C) USP <61>
- D) USP <795>

109. Which technique is used to determine the polymorphic form of a drug substance?

- A) IR Spectroscopy
- B) XRD (X-Ray Diffraction)
- C) HPLC
- D) Karl Fischer Titration

110. During process validation, which stage involves testing at the extremes of process parameters?

- A) Stage 1 – Process Design
- B) Stage 2 – Process Qualification
- C) Stage 3 – Continued Process Verification
- D) Challenge Testing

111. Which term describes the agreement between test results obtained by different laboratories?

- A) Precision
- B) Reproducibility
- C) Repeatability
- D) Ruggedness

112. A dissolution test failure occurs due to basket mesh clogging. Which component of the dissolution apparatus is faulty?

- A) Paddle
- B) Sinkers
- C) Vessel
- D) Basket

113. Which statistical tool is used to assess the correlation between two variables in stability studies?

- A) ANOVA
- B) Regression Analysis
- C) Control Charts
- D) t-Test

114. Which USP test ensures the absence of endotoxins in parenteral products?

- A) Sterility Test
- B) LAL (Limulus Amebocyte Lysate) Test
- C) Particulate Matter Test
- D) Pyrogen Test

115. A quality auditor identifies undocumented changes in a batch record. Which GMP violation has occurred?

- A) Data Integrity Breach
- B) Lack of Training
- C) Cross-Contamination
- D) Improper Storage

116. Which pharmacopeial monograph specifies testing for uniformity of dosage units?

- A) USP <905>
- B) USP <701>
- C) USP <621>
- D) USP <467>

117. Which analytical method is least suitable for determining water content in a hygroscopic drug?

- A) Karl Fischer Titration
- B) Loss on Drying
- C) TGA (Thermogravimetric Analysis)
- D) UV-Vis Spectroscopy

118. Which ICH guideline focuses on pharmaceutical quality systems?

- A) ICH Q10
- B) ICH Q9
- C) ICH Q7
- D) ICH Q6A

119. A stability study shows a drug product's pH decreases over time. Which degradation mechanism is likely?

- A) Oxidation

- B) Hydrolysis
- C) Photolysis
- D) Racemization

120. Which term refers to the process of ensuring an analytical method measures what it claims to?

- A) Specificity
- B) Accuracy
- C) Validation
- D) Qualification

121. Which quality attribute is tested using a friability tester?

- A) Tablet Hardness
- B) Tablet Disintegration
- C) Tablet Weight Variation
- D) Tablet Surface Erosion

122. A company wants to implement continuous manufacturing. Which ICH guideline supports this approach?

- A) ICH Q8(R2)
- B) ICH Q11
- C) ICH Q12
- D) ICH Q13

123. Which parameter is assessed during a forced degradation study?

- A) Precision
- B) Robustness
- C) Stability-Indicating Property
- D) Linearity

124. A drug product fails microbial limits testing. Which action is appropriate?

- A) Release the batch with a warning label
- B) Retest the batch
- C) Quarantine and investigate
- D) Reprocess the batch

75. Which strategy reduces polymorphism risk during drug formulation?

- A) Using surfactants
- B) Lyophilization
- C) Selecting a stable polymorph
- D) Increasing particle size