JELET Pharmacy Sample Paper-3

Duration: 120 Minutes **Maximum Marks: 100**

Instructions

- This paper contains **100** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+1 marks**.
- Each incorrect answer carries: **−0.25** marks.
- Unattempted questions carry **0** marks.
- Only one option is correct for each question.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. A formulation containing a drug with poor water solubility is stabilized by the addition of a specific cosolvent. During storage, a temperature drop causes a significant change in the dielectric constant of the solvent system. This is most likely to result in:

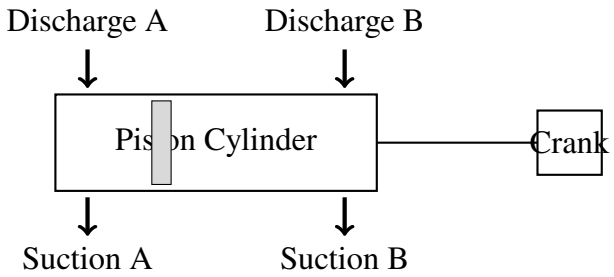
(A) An increase in the critical micelle concentration (CMC)

(B) The precipitation of the solute due to altered solubility parameters

(C) Rapid polymorphic transformation to a more stable crystalline form

(D) Complete chemical hydrolysis of the active ingredient

Q2. The following diagram represents a schematic layout of a double-acting reciprocating pump utilized in fluid transport during a unit operation:



During the forward stroke of the piston, which specific combination of valves operates to ensure continuous discharge?

(A) Suction A opens, Discharge B opens

(B) Suction B opens, Discharge A opens

(C) Suction A closes, Suction B closes

(D) Discharge A opens, Discharge B opens

Q3. In the limit test for Iron, citric acid is added primarily to prevent the precipitation of iron by ammonia. It achieves this specifically by forming a:

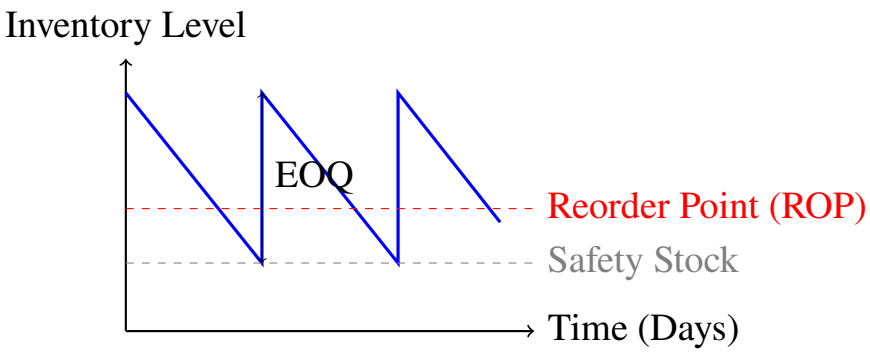
(A) Soluble purple complex with thioglycolic acid

(B) Soluble ferrous ammonium sulfate complex

(C) Soluble complex with iron, preventing its precipitation as ferrous hydroxide

(D) Insoluble chelate that remains suspended in the medium

Q4. An automatic tablet-punching machine is running at full capacity. The inventory manager observes that the reorder point needs adjustment based on usage patterns. Consider the inventory cycle graph shown below:



If the lead time for obtaining raw material doubles while the average daily consumption remains completely uniform, what modification happens to the Reorder Point (ROP)?

(A) ROP decreases by exactly half

(B) ROP increases, shifting upward relative to safety stock

(C) ROP remains completely unchanged

(D) ROP drops down to the baseline safety stock level

Q5. A prescription requires the compounding of an emulsion containing a volatile oil. The prescriber has noted a specific requirement for a primary emulsion ratio. Which of the following standard oil:water:gum ratios should be employed for a volatile oil using the dry gum method?

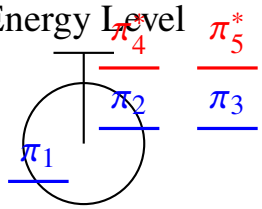
(A) 4 : 2 : 1

(B) 3 : 2 : 1

(C) 2 : 2 : 1

(D) 1 : 2 : 1

Q6. A pharmaceutical chemist is evaluating the structural properties of aromatic compounds during a drug synthesis pipeline. Consider the resonance and orbital energy structures depicted below:



According to Huckel's criteria for aromaticity, a planar, monocyclic, completely conjugated system must possess a specific number of π-electrons. Which of the following systems is classified as non-aromatic or anti-aromatic based on this electronic distribution rule?

(A) Cyclopropenyl cation

(B) Cyclobutadiene

(C) Cyclopentadienyl anion

(D) Benzene

Q7. During the formulation of a parenteral dosage form, a buffer system is utilized to maintain physiological pH. A solution contains a mixture of a weak acid ($pK_a = 4.76$) and its conjugate base. If the concentration of the conjugate base is exactly ten times greater than the concentration of the weak acid, what will be the resulting pH of this formulation?

(A) 3.76

(B) 4.76

(C) 5.76

(D) 6.76

Q8. A patient is administered a drug that acts as a potent agonist at the beta-1 (β_1) adrenergic receptors. Which of the following physiological changes will be directly observed upon activation of these specific receptors in the cardiovascular system?

(A) Profound peripheral vasodilation leading to postural hypotension

(B) Positive inotropic and positive chronotropic effect on the myocardium

(C) Slower atrioventricular conduction velocity

(D) Pronounced bronchoconstriction in the pulmonary airways

Q9. A crude drug specimen of Digitalis purpurea is being evaluated in a pharmacognosy laboratory. Microscopic examination of the powdered leaf sample reveals the prominent presence of which of the following characteristic anatomical structures?

(A) Anomocytic stomata and multicellular uniseriate trichomes with collapsed cells

(B) Paracytic stomata with abundant lignified sclereids

(C) Diacytic stomata with long, wavy non-glandular trichomes

(D) Actinocytic stomata with glandular sessile peltate trichomes

Q10. A biochemical diagnostic assay is executed to identify abnormalities in carbohydrate metabolism. The reaction sequence involves the enzymatic oxidation of glucose at carbon-1 to form a lactone, followed by hydrolysis. Which of the following metabolic pathways is initiated by this highly regulated first committed step?

(A) Glycolysis (Embden-Meyerhof pathway)

(B) Pentose Phosphate Pathway (Hexose Monophosphate Shunt)

(C) Glycogenolysis

(D) Gluconeogenesis

Q11. A community pharmacist is reviewing a therapeutic regimen for an elderly patient who has been prescribed an over-the-counter (OTC) NSAID along with a prescription anticoagulant. The primary role of the pharmacist in this scenario is to provide counseling on which critical safety concern?

(A) Increased risk of acute urinary retention

(B) Severe gastrointestinal ulceration and enhanced bleeding risk

(C) Acute development of systemic lactic acidosis

(D) Rapid onset of profound postural hypotension

Q12. According to the provisions of the Drugs and Cosmetics Act 1940 and Rules 1945, the requirements, list of minimum equipment, and operational space required for running a pharmacy effectively are specified under which schedule?

(A) Schedule M

(B) Schedule N

(C) Schedule O

(D) Schedule P

Q13. In hospital pharmacy management, the procurement of items with highly fluctuating demand requires a specialized classification. Items that are absolutely essential and without which hospital operations would immediately collapse are categorized under which class of the VED analysis?

(A) Vital items

(B) Essential items

(C) Desirable items

(D) Valuable items

Q14. A clinical pharmacist notes that a patient has been admitted with a suspected overdose of a weak acid drug like phenobarbital. To accelerate the renal clearance of this specific toxicant, which therapeutic intervention is most appropriate?

(A) Acidification of urine using ammonium chloride

(B) Alkalinization of urine using sodium bicarbonate

(C) Administration of a large dose of activated charcoal only

(D) Subcutaneous injection of a loop diuretic without fluid replacement

Q15. The World Health Organization (WHO) has recommended a specific standard formulation for Oral Rehydration Salts (ORS) to manage dehydration due to diarrhea. What is the precise concentration of anhydrous glucose required in the current low-osmolarity ORS formulation per liter of water?

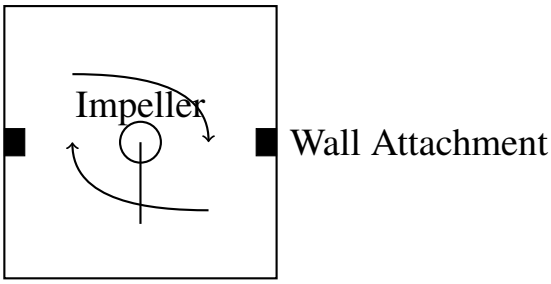
(A) 13.5 g/L

(B) 20.0 g/L

(C) 2.9 g/L

(D) 3.5 g/L

Q16. During a liquid mixing operation in a pharmaceutical manufacturing unit, the flow pattern needs to be modified to eliminate a central vortex that reduces mixing efficiency. The following cross-sectional diagram illustrates a mixing vessel:



What are the internal structural modifications represented along the vessel walls that prevent vortex formation?

(A) Propeller blades

(B) Baffles

(C) Draft tubes

(D) Stator rings

Q17. A prescription calls for 120 grams of a 5% w/w salicylic acid ointment. The pharmacy has stocks of a 10% w/w salicylic acid ointment and a pure petrolatum base. How much of the 10% ointment and petrolatum base must be blended together to fulfill this request?

(A) 30 g of 10% ointment and 90 g of petrolatum base

(B) 60 g of 10% ointment and 60 g of petrolatum base

(C) 40 g of 10% ointment and 80 g of petrolatum base

(D) 80 g of 10% ointment and 40 g of petrolatum base

Q18. A patient is prescribed a sublingual nitroglycerin tablet for the acute management of angina pectoris. The choice of this route of administration is primarily dictated by which physiological rationale?

(A) It maximizes the rate of drug excretion via the kidneys

(B) It completely avoids first-pass hepatic metabolism, ensuring rapid systemic absorption

(C) It permits a massive dose of the drug to be administered slowly

(D) It utilizes active transport carriers present exclusively in the sublingual mucosa

Q19. Glass containers are widely utilized as primary packaging materials for sterile and non-sterile pharmaceutical products. Type I glass is highly preferred for parenterals due to its superior chemical resistance. Type I glass is chemically classified as:

(A) Highly resistant borosilicate glass

(B) Treated soda-lime glass

(C) Regular soda-lime glass

(D) General-purpose non-parenteral glass

Q20. A physical incompatibility arises when two or more substances are mixed together, resulting in the liquefaction of the solid mixture at room temperature. This phenomenon is known as the formation of a:

(A) Eutectic mixture

(B) Hygroscopic mass

(C) Deliquescent crystalline network

(D) Efflorescent hydrate granules

Q21. Alum ($AlK(SO_4)_2 \cdot 12H_2O$) is an inorganic pharmaceutical compound that is widely employed in topical formulations. What is the primary therapeutic or pharmaceutical application of Alum?

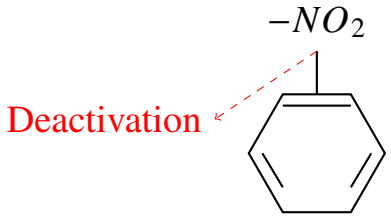
(A) Systemic alkalizer

(B) Topical astringent

(C) Gastrointestinal protective agent

(D) Antimicrobial preservative

Q22. In the design of multi-substituted medicinal agents, aromatic rings undergo electrophilic aromatic substitution reactions. Consider the orientation effect of a functional group attached to a benzene nucleus:



Which of the following structural groups acts as a strong deactivating group and directs the incoming electrophile strictly to the meta-position?

(A) $-OCH_3$

(B) $-NHCOCH_3$

(C) $-C \equiv N$

(D) $-CH_3$

Q23. The stability of an ester-based drug formulation is monitored over time. It is determined that the degradation reaction rate depends directly on the concentration of only one reactant species, demonstrating a clear first-order kinetic profile. What is the correct mathematical expression for the half-life ($t_{1/2}$) of a first-order degradation reaction?

(A) $t_{1/2} = \frac{0.693}{k}$

(B) $t_{1/2} = \frac{A_0}{2k}$

(C) $t_{1/2} = \frac{1}{k \cdot A_0}$

(D) $t_{1/2} = \frac{2.303}{k}$

Q24. A patient suffering from parkinsonism is initiated on a combination therapy containing levodopa and carbidopa. What is the mechanistic purpose of adding carbidopa to this therapeutic regimen?

(A) It acts as a central dopamine receptor antagonist

(B) It inhibits peripheral dopa decarboxylase, increasing the fraction of levodopa crossing the blood-brain barrier

(C) It accelerates the metabolic clearance of dopamine from the systemic circulation

(D) It prevents the auto-oxidation of levodopa within the gastric lumen

Q25. A clinical pharmacological study is investigating a new antihypertensive drug that acts by selectively blocking the actions of angiotensin II at its primary receptor subtype. This drug class is known as:

(A) ACE Inhibitors

(B) Calcium Channel Blockers

(C) Angiotensin Receptor Blockers (ARBs)

(D) Direct Renin Inhibitors

Q26. A group of broad-spectrum antibiotics exerts their bactericidal action by binding irreversibly to the 30S ribosomal subunit of susceptible microorganisms, inducing

a misreading of the genetic code. This mechanism is characteristic of which drug family?

(A) Macrolides

(B) Penicillins

(C) Aminoglycosides

(D) Tetracyclines

Q27. During a histology laboratory session, a tissue biopsy specimen is examined under a high-power microscope. The specimen reveals a single layer of flattened, scale-like cells with centrally located, oval nuclei. This tissue is identified as:

(A) Simple squamous epithelium

(B) Stratified cuboidal epithelium

(C) Pseudostratified columnar epithelium

(D) Transitional epithelium

Q28. The functional anatomical unit of the skeletal system consists of concentric rings of bone matrix called lamellae, surrounding a central canal that carries blood vessels and nerves. This entire structural unit is known as an:

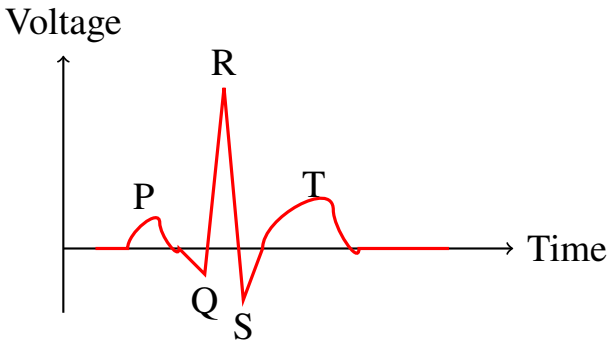
(A) Osteoblast

(B) Osteon (Haversian system)

(C) Trabeculae network

(D) Canaliculus

Q29. A standard electrocardiogram (ECG) trace maps the electrical activity of the cardiac cycle. The electrical vector propagation through the ventricles is monitored continuously. Consider the classic ECG waveform tracing below:



Which segment or wave in this tracing directly corresponds to the physiological event of ventricular depolarization?

(A) P wave

(B) QRS complex

(C) T wave

(D) PR interval

Q30. A physiological analysis of pulmonary function measures the volume of air inspired or expired during a normal, quiet respiratory cycle. This specific volume is termed:

(A) Residual Volume (RV)

(B) Vital Capacity (VC)

(C) Tidal Volume (TV)

(D) Inspiratory Reserve Volume (IRV)

Q31. The gastric mucosa contains specialized secretory cells that are responsible for maintaining an intensely acidic environment within the stomach lumen to facilitate protein digestion. Which cells secrete hydrochloric acid (HCl) and intrinsic factor?

(A) Peptic (Chief) cells

(B) Parietal (Oxyntic) cells

(C) Mucus neck cells

(D) G-cells

Q32. A clinical case study describes a patient who exhibits an inability to coordinate complex voluntary motor patterns, resulting in an unsteady, staggering gait and loss of balance. A structural lesion is suspected in which specific anatomical region of the brain?

(A) Hypothalamus

(B) Cerebrum

(C) Cerebellum

(D) Medulla oblongata

Q33. A crude drug specimen is classified systematically based on its morphological features. Which of the following drugs is organized into the category of "organized crude drugs" due to the presence of well-defined cellular structures?

(A) Acacia gum

(B) Clove buds

(C) Agar-agar flakes

(D) Bee wax

Q34. The morphological classification of crude drugs distinguishes between those that possess regular cellular architectures and those obtained by physical processing. Which of the following options represents an unorganized crude drug consisting of a dried latex?

(A) Opium

(B) Senna leaflets

(C) Cinnamon bark

(D) Nux vomica seeds

Q35. A quality control chemist is conducting a quantitative analysis of a solution containing an amino acid. The molecule contains an amino group and a carboxylic acid group attached to the same alpha-carbon. Which of the following analytical reagents produces a deep purple/violet complex when heated with an amino acid?

(A) Biuret reagent

(B) Ninhydrin reagent

(C) Molisch reagent

(D) Benedict's solution

Q36. A clinical laboratory receives a blood sample from a patient suspected of having a recent acute myocardial infarction. The laboratory panel measures specific serum enzyme activities over a time course. Which of the following enzymes shows a sharp, highly specific diagnostic elevation within the first few hours following myocardial cell necrosis?

(A) Alanine aminotransferase (ALT)

(B) Creatine kinase-MB isoenzyme (CK-MB)

(C) Acid phosphatase (ACP)

(D) Amylase

Q37. A national public health campaign aims to curb the transmission of a highly infectious vector-borne disease in an urban region. If the primary objective is the eradication of breeding grounds for the *Anopheles* mosquito, which of the following public health categories does this intervention primarily target?

(A) Secondary chemoprophylaxis

(B) Environmental sanitation and vector control

(C) Tertiary rehabilitation

(D) Occupational health hazard mitigation

Q38. Under the guidelines of a National Health Program for tuberculosis control in India, the primary therapeutic strategy relies on a specialized short-course chemotherapy regimen that is directly observed by healthcare workers. This program is internationally known as:

(A) NACP

(B) DOTS (RNTCP/NTEP)

(C) NVBDCP

(D) NMHP

Q39. A formal document from a registered medical practitioner contains a section containing instructions to the pharmacist regarding the specific types and quantities of dosage forms to be prepared. This specific part of the prescription layout is known as the:

(A) Superscription

(B) Inscription

(C) Subscription

(D) Signatura

Q40. According to the provisions of the Pharmacy Act 1948, the central governing council is required to be reconstituted after a defined period of time to maintain regulatory oversight. What is the standard duration of the term of office for elected and nominated members of the Pharmacy Council of India (PCI)?

(A) 3 years

(B) 5 years

(C) 7 years

(D) 10 years

Q41. A liquid oral dosage form must be formulated with a suitable vehicle that provides optimal stability and palatability for pediatric use. Which of the following liquids is most commonly preferred as a sweet, viscous vehicle to mask the bitter taste of dissolved active drug substances?

(A) Aromatic water

(B) Simple Syrup IP

(C) Dilute alcohol

(D) Fixed vegetable oil

Q42. During a routine manufacturing audit of a sterile processing facility, a thermal sterilization cycle is being validated. The validation engineer must determine the time required in minutes to reduce the microbial population by 90% at a specific temperature. This parameter is defined as the:

(A) Z-value

(B) D-value (Decimal reduction time)

(C) F-value

(D) Q10 value

Q43. A quality control technician is preparing to perform the official limit test for Arsenic using a specialized glass apparatus. The chemical principle of this test depends on the conversion of all arsenic impurities into an unstable gas that reacts with a reagent-treated paper strip to form a yellow stain. What is this standard apparatus called?

(A) Nessler cylinder assembly

(B) Gutzeit apparatus

(C) Kjeldahl distillation flask

(D) Soxhlet extractor

Q44. A synthetic medicinal chemistry pathway involves an organic reaction that proceeds via a bimolecular nucleophilic substitution (S_N2) mechanism. Which of the following statements correctly describes the stereochemical outcome and kinetic profile of a classic S_N2 reaction?

(A) Complete racemization with a first-order rate law

(B) Complete inversion of configuration (Walden inversion) with a second-order rate law

(C) Partial retention of configuration with a zero-order rate law

(D) Structural carbocation rearrangement with a multi-step kinetic sequence

Q45. A patient presents to the emergency department displaying signs of profound toxic exposure after accidental ingestion of an organophosphate insecticide. The

mechanism of toxicity involves the irreversible inhibition of acetylcholinesterase, leading to an acute cholinergic crisis. Which antidote must be administered immediately to reactivate the acetylcholinesterase enzyme?

(A) Atropine sulfate

(B) Pralidoxime (2-PAM)

(C) Physostigmine

(D) Naloxone

Q46. A pharmacological research group is investigating a therapeutic agent that acts as a potent inhibitor of the enzyme cyclooxygenase-2 (COX-2) while sparing cyclooxygenase-1 (COX-1). This selectivity profile is designed to minimize which specific adverse effect associated with traditional NSAIDs?

(A) Nephrotoxicity and interstitial nephritis

(B) Gastrointestinal mucosal ulceration and bleeding

(C) Hepatotoxic centrilobular necrosis

(D) Pulmonary bronchospasm and anaphylaxis

Q47. A histological section of the endocrine pancreas is evaluated using immunohistochemical staining. The pancreatic islets contain multiple distinct cell populations that secrete hormones directly into the capillary network. Which cell type is responsible for the synthesis and secretion of glucagon?

(A) Alpha (α) cells

(B) Beta (β) cells

(C) Delta (δ) cells

(D) F cells (PP cells)

Q48. A patient undergoes an endocrinological evaluation due to chronic fatigue and a noticeable swelling in the anterior neck region. The laboratory report reveals a deficiency in the dietary intake of iodine, leading to impaired synthesis of thyroxine (T_4) and triiodothyronine (T_3). This deficiency triggers an excessive feedback secretion of which hormone from the anterior pituitary?

(A) Adrenocorticotropic hormone (ACTH)

(B) Growth Hormone (GH)

(C) Thyroid-stimulating hormone (TSH)

(D) Luteinizing hormone (LH)

Q49. A commercial shipment of a premium crude drug sample is suspected of being altered with an inferior substitute material that visually mimics the genuine article but lacks therapeutic efficacy. This intentional replacement of a genuine drug with a lower-grade material is termed:

(A) Sophistication

(B) Substitution

(C) Adulteration

(D) Deterioration

Q50. A structural biochemistry lecture focuses on the three-dimensional architecture of globular proteins. The structural conformation characterized by local folding patterns such as alpha-helices and beta-pleated sheets, stabilized predominantly by hydrogen bonds along the polypeptide backbone, is classified as the:

(A) Primary structure

(B) Secondary structure

(C) Tertiary structure

(D) Quaternary structure

Q51. A hospital pharmacy receives a specialized order for a total parenteral nutrition (TPN) admixture that must remain completely sterile and free of particulate matter. The compounding process must be performed within an environment equipped with high-efficiency particulate air (HEPA) filters. What is the minimum air filtration efficiency mandated for standard HEPA filters used in sterile compounding areas?

(A) 95.54% efficiency for particles $\geq 0.5\ \mu$m

(B) 99.97% efficiency for particles $\geq 0.3\ \mu$m

(C) 85.00% efficiency for particles $\geq 1.0\ \mu$m

(D) 90.25% efficiency for particles $\geq 0.1\ \mu$m

Q52. The Narcotic Drugs and Psychotropic Substances (NDPS) Act 1985 sets strict statutory provisions to regulate the cultivation, manufacture, possession, and sale of habit-forming substances. Under this act, any person who grows or cultivates the opium poppy without a valid government license is liable for severe criminal penalties. The botanical source of opium is officially known as:

(A) Cannabis sativa

(B) Papaver somniferum

(C) Erythroxylum coca

(D) Atropa belladonna

Q53. A community pharmacy needs to optimize its internal process for patient counseling regarding chronic medication adherence. To maximize understanding, the layout of the counseling session should follow a structured communication sequence. Which of the following methods represents the most effective strategy to verify that a patient fully understands their dosage instructions?

(A) Asking the patient "Do you have any questions about this medicine?"

(B) Requesting the patient to repeat back the key instructions in their own words (Teach-back method)

(C) Providing a long, highly detailed medical brochure with technical jargon

(D) Pointing to the text written on the prescription label without speaking

Q54. A clinical laboratory receives a urine sample from a pregnant patient for a routine wellness panel. The analysis reveals the presence of abnormal quantities of a specific chemical substance that points to an incomplete oxidation of fatty acids, often secondary to prolonged fasting or uncontrolled gestational diabetes. This clinical finding is known as:

(A) Glucosuria

(B) Albuminuria

(C) Ketonuria

(D) Hematuria

Q55. In the cultivation and collection of crude drugs, environmental factors play an indispensable role in determining the final yield of secondary metabolites. For which of the following medicinal plants is the collection of the active part specifically performed by making precise incisions on the unripe capsules during dry, sunny weather?

(A) Cinchona succirubra

(B) Papaver somniferum

(C) Digitalis lanata

(D) Senna alexandrina

Q56. A patient with an advanced stage of chronic kidney disease presents with a lab report indicating a significant drop in the systemic production of a specific hormone synthesized by the juxtaglomerular cells of the kidneys. This deficiency leads to severe normocytic anemia. Which hormone is impaired?

(A) Renin

(B) Erythropoietin

(C) Calcitriol

(D) Aldosterone

Q57. A pharmacological trial evaluates a medication that acts as a highly selective antagonist at central dopamine D_2 receptors in the mesolimbic pathway. This therapeutic mechanism profile is typical for which drug classification?

(A) Antianxiety agents (Anxiolytics)

(B) Antipsychotic agents (Neuroleptics)

(C) Antidepressant agents

(D) Anticonvulsant agents

Q58. A physical stability study is conducted on a topical suspension formulation. The formulator notes that the particles settle slowly over time but form a hard, compact sediment at the bottom of the container that resists redispersion upon shaking. This phenomenon is technically described as:

(A) Flocculation

(B) Caking

(C) Coalescence

(D) Phase inversion

Q59. A standard manufacturing calculation must be performed to determine the weight of sodium chloride needed to make 500 mL of a 1% w/v solution of a drug isotonic with human blood plasma. This procedure relies on using freezing point depression values or sodium chloride equivalent values (E-values). The freezing point depression (ΔT_f) of human blood plasma and tears is universally taken as:

(A) $-0.52°C$

(B) $0.00°C$

(C) $-0.12°C$

(D) $-1.86°C$

Q60. A standard chemical limit test for Sulfates is performed in a quality control laboratory to check for controlled impurities in an inorganic pharmaceutical sample. The test relies on a precipitation reaction where sulfate ions react with barium chloride in an acidic medium to form a uniform turbidity. What acid is added to provide the required acidic environment for this test?

(A) Hydrochloric acid

(B) Dilute Hydrochloric acid

(C) Dilute Hydrochloric acid or Acetic acid depending on sample matrix, but specifically Hydrochloric acid to prevent precipitation of other barium salts

(D) Sulfuric acid

Q61. In the industrial manufacturing of tablets, several unit operations are connected sequentially. The operational phase where dry granules are compressed inside a die cavity by upper and lower punches can exhibit specific structural defects. If the top or bottom surface of a tablet separates horizontally into distinct layers during or after compression, this defect is called:

(A) Mottling

(B) Capping or Lamination

(C) Picking

(D) Sticking

Q62. A medicinal chemist modifies the structure of a lead molecule to optimize its pharmacodynamic profile. The molecule contains a carboxylic acid functional group ($R - COOH$) that is converted into an ester link ($R - COOR'$). This structural modification usually enhances the drug's parameters by:

(A) Increasing water solubility for rapid intravenous administration

(B) Increasing lipophilicity, thereby enhancing passive membrane permeability

(C) Preventing any metabolic degradation by hepatic enzymes

(D) Forcing the drug to bind exclusively to extracellular plasma proteins

Q63. A critical pharmacological parameter describes the relationship between the minimum effective therapeutic dose of a drug and its minimum toxic dose. This safety index is calculated as the ratio of TD_{50} to ED_{50} and is known as the:

(A) Therapeutic Window

(B) Therapeutic Index

(C) Intrinsic Activity Profile

(D) Biocompatibility Constant

Q64. During an anatomical study of the human respiratory system, the structural pathways are traced from the trachea down to the site of gas exchange. Which of the following anatomical structures represents the exact boundary where the conducting zone ends and the respiratory zone officially begins?

(A) Terminal bronchioles

(B) Respiratory bronchioles

(C) Alveolar ducts

(D) Primary main bronchi

Q65. A systematic evaluation of crude drugs uses quantitative microscopy to establish identity parameters that cannot be resolved by visual inspection alone. The average number of stomata present per square millimeter of the leaf epidermis is defined as the:

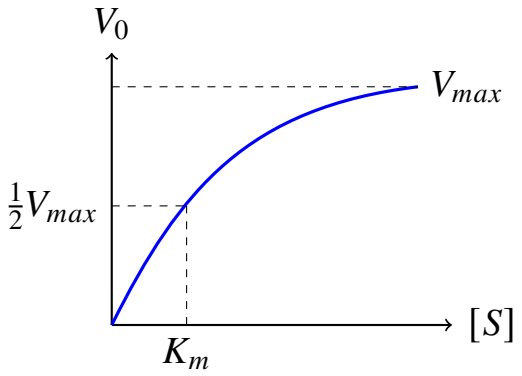
(A) Stomatal Index

(B) Stomatal Number

(C) Vein-islet Number

(D) Palisade Ratio

Q66. An enzyme kinetics experiment measures the rate of an uninhibited reaction at varying substrate concentrations. Consider the classic Michaelis-Menten velocity plot shown below:



If a competitive inhibitor is added to this enzyme system, how will the kinetic parameters change on this plot?

(A) V_{max} decreases, K_m remains completely unchanged

(B) V_{max} remains unchanged, K_m increases

(C) Both V_{max} and K_m decrease proportionally

(D) V_{max} increases, K_m decreases

Q67. A family welfare program focuses on educating reproductive-age couples about temporary and permanent contraceptive methodologies. Which of the following options is classified as a highly reliable surgical method that provides permanent contraception in males by interrupting the anatomical continuity of the vas deferens?

(A) Tubectomy

(B) Vasectomy

(C) Intrauterine device (IUD) insertion

(D) Subcutaneous hormonal implant

Q68. A pharmaceutical procurement officer needs to track the financial efficiency of capital tied up in inventory over a one-year operating horizon. The specific ratio calculated by dividing the total cost of goods sold by the average inventory value held during the period is known as the:

(A) Lead time index

(B) Inventory turnover ratio

(C) Safety stock margin

(D) Carrying cost percentage

Q69. A clinical evaluation is ordered for a patient presenting with symptoms of acute structural damage to the human reproductive system. A biopsy confirms a lesion in the interstitial cells of Leydig located within the testes. This pathological defect will result in a drop in the systemic levels of which hormone?

(A) Luteinizing hormone (LH)

(B) Follicle-stimulating hormone (FSH)

(C) Testosterone

(D) Progesterone

Q70. During an advanced pharmaceutical analysis of structural properties of drugs, the optical rotation of an enantiomeric pair is analyzed. An organic molecule

possesses a central tetrahedral carbon atom bonded to four entirely distinct functional groups. This specific carbon atom is termed a:

(A) Meso center

(B) Chiral center (Asymmetric carbon)

(C) Anomeric carbon

(D) Allylic position

Q71. A clinical toxicological report describes a child who ingested a lethal dose of a household rodenticide containing warfarin. The mechanism of toxicity involves the profound depletion of active clotting factors, leading to generalized internal hemorrhage. Which therapeutic agent is the specific pharmacological antidote to reverse warfarin toxicity?

(A) Protamine sulfate

(B) Vitamin K1 (Phytomenadione)

(C) Heparin calcium

(D) Deferoxamine mesylate

Q72. A clinical diagnostic test is conducted by treating a patient's serum sample with a solution containing copper sulfate in an alkaline medium. The appearance of a distinct violet-purple coloration indicates the presence of peptide bonds in the sample. This classic colorimetric test is known as the:

(A) Molisch test

(B) Biuret test

(C) Ninhydrin test

(D) Seliwanoff test

Q73. A public health worker is reviewing the primary strategic targets of a current National Health Program aimed at completely eliminating a parasitic disease characterized by massive lymphatic blockages and subsequent lower limb swelling (elephantiasis). This target disease is:

(A) Visceral leishmaniasis (Kala-azar)

(B) Lymphatic filariasis

(C) Trachoma

(D) Leprosy

Q74. During the compounding of an aqueous solution prescription, a physical incompatibility occurs because a prescribed solute exceeds its maximum solubility limit in the vehicle at that temperature. The pharmacist can resolve this issue without altering the therapeutic activity by:

(A) Adding a strong chemical oxidizing agent

(B) Substituting the vehicle with a non-polar solvent like benzene

(C) Utilizing a permissible cosolvent or adjusting the solvent volume within safe limits

(D) Boiling the solution until the solute undergoes thermal degradation

Q75. A structural biochemistry assignment involves evaluating lipid storage diseases. A patient is diagnosed with a genetic defect that impairs the metabolic breakdown of sphingolipids, leading to severe accumulation within central nervous system tissues. Sphingolipids are structurally distinct from glycerophospholipids because they contain which core amino alcohol backbone instead of glycerol?

(A) Choline

(B) Sphingosine

(C) Ethanolamine

(D) Inositol

Q76. A hospital pharmacist is reviewing the operational structure of the Pharmacy and Therapeutics Committee (PTC). Which of the following options correctly defines the primary objective and composition of the PTC within a modern healthcare institution?

(A) It is an administrative body of nurses that manages hospital payroll

(B) It is an advisory group of physicians, pharmacists, and other health professionals that ensures safe and effective drug use in the hospital

(C) It is a commercial group of drug wholesalers that fixes retail medicine prices

(D) It is a regulatory branch of the state government that conducts pharmacy inspections

Q77. According to the Drug and Cosmetics Rules 1945, certain prescription drugs must carry a prominent warning label stating: "To be sold by retail on the prescription of a Registered Medical Practitioner only." These specific drugs are classified under which schedule?

(A) Schedule H

(B) Schedule X

(C) Schedule G

(D) Schedule Y

Q78. During a structural study of human cardiovascular physiology, the flow of deoxygenated blood returning from the systemic circulation into the chambers of the heart is traced. Which specific valve prevents the backflow of blood from the right ventricle into the right atrium during ventricular systole?

(A) Tricuspid valve

(B) Bicuspid (Mitral) valve

(C) Aortic semilunar valve

(D) Pulmonary semilunar valve

Q79. A crude drug sample of Cinchona bark needs to be evaluated for its specific alkaloidal composition. Which chemical color reaction is characteristically used to identify the presence of cinchona alkaloids, producing a distinct emerald green color upon treatment with bromine water and dilute ammonia?

(A) Thalleioquin test

(B) Murexide test

(C) Vitali-Morin test

(D) Borntrager test

Q80. A public health study evaluates the patterns of disease distribution across global populations. An infectious disease that is constantly present at a baseline, predictable level within a specific geographic area or population group is epidemiologically defined as:

(A) Epidemic

(B) Pandemic

(C) Endemic

(D) Sporadic

Q81. A pharmaceutical manufacturer requires a dynamic drying technology to rapidly dry heat-sensitive active pharmaceutical ingredients (APIs) into free-flowing spherical granules. The process involves atomizing a liquid feed into a stream of hot gas. What drying unit operation is described?

(A) Tray drying

(B) Fluidized bed drying

(C) Spray drying

(D) Vacuum oven drying

Q82. In clinical pharmacology, a drug that binds tightly to a receptor site but produces a submaximal biological response compared to a full agonist, even at complete receptor occupancy, is classified as a:

(A) Inverse agonist

(B) Competitive antagonist

(C) Partial agonist

(D) Non-competitive antagonist

Q83. A structural study of the human digestive system focuses on the microscopic anatomy of the small intestinal mucosa. The surface area available for nutrient

absorption is increased by structural finger-like projections of the mucosa, which are covered by an epithelial layer containing microvilli. These structural projections are known as:

(A) Plicae circulares

(B) Villi

(C) Rugae networks

(D) Haustra folds

Q84. A formal prescription contains the Latin abbreviation "t.i.d." written within the directional signatura section. What translation should the pharmacist write on the dispensing label for the patient?

(A) Once daily

(B) Twice daily

(C) Three times daily

(D) Four times daily

Q85. During a laboratory evaluation of herbal drugs, a student needs to differentiate between different types of volatile oils based on their primary chemical constituents. Peppermint oil, derived from *Mentha piperita*, is widely used in pharmaceutical preparations and contains which major monoterpene alcohol component?

(A) Eugenol

(B) Menthol

(C) Cineole

(D) Carvone

Q86. A hospital pharmacy department is redesigning its drug distribution system to reduce medication errors and lower operational costs. A system where drugs are dispensed from the central pharmacy in single-dose, labeled packages ready for administration to a specific patient is known as the:

(A) Floor stock system

(B) Individual prescription order system

(C) Unit dose dispensing system

(D) Saturation banking model

Q87. A patient presents to a health education clinic requesting guidance on lifestyle modifications to prevent long-term complications associated with severe chronic hypertension. The educator emphasizes a dietary pattern rich in potassium and calcium but restricted in sodium. This health education intervention is an example of:

(A) Primary prevention

(B) Secondary prevention

(C) Tertiary prevention

(D) Primordial prevention

Q88. An analytical calculation must be performed to determine the weight of a solute required to prepare 2 liters of a 0.5 M aqueous solution of sodium hydroxide ($NaOH$, Molecular Weight = 40). What is the total mass of $NaOH$ needed?

(A) 20 grams

(B) 40 grams

(C) 80 grams

(D) 160 grams

Q89. In the official limit test for Iron, thioglycolic acid is added to the sample mixture in the presence of ammonia. What is the specific chemical function of thioglycolic acid in this test?

(A) It precipitates iron as a white insoluble matrix

(B) It reduces ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}) and forms a soluble purple complex

(C) It acts as an internal pH indicator that changes color at neutrality

(D) It neutralizes any heavy metal contamination present in the water

Q90. A patient arrives at an emergency department with a severe clinical presentation of an acute drug overdose. The medical team determines that the toxic agent is an alkaline substance (weak base) such as an amphetamine. To accelerate renal clearance by minimizing tubular reabsorption, which physiological modification should be made to the patient's urine?

(A) Alkalinization of urine using sodium bicarbonate

(B) Acidification of urine using ammonium chloride

(C) Maintain urine pH at a neutral value of 7.0

(D) Administration of an antacid containing magnesium hydroxide

Q91. During a formulation stability study, a liquid drug preparation undergoes a visible color change due to chemical auto-oxidation. Which of the following functional additives should be included in the formulation matrix to serve as an effective water-soluble antioxidant?

(A) Tocopherol (Vitamin E)

(B) Sodium metabisulfite

(C) Butylated hydroxytoluene (BHT)

(D) Ascorbyl palmitate

Q92. A clinical case study describes a patient diagnosed with a profound hormonal imbalance caused by an autoimmune destruction of the adrenal cortex. This pathology results in a severe deficiency of aldosterone and cortisol. What is this clinical endocrine disorder called?

(A) Cushing's syndrome

(B) Addison's disease

(C) Graves' disease

(D) Acromegaly

Q93. A pharmacognostic evaluation of an unknown powdered drug sample involves performing a chemical test for anthracenone derivatives. The sample is heated with dilute hydrochloric acid and ferric chloride solution, extracted with an organic solvent, and shaken with dilute ammonia. The appearance of a rose-pink color in the ammoniacal layer confirms the presence of anthraquinone glycosides. What is this standard test called?

(A) Modified Borntrager's test

(B) Legal's test

(C) Raymond's test

(D) Killer-Killiani test

Q94. A research scientist is analyzing the structural components of cell membranes. The fundamental structural framework of the plasma membrane consists of an amphipathic lipid bilayer. Which of the following options represents the primary structural lipid molecule that spontaneously forms this dynamic bilayer matrix?

(A) Triacylglycerol

(B) Phospholipid

(C) Cholesteryl ester

(D) Free fatty acid chains

Q95. During a laboratory session focusing on clinical diagnostic biochemistry, a patient's urine specimen is tested using Benedict's qualitative reagent. After heating the mixture in a water bath, a brick-red precipitate forms. This positive diagnostic finding indicates the presence of:

(A) Non-reducing disaccharides like sucrose

(B) Reducing sugars like glucose

(C) Ketone bodies like acetoacetate

(D) Conjugated proteins like albumin

Q96. A community health survey monitors the implementation of maternal and child health interventions within a rural block. The specific program that integrates

family welfare planning with essential immunization services across India is structured under which national framework?

(A) National Urban Health Mission (NUHM)

(B) Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCH+A)

(C) Revised National Tuberculosis Control Program (RNTCP)

(D) National Mental Health Program (NMHP)

Q97. According to the Drug and Cosmetics Act 1940, any drug that consists in whole or in part of any filthy, putrid, or decomposed substance, or that has been prepared under insanitary conditions whereby it may have been contaminated with filth, is legally classified as a:

(A) Misbranded drug

(B) Spurious drug

(C) Adulterated drug

(D) Prohibited drug

Q98. A hospital pharmacist is optimizing the purchasing and procurement cycle for high-value specialized medications. The system that coordinates procurement to ensure that materials arrive at the pharmacy storage unit exactly when they are needed for patient administration, thereby reducing storage costs to zero, is called the:

(A) ABC inventory system

(B) Just-In-Time (JIT) procurement system

(C) Max-Min inventory system

(D) Perpetual log system

Q99. In clinical therapeutics, a patient receiving long-term treatment with high doses of a potent loop diuretic must be monitored closely for an electrolyte imbalance that can cause cardiac arrhythmias. This characteristic adverse effect is:

(A) Hyperkalemia

(B) Hypokalemia

(C) Hypercalcemia

(D) Hypernatremia

Q100. A community health center is running an education campaign on public safety hazards. The environmental specialist explains that chronic exposure to low levels of lead from industrial paint chips can cause severe neurotoxicity and developmental delays in children. This type of environmental poisoning is clinically classified under:

(A) Acute industrial toxicology

(B) Chronic heavy metal toxicology (Plumbism)

(C) Corrosive pesticide poisoning

(D) Cyanide toxicosis

Detailed Solutions

Q1.

Solution

Concept: The solubility of non-polar or weakly polar drug substances in aqueous media depends on the balance between hydrophobic and hydrophilic regions of both the solute and the solvent molecules. Cosolvents function by altering the overall dielectric constant of the liquid system, thereby adjusting its cohesive energy density to match the specific solubility parameter of the solute.

Solution:

(a) The dielectric constant of a solvent blend is highly sensitive to thermal variations, generally increasing as the temperature of the system is systematically reduced.

(b) This temperature-induced shift in the dielectric properties significantly alters the native solubility parameters and the overall solvation capacity of the mixed vehicle matrix.

(c) When the solvent parameters deviate from the ideal range required to stabilize the poorly water-soluble molecule, the solute-solvent interaction forces become thermodynamically unfavorable.

(d) As a direct consequence of this disruption in solvation energy, the dissolved active drug substance can no longer remain uniformly dispersed within the vehicle.

(e) This structural instability triggers the physical precipitation of the solute out of the formulation, leading to a loss of dose uniformity.

Final Answer: The precipitation of the solute due to altered solubility parameters.

Answer: (B)

Go Back to Question 1

Q2.

Solution

Concept: A double-acting reciprocating pump utilizes a displacement mechanism where fluids are moved continuously by a piston moving back and forth within a closed cylinder. Unlike single-acting systems, this configuration possesses active suction and discharge manifolds on both sides of the piston head to maintain continuous volumetric output.

Solution:

(a) During the forward (rightward) stroke, the piston advances within the internal cylinder, creating a high-pressure zone ahead of it and a low-pressure zone behind it.

(b) The rising pressure in the forward chamber forcefully seals Suction B and pushes open Discharge B, facilitating liquid movement into the upper output manifold.

(c) Simultaneously, the advancing piston creates a partial vacuum in the rear chamber, which causes Discharge A to tightly close due to downstream backpressure.

(d) This localized vacuum drops the internal pressure below atmospheric levels, allowing Suction A to open and draw fresh liquid into the cylinder from the supply reservoir.

(e) Therefore, this parallel mechanism ensures that fluid is drawn through Suction A while being expelled through Discharge B, preventing pressure pulsations in the pipeline.

Final Answer: Suction A opens, Discharge B opens.

Answer: (A)

Go Back to Question 2

Q3.

Solution

Concept: The limit test for iron relies on a highly sensitive colorimetric reaction between iron impurities and thioglycolic acid under basic chemical conditions. To establish the specific alkaline environment required for the final color development, an excess of ammonia solution must be introduced into the sample mixture.

Solution:

(a) When ammonia is added to a solution containing iron ions, it normally reacts to form an insoluble precipitate of ferrous or ferric hydroxide.

(b) This precipitation would interfere with the quantitative colorimetric analysis by causing cloudiness, preventing accurate visual comparisons in the Nessler cylinders.

(c) To circumvent this issue, citric acid is introduced into the formulation before the addition of ammonia to act as a powerful chelating agent.

(d) Citric acid binds tightly with the iron ions, creating a stable, water-soluble coordination complex that masks the iron against hydroxide precipitation.

(e) Consequently, the iron remains completely dissolved in its chelated state, allowing it to react cleanly with thioglycolic acid to form the characteristic pale pink to deep reddish-purple color.

Final Answer: Soluble complex with iron, preventing its precipitation as ferrous hydroxide.

Answer: (C)

Go Back to Question 3

Q4.

Solution

Concept: Inventory control models utilize a specific Reorder Point (ROP) parameter to determine the exact stock level at which a new procurement order must be placed. The ROP is calculated by evaluating the material consumption rate alongside the lead time required for the supplier to fulfill the order.

Solution:

(a) The basic formula for calculating the reorder point under uniform conditions is defined as the product of the average daily consumption rate and the lead time.

(b) Safety stock is a static inventory buffer maintained separately to mitigate random disruptions, which is added directly to the baseline ROP value.

(c) When the supplier's lead time doubles while daily manufacturing consumption remains constant, the material required during the transit period increases proportionally.

(d) This modification requires the procurement trigger to be activated much earlier in the inventory cycle to prevent stockouts.

(e) Visually, this modification forces the ROP line to shift vertically upward on the inventory cycle graph, widening the gap relative to the safety stock baseline.

Final Answer: ROP increases, shifting upward relative to safety stock.

Answer: (B)

Go Back to Question 4

Q5.

Solution

Concept: The compounding of stable pharmaceutical emulsions requires the selection of an ideal primary emulsion ratio linking the oil, water, and gum components. These standardized volumetric distributions vary based on the specific physicochemical properties and viscosity profiles of the oil phase being processed.

Solution:

(a) The dry gum method involves mixing the primary emulsifying agent (gum acacia) directly with the oil phase before adding the aqueous vehicle.

(b) For fixed vegetable oils, a classic $4:2:1$ ratio is mandatory because these heavy oils require less gum relative to their total volume.

(c) Volatile oils possess lower molecular weights and lower structural viscosities, making them more prone to phase separation if not adequately trapped.

(d) To stabilize these fluid structures, a higher relative proportion of the primary emulsifier must be utilized during the initial compounding stage.

(e) Pharmacopoeial standards dictate that volatile oils require a strict $3:2:1$ ratio of oil to water to gum to ensure adequate interfacial film formation.

Final Answer: $3:2:1$.

Answer: (B)

Go Back to Question 5

Q6.

Solution

Concept: Huckel's rule defines the fundamental electronic criteria required for a monocyclic, planar conjugated molecular network to exhibit aromatic stabilization. This rule differentiates highly stable aromatic systems from unstable anti-aromatic configurations based on the total count of delocalized pi-electrons in the perimeter loop.

Solution:

(a) Aromatic compounds must possess a completely closed shell of delocalized electrons satisfying the specific mathematical expression of (4n + 2) pi-electrons.

(b) Systems that contain a total count matching the 4n pi-electron formula are classified as anti-aromatic if they satisfy the planar conjugation criteria.

(c) Benzene, the cyclopentadienyl anion, and the cyclopropenyl cation all possess fully delocalized systems containing six, six, and two pi-electrons respectively.

(d) Cyclobutadiene is a cyclic, planar conjugated hydrocarbon that contains exactly four pi-electrons, which perfectly fits the 4n anti-aromatic formula where n equals one.

(e) This electronic configuration leads to an open-shell diradical character that destabilizes the ring structure, rendering cyclobutadiene highly reactive and non-aromatic.

Final Answer: Cyclobutadiene.

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: The chemical behavior and buffering capacity of weak acids mixed with their conjugate bases are governed by the Henderson-Hasselbalch equation. This logarithmic expression correlates the final pH of a buffer system with the dissociation constant of the acid and the ratio of the components.

Solution:

(a) The standard mathematical equation for an acidic buffer is written as pH equals pKa plus the logarithm of the conjugate base concentration divided by the weak acid concentration.

(b) The problem states that the concentration of the conjugate base is exactly ten times greater than the concentration of the weak acid species.

(c) Substituting this value into the concentration ratio yields a value of ten, which simplifies the logarithmic term to log base ten of ten.

(d) The logarithm of ten is equal to exactly one, meaning the final pH value will be equal to the pKa value increased by one.

(e) Given a pKa of 4.76, adding one results in a final pH value of 5.76 for the parenteral formulation.

Final Answer: 5.76.

Answer: (C)

Go Back to Question 7

Q8.

Solution

Concept: Adrenergic receptors are classified into distinct alpha and beta subtypes distributed throughout the autonomic nervous system. The beta-1 receptor variant is heavily concentrated within myocardial tissues, where its activation directly modulates cardiac output through G-protein coupled signaling pathways.

Solution:

(a) Stimulation of beta-1 receptors triggers a cascade that increases intracellular cyclic adenosine monophosphate (cAMP) levels within cardiac muscle cells.

(b) This biochemical cascade enhances calcium influx during depolarization, increasing the overall force of myocardial contraction (positive inotropic effect).

(c) Concurrently, it accelerates the firing rate of the sinoatrial node, leading to a marked increase in heart rate (positive chronotropic effect).

(d) Other adrenergic receptor variants, such as beta-2 receptors, are responsible for smooth muscle relaxation, which mediates bronchodilation and peripheral vasodilation.

(e) Therefore, a selective beta-1 agonist primarily amplifies the mechanical workload and pumping efficiency of the heart rather than modifying airway resistance.

Final Answer: Positive inotropic and positive chronotropic effect on the myocardium.

Answer: (B)

Go Back to Question 8

Q9.

Solution

Concept: The microscopic evaluation of crude botanical drugs relies on identifying distinct anatomical markers within the leaf epidermis. These structural parameters, such as trichome geometry and stomatal arrangement, provide unambiguous diagnostic keys to verify species authenticity.

Solution:

(a) Digitalis purpurea leaves exhibit a distinctive epidermal layer characterized by a specific arrangement of surrounding subsidiary cells.

(b) The stomata are classified as anomocytic (ranunculaceous), meaning they are surrounded by cells that are indistinguishable from normal epidermal cells.

(c) The leaf margins also bear characteristic non-glandular covering trichomes that are multicellular, uniseriate, and possess a noticeably collapsed central cell.

(d) Other options describe diagnostic keys for alternative species, such as paracytic stomata which are typical for Senna leaflets.

(e) Identifying this specific combination of anomocytic stomata and collapsed-cell trichomes confirms the identity of the Digitalis purpurea specimen.

Final Answer: Anomocytic stomata and multicellular uniseriate trichomes with collapsed cells.

Answer: (A)

Go Back to Question 9

Q10.

Solution

Concept: Carbohydrate metabolism encompasses multiple interconnected pathways designed to extract energy or generate specialized structural precursors. The initial committed step of a pathway often dictates whether glucose is directed toward energy production or macromolecular synthesis.

Solution:

(a) The pathway starts with the enzymatic oxidation of glucose-6-phosphate at carbon-1, a reaction catalyzed by glucose-6-phosphate dehydrogenase.

(b) This specific conversion produces 6-phosphoglucono-delta-lactone, which subsequently undergoes enzymatic hydrolysis to yield 6-phosphogluconate.

(c) This reaction serves as the primary regulatory checkpoint for the Pentose Phosphate Pathway, also known as the Hexose Monophosphate Shunt.

(d) Unlike glycolysis, which breaks down glucose to generate pyruvate and adenosine triphosphate (ATP), this shunt skips the citric acid cycle entirely.

(e) The primary physiological roles of this shunt are to synthesize NADPH for reductive biosynthesis and to generate ribose-5-phosphate for nucleotide construction.

Final Answer: Pentose Phosphate Pathway (Hexose Monophosphate Shunt).

Answer: (B)

Go Back to Question 10

Q11.

Solution

Concept:

Concomitant administration of multiple highly active pharmacological therapeutic entities demands vigilant screening for adverse drug-drug interactions. In geriatric patient subsets, age-related decline in protective endogenous mucosal factors and renal clearance mechanics markedly exacerbates susceptibility to serious systemic pathological injuries.

Solution:

(a) Non-steroidal anti-inflammatory drugs exert their primary analgesic properties via the non-selective physiological inhibition of cyclooxygenase enzymes, which significantly diminishes the structural biosynthesis of cytoprotective prostaglandins.

(b) Prostaglandins in the gastric environment play an indispensable homeostatic role by stimulating mucosal blood circulation, inducing bicarbonate ion secretion, and maintaining the mucosal epithelial defense barrier.

(c) Concurrently, prescription oral anticoagulants block vital parts of the coagulation cascade, such as reducing active vitamin K dependent clotting factors or directly suppressing thrombin activity.

(d) Combining these classes creates a dangerous synergy where the mucosal lining is compromised while systemic platelet aggregation and clot formation are suppressed.

(e) This clinical overlap markedly increases the risk of severe hidden gastrointestinal bleeding, extensive mucosal ulceration, and life-threatening hematemesis.

Final Answer: Severe gastrointestinal ulceration and enhanced bleeding risk.

Answer: (B)

Go Back to Question 11

Q12.

Solution

Concept:

The statutory implementation of legal regulations within statutory pharmaceutical retail contexts is comprehensively organized under specific legal schedules. These legislative frames dictate the baseline administrative layouts, operational dimensions, and required mechanical assets to preserve safety metrics.

Solution:

(a) The Drugs and Cosmetics Rules contain multiple distinct sections that govern the legal operation of manufacturing facilities and retail compounding pharmacies.

(b) Schedule M defines current good manufacturing practices and engineering demands for extensive industrial production plants and cleanroom suites.

(c) In clear contrast, Schedule N explicitly tracks the absolute baseline prerequisites for managing an open retail pharmacy storefront smoothly.

(d) These details include mandatory minimum space allocations for dispensing setups and specific list structures for functional measuring devices, storage vessels, and reference books.

(e) Adherence to these guidelines ensures a controlled environment for compounding prescriptions and securely handling controlled drug products.

Final Answer: Schedule N.

Answer: (B)

Go Back to Question 12

Q13.

Solution

Concept:

Hospital materials management utilizes specialized selective inventory analysis techniques to handle a vast array of stocked pharmaceutical supplies. Categorization systems prioritize clinical necessity over purely economic parameters to preserve uninterrupted institutional functionality.

Solution:

(a) The VED analytical framework divides therapeutic inventory items into three groups: Vital, Essential, and Desirable, based on clinical criticality.

(b) Vital components represent life-saving therapeutic interventions, emergency antidotes, and core anesthesia items whose absence stalls clinical operations.

(c) Essential supplies cover items whose absence can be handled for short periods but cause an operational drop if long-term shortages occur.

(d) Desirable products represent supportive items or optional formulations that do not impact basic clinical care when exhausted.

(e) Because a lack of vital items immediately halts critical surgical services and emergency interventions, they receive maximum priority in procurement cycles.

Final Answer: Vital items.

Answer: (A)

Go Back to Question 13

Q14.

Solution

Concept:

The basic mechanism of renal drug elimination depends heavily on passive non-ionic back-diffusion across cellular lipid structures in the nephron. Modifying the ionization state of a chemical compound inside the luminal filtrate controls its systemic reabsorption profile.

Solution:

(a) Weakly acidic pharmaceutical compounds like phenobarbital exist in an equilibrium between un-ionized lipid-soluble forms and ionized water-soluble forms.

(b) In normal or acidic urinary media, a large fraction remains un-ionized, allowing passive reabsorption across the renal tubular epithelium.

(c) Introducing sodium bicarbonate elevates the pH of the luminal fluid, converting the weak acid into its conjugated ionic state.

(d) The charged chemical structures cannot easily traverse the hydrophobic cell membranes of the nephron tubules, trapping them inside the fluid.

(e) This process, known as ion trapping, accelerates renal clearance of the toxicant and shortens systemic half-life.

Final Answer: Alkalinization of urine using sodium bicarbonate.

Answer: (B)

Go Back to Question 14

Q15.

Solution

Concept:

Modern treatment of acute secretory diarrheal conditions uses precisely formulated Oral Rehydration Salts to restore fluid balances. The modern standard utilizes a reduced-osmolarity model to lower stool output and mitigate emetic side effects.

Solution:

(a) The current formulation optimizes the active co-transport mechanism of sodium and glucose molecules across the brush border of mucosal cells.

(b) Anhydrous glucose is included to provide the essential kinetic driving force that pulls water into the bloodstream alongside sodium ions.

(c) The exact quantitative profile requires 13.5 grams of anhydrous glucose per single liter of clean drinking water.

(d) This concentration works in tandem with 2.6 grams of sodium chloride and 2.9 grams of trisodium citrate dihydrate.

(e) This combination achieves an optimal osmolarity of 245 mOsm/L, avoiding the osmotic shifts seen with older high-glucose solutions.

Final Answer: 13.5 g/L.

Answer: (A)

Go Back to Question 15

Q16.

Solution

Concept:

Fluid dynamics inside large pharmaceutical mixing vats are governed by velocity vectors and rotational momentum generated by a spinning central impeller. Modifying physical flow patterns is necessary to achieve uniform distribution and prevent structural air entrapment.

Solution:

(a) High-speed rotation of a central impeller creates a localized low-pressure zone that produces a swirling swirling vortex.

(b) This vortex can draw atmospheric air into the liquid mixture, leading to unwanted foaming and poor mixing.

(c) Installing static structural plates along the inner vessel perimeter alters these circular fluid pathways.

(d) These vertical wall attachments, known as baffles, convert the tangential flow vectors into axial or radial currents.

Final Answer: Baffles.

Answer: (B)

Go Back to Question 16

Q17.

Solution

Concept:

Compounding specific ointment strengths from higher-concentration stocks requires precise allegation or standard mass-balance algebraic equations. The absolute amount of active chemical constituent must equal the target amount within the final blended formulation weight.

Solution:

(a) The target prescription demands a final mass of 120 grams containing a uniform concentration of 5

(b) Multiplying 120 grams by 0.05 shows that exactly 6 grams of pure salicylic acid are required in the final product.

(c) The pharmacy has a stock ointment concentrated at 10

(d) Dividing the required 6 grams of active drug by the 10

(e) Subtracting the 60 grams of stock from the total target mass of 120 grams leaves 60 grams of pure petrolatum base.

Final Answer: 60 g of 10

Answer: (B)

Go Back to Question 17

Q18.

Solution

Concept:

The selection of specific systemic drug delivery routes depends heavily on the physiochemical parameters of the molecule and the desired onset of action. Bypassing anatomical barriers can alter bioavailability profiles.

Solution:

(a) Oral administration exposes active ingredients to the highly acidic gastric lumen and specialized digestive enzymes, which can degrade sensitive structures.

(b) Absorbed oral medications travel through the portal venous system directly to the liver, where extensive first-pass metabolism can occur.

(c) The sublingual mucosa features a highly vascularized epithelial network that connects directly to the systemic venous circulation.

(d) Placing a nitroglycerin tablet under the tongue allows rapid absorption into deep lingual veins, bypassing hepatic clearance mechanisms.

(e) This ensures a rapid therapeutic response, which is crucial for managing acute cardiac ischemic events.

Final Answer: It completely avoids first-pass hepatic metabolism, ensuring rapid systemic absorption.

Answer: (B)

Go Back to Question 18

Q19.

Solution

Concept:

Glass containers are widely used as primary packaging materials, and their selection depends on their hydrolytic resistance. This parameter dictates the material's ability to resist leaching alkaline components into stored liquid volumes.

Solution:

(a) Type I glass is fabricated by incorporating significant proportions of boric oxide alongside silica to lower the thermal expansion coefficient.

(b) This specific chemical formulation forms a highly durable borosilicate matrix that exhibits exceptional chemical inertness.

(c) The low concentration of leachable metal ions prevents pH shifts in packaged fluids during autoclaving or extended shelf storage.

(d) This resistance makes Type I glass the ideal standard for packaging sensitive parenteral preparations and sterile solutions.

(e) Other glass categories, such as Type II or III, consist of modified soda-lime matrices that are better suited for less reactive formulations.

Final Answer: Highly resistant borosilicate glass.

Answer: (A)

Go Back to Question 19

Q20.

Solution

Concept:

Physical chemical incompatibilities happen when combining specific solid molecules triggers an alteration in their macroscopic physical state. These shifts can happen without covalent bond modification.

Solution:

(a) Certain crystalline powders possess surface properties that cause mutual melting point depression when mixed in close contact.

(b) This interaction disrupts the intermolecular forces within the crystal lattices, lowering the melting point below ambient room temperature.

(c) When these substances are blended, the mixture transitions from a solid state to a liquid phase.

(d) This phenomenon is defined as a eutectic mixture, and common examples include combinations of menthol, thymol, and camphor.

(e) This transformation can challenge standard powder compounding, requiring the use of protective adsorbent materials like magnesium carbonate.

Final Answer: Eutectic mixture.

Answer: (A)

Go Back to Question 20

Q21.

Solution

Concept:

Topical pharmaceutical formulations require specific astringent agents to induce localized protein precipitation and cellular shrinkage without causing widespread tissue destruction. Inorganic metal salts often undergo hydrolysis reactions in solution to yield active, highly charged ionic groups that interact with basic residues on tissue surfaces.

Solution:

(a) Alum functions as a topical astringent by interacting with proteins present on exposed mucosal surfaces or minor lacerations.

(b) Upon topical application, the aluminum ions form coordination bonds with the carboxyl and sulfhydryl functional groups of tissue proteins.

(c) This interaction results in the immediate precipitation of surface proteins, which creates a protective, dense layer over the affected area.

(d) The localized protein precipitation causes mechanical constriction of peripheral blood vessels, facilitating rapid homeostasis during superficial capillary bleeding.

(e) Furthermore, this action decreases the permeability of the tissue matrix, reducing inflammatory exudation and providing localized antiseptic characteristics.

Final Answer: Topical astringent.

Answer: (B)

Go Back to Question 21

Q22.

Solution

Concept:

Electrophilic aromatic substitution kinetics and regioselectivity depend entirely on the electron density distribution established by pre-existing functional groups on the benzene core. Substituents alter the relative stability of the intermediate arenium ion by pulling or pushing electron density through inductive and resonance pathways.

Solution:

(a) The cyano functional group possesses a highly polarized triple bond between the carbon and nitrogen atoms.

(b) This structural arrangement exerts a powerful electron-withdrawing effect through both inductive mechanisms and resonance delocalization patterns.

(c) By withdrawing electron density out of the aromatic pi-cloud, the substituent decreases the nucleophilicity of the benzene ring.

(d) This deactivation is least pronounced at the meta positions because ortho and para attacks place a positive charge adjacent to the electron-withdrawing group.

(e) Consequently, the incoming electrophilic species is directed to attack the meta position exclusively, where the transition state energy barrier remains relatively lower.

Final Answer: $-C \equiv N$.

Answer: (C)

Go Back to Question 22

Q23.

Solution

Concept:

Pharmaceutical degradation kinetics describe the mathematical relationship between active molecule concentrations and elapsed storage periods under defined conditions. First-order chemical transformations are characterized by a consumption rate that is directly proportional to the remaining fraction of the target reactant.

Solution:

(a) The differential rate equation for a first-order chemical degradation process specifies that the change in concentration per unit time equals the rate constant multiplied by the current concentration.

(b) Integrating this mathematical expression across a specific time interval yields a logarithmic relationship connecting the initial and final quantities.

(c) The half-life is defined as the exact time required for the initial concentration to decrease by fifty percent.

(d) Substituting half of the initial concentration value into the integrated first-order logarithmic equation simplifies the concentration terms completely.

(e) This mathematical derivation proves that the half-life depends entirely on the natural logarithm of two divided by the specific reaction velocity constant.

Final Answer: $t_{1/2} = \frac{0.693}{k}$.

Answer: (A)

Go Back to Question 23

Q24.

Solution

Concept:

The therapeutic management of neurological conditions involving central neurotransmitter deficiencies requires strategies to maximize the transport of precursor molecules across systemic biological membranes. Co-administering selective peripheral enzyme inhibitors prevents premature metabolic breakdown prior to target tissue entry.

Solution:

(a) Levodopa readily crosses the blood-brain barrier via active amino acid transporters to undergo central conversion into active dopamine molecules.

(b) However, extensive peripheral metabolism by aromatic L-amino acid decarboxylase converts the majority of an oral dose into systemic dopamine.

(c) Systemic dopamine cannot cross the tight endothelial junctions of the blood-brain barrier and triggers peripheral cardiovascular side effects.

(d) Carbidopa functions as a selective peripheral dopa decarboxylase inhibitor that cannot cross the blood-brain barrier into central tissues.

(e) Adding carbidopa preserves levodopa concentrations within the systemic circulation, allowing a larger fraction to enter the brain effectively.

Final Answer: It inhibits peripheral dopa decarboxylase, increasing the fraction of levodopa crossing the blood-brain barrier.

Answer: (B)

Go Back to Question 24

Q25.

Solution

Concept:

The renin-angiotensin-aldosterone system plays a critical role in regulating systemic blood pressure and fluid balance through multiple biochemical pathways. Pharmacological interventions can target this system at different steps, such as blocking enzyme synthesis or blocking specific receptor sites.

Solution:

(a) Angiotensin II acts as a potent endogenous vasoconstrictor that binds to specific cell surface receptors to increase systemic vascular resistance.

(b) Angiotensin converting enzyme inhibitors function by blocking the conversion of angiotensin I into active angiotensin II molecules.

(c) In contrast, angiotensin receptor blockers selectively target and antagonize the type one angiotensin II receptors on vascular smooth muscle walls.

(d) This pharmacological action prevents angiotensin II from binding to its target sites, resulting in continuous vasodilation.

(e) This selective blockade lowers peripheral vascular resistance and decreases aldosterone secretion without altering the degradation pathways of bradykinin.

Final Answer: Angiotensin Receptor Blockers (ARBs).

Answer: (C)

Go Back to Question 25

Q26.

Solution

Concept:

Antimicrobial agents exploit biochemical differences between prokaryotic and eukaryotic systems to exert selective toxicity against pathogenic microorganisms. Inhibiting protein synthesis is accomplished by targeting specific ribosomal subunits, which disrupts translation accuracy.

Solution:

(a) Bacterial translation relies on seventy-S ribosomes, which consist of a smaller thirty-S subunit and a larger fifty-S subunit working together.

(b) Aminoglycoside antibiotics bind irreversibly to specific protein sites located within the decoding region of the thirty-S subunit.

(c) This structural binding alters the confirmation of the A site, which causes the misreading of messenger RNA codons during translation.

(d) The resulting synthesis of abnormal, non-functional proteins disrupts vital bacterial structural components and metabolic pathways.

(e) These abnormal proteins can accumulate within the cell membrane, altering permeability parameters and leading to rapid bacterial cell death.

Final Answer: Aminoglycosides.

Answer: (C)

Go Back to Question 26

Q27.

Solution

Concept:

Histological differentiation of epithelial tissues relies on classifying the number of cell layers and the morphological characteristics of the cells on the apical surface. These structural configurations correspond directly to the functional requirements of specific anatomical barriers.

Solution:

(a) Simple epithelia consist of a single layer of cells anchored directly to an underlying basement membrane matrix.

(b) Squamous cells display a distinctively flattened, scale-like architecture where the cell width is significantly greater than the height.

(c) The single layer of thin cells minimizes the physical barrier thickness, facilitating rapid passive diffusion and filtration processes.

(d) This specific tissue type lines anatomical structures that require rapid gas or fluid exchange, such as pulmonary alveoli and capillaries.

(e) In contrast, cuboidal and columnar epithelia feature thicker profiles that are optimized for active secretory or absorptive functions.

Final Answer: Simple squamous epithelium.

Answer: (A)

Go Back to Question 27

Q28.

Solution

Concept:

The structural organization of compact bone matrix relies on microscopic functional assemblies designed to withstand multi-directional mechanical forces. These specialized mineralized units run parallel to the long axis of osseous structures to distribute physical workloads.

Solution:

(a) Compact bone is organized into repeating cylindrical structural units known as osteons or Haversian systems.

(b) Each individual osteon consists of concentric layers of calcified extracellular matrix called lamellae, which encircle a central cavity.

(c) This central Haversian canal contains the primary blood vessels, lymphatic structures, and nerve fibers that sustain the bone tissue.

(d) Osteocytes reside within small spaces called lacunae, which are distributed between the mineralized lamellar rings.

(e) Tiny networks of canaliculi radiate from these spaces to provide essential routes for nutrient transport throughout the mineralized matrix.

Final Answer: Osteon (Haversian system).

Answer: (B)

Go Back to Question 28

Q29.

Solution

Concept:

Electrocardiographic diagnostic waveforms record the spatial propagation of electrical depolarization and repolarization vectors through myocardial conduction networks. Each distinct deflection corresponds directly to a specific mechanical phase of the cardiac cycle.

Solution:

(a) The initial small deflection, designated as the P wave, represents the electrical vector of atrial depolarization.

(b) Following the atrial contraction phase, the electrical impulse travels through the atrioventricular node into the specialized bundle branches.

(c) The rapid propagation of this electrical signal through the Purkinje network triggers the depolarization of the large ventricular mass.

(d) This physiological event generates a prominent multi-phasic waveform deflection on the tracing known as the QRS complex.

(e) The subsequent T wave records the slower electrical vector of ventricular repolarization as the myocardium prepares for the next cycle.

Final Answer: QRS complex.

Answer: (B)

Go Back to Question 29

Q30.

Solution

Concept:

Pulmonary function and ventilatory dynamics are quantified by measuring specific lung volumes and capacities under controlled conditions. These respiratory parameters change dynamically based on metabolic demands and the compliance of the thoracic wall.

Solution:

(a) Lung volumes are divided into four distinct components that capture the total volumetric capacity of the respiratory system.

(b) The volume of air moved into or out of the lungs during a single, quiet respiratory cycle is defined as the tidal volume.

(c) In a healthy adult individual under resting conditions, this baseline breath volume measures approximately five hundred milliliters.

(d) Inspiratory reserve volume represents the additional air that can be forcefully inspired beyond a normal tidal inhalation.

(e) Residual volume defines the remaining gas that stays trapped inside the alveoli following a maximal, forced exhalation phase.

Final Answer: Tidal Volume (TV).

Answer: (C)

Go Back to Question 30

Q31.

Solution

Concept:

The gastric mucosal epithelium is populated by highly specialized secretory cell populations that drive the primary digestive and endocrine functions of the stomach. These cellular networks are sequestered within gastric pits and possess unique transport systems and receptors to dynamically modify the chemical composition of the gastric juice.

Solution:

(a) Parietal cells, historically documented as oxyntic cells, are large pyramidal structures located predominantly within the mucosal linings of the gastric fundus and corpus.

(b) These specialized units are equipped with an abundant population of intracellular canaliculi and hydrogen potassium ATPase pumps to actively secrete concentrated hydronium ions.

(c) This metabolic transport mechanism maintains the luminal gastric pH between one and two, which is essential to optimize the denaturation of dietary protein sheets.

(d) Simultaneously, these structures synthesize and release intrinsic factor, a highly stable glycoprotein required for the downstream binding and absorption of cyanocobalamin in the terminal ileum.

(e) In clear contrast, adjacent chief cells express zymogens like pepsinogen, whereas neuroendocrine G-cells synthesize the peptide hormone gastrin to regulate acid production.

Final Answer: Parietal (Oxyntic) cells.

Answer: (B)

Go Back to Question 31

Q32.

Solution

Concept:

Central nervous system motor regulation involves complex processing loops distributed among cortical, subcortical, and brainstem structures. Integrating sensory feedback regarding body orientation with voluntary motor commands is necessary to execute smooth, fluid skeletal movements without conscious intervention.

Solution:

(a) The cerebellum is situated within the posterior cranial fossa, posterior to the brainstem, where it functions as the primary tracking coordinator of somatic motor pathways.

(b) This structure receives continuous proprioceptive inputs from peripheral neuromuscular spindles alongside motor plan blueprints descending from the primary cerebral motor cortex.

(c) By constantly comparing intended movements with real-time tracking feedback from muscles, the cerebellar circuits compute precise corrective signals to modulate muscle tone.

(d) Damage to these neuronal networks prevents proper regulation of timing and force during complex contractions, presenting clinically as cerebellar ataxia.

(e) Patients with such lesions present with an uncoordinated, wide-based stagger, severe kinetic tremors, and an inability to maintain spatial equilibrium.

Final Answer: Cerebellum.

Answer: (C)

Go Back to Question 32

Q33.

Solution

Concept:

Pharmacognostic classification frameworks separate crude natural drugs based on their specific structural integrity and the macroscopic presence of organized tissues. This morphology system categorizes items depending on whether they represent distinct anatomical organs or processed biological fluids.

Solution:

(a) Organized crude drugs consist of defined anatomical parts of plants or animals that preserve complex cellular networks like parenchyma, xylem, and phloem.

(b) Clove buds represent dried, unopened flower buds harvested from Syzygium aromaticum, meaning they retain distinct structural features like epidermal cells and oil glands.

(c) When subjected to microscopic analysis, these specimens show clear diagnostic markers, including schizolysigenous cavities and calcium oxalate clusters within their floral layers.

(d) Conversely, unorganized crude drugs are obtained via physical expression, incision, or extraction methods that eliminate all trace of cellular arrangement.

(e) Solid materials like acacia gum, agar flakes, and purified bee wax fall under unorganized categories because they lack defined histological boundaries.

Final Answer: Clove buds.

Answer: (B)

Go Back to Question 33

Q34.

Solution

Concept:

Botanical extracts and materials derived from plant matrices undergo categorization based on the mechanical processes involved in their collection. Unorganized drug entities encompass dried secretions, exudates, juices, and volatile or fixed concentrates that lack repeating microscopic cellular architectures.

Solution:

(a) Opium is an unorganized crude drug obtained by making precision incisions on the unripe capsular pericarps of Papaver somniferum during specific seasonal windows.

(b) This micro-incision prompts the exuding of a complex milky latex secretion, which is subsequently air-dried and collected as a raw resin mass.

(c) Because this material is a dried cellular exudate rather than an intact plant organ, it displays no internal cellular frameworks under microscopy.

(d) In comparison, senna leaflets represent complete foliar structures, cinnamon bark constitutes a localized phloem layer, and nux vomica represents intact embryonic seeds.

(e) These three comparative options are classified as organized drugs because they retain clear cellular structures like sclereids, trichomes, and vascular bundles.

Final Answer: Opium.

Answer: (A)

Go Back to Question 34

Q35.

Solution

Concept:

Analytical colorimetric testing relies on specific chemical reactions between functional groups on a solute and specialized structural reagents. These diagnostic reagents oxidize or chelate target molecules under controlled temperatures to produce measurable shifts in light absorption.

Solution:

(a) Ninhydrin functions as a powerful oxidizing agent that targets alpha-amino acids possessing a free amino group and a free carboxylic acid link.

(b) When an amino acid solution is heated with excess ninhydrin, the reagent drives oxidative deamination and decarboxylation of the structural backbone.

(c) This reaction reduces the core reagent structure while liberating ammonia, carbon dioxide, and an aldehyde derivative matching the specific amino acid side-chain.

(d) The liberated ammonia molecule combines with one reduced and one oxidized ninhydrin molecule to form a highly conjugated chemical structure.

(e) This resulting condensation product, known as Ruhemann violet, exhibits intense electromagnetic absorption that produces a characteristic deep purple coloration.

Final Answer: Ninhydrin reagent.

Answer: (B)

Go Back to Question 35

Q36.

Solution

Concept:

Tissue damage and cellular necrosis release internal enzymatic proteins into the systemic circulation due to loss of plasma membrane structural integrity. Tracking the kinetic profiles of these serum markers helps diagnose localized ischemic injuries.

Solution:

(a) Creatine kinase is a dimeric enzyme that catalyzes the reversible transfer of high-energy phosphate groups between adenosine diphosphate and creatine matrices.

(b) This enzyme exists as three distinct structural isoenzymes: CK-MM in skeletal muscle, CK-BB in brain tissue, and CK-MB in myocardial cells.

(c) Following acute coronary artery occlusion and subsequent myocardial infarction, necrotic cardiac cells leak their internal contents into surrounding capillaries.

(d) Serum concentrations of the CK-MB isoenzyme rise sharply within four to six hours post-injury, peaking around twenty-four hours.

(e) This rapid kinetic profile makes it a sensitive biomarker for verifying acute myocardial wall damage in emergency settings.

Final Answer: Creatine kinase-MB isoenzyme (CK-MB).

Answer: (B)

Go Back to Question 36

Q37.

Solution

Concept:

Epidemiological prevention methodologies distribute public health interventions into distinct tiers depending on the stage of disease progression being addressed. Environmental engineering strategies target structural transmission pathways to minimize host exposure vectors.

Solution:

(a) Primary prevention aims to inhibit the initial onset of pathogenic conditions across healthy populations by removing structural risk factors.

(b) Environmental sanitation programs target vector propagation cycles to disrupt transmission networks before pathogen inoculation occurs.

(c) Eliminating standing water bodies removes the mandatory aquatic environment needed for Anopheles mosquitoes to deposit eggs and nurture larvae.

(d) This environmental modification reduces the vector density index, lowering the transmission rate of malaria within the urban community.

(e) Because this campaign modifies environmental conditions to protect healthy individuals, it falls under environmental sanitation and vector control.

Final Answer: Environmental sanitation and vector control.

Answer: (B)

Go Back to Question 37

Q38.

Solution

Concept:

National disease eradication programs implement structured clinical protocols to optimize patient compliance and reduce the selection of drug-resistant pathogens. Standardizing therapy observation ensures accurate dosing schedules during extended outpatient regimens.

Solution:

(a) The National Tuberculosis Elimination Program in India organizes therapeutic regimens around the globally standardized DOTS management strategy.

(b) DOTS represents Directly Observed Treatment Short-course, a protocol where trained healthcare providers witness patients swallowing each medication dose.

(c) This system eliminates common compliance errors associated with long-term combination chemotherapy, preventing treatment defaults.

(d) The primary treatment strategy utilizes a combination of rifampicin, isoniazid, pyrazinamide, and ethambutol during the intensive initial phase.

(e) By ensuring absolute adherence, this clinical program maximizes cure rates and limits the emergence of multi-drug resistant strains.

Final Answer: DOTS (RNTCP/NTEP).

Answer: (B)

Go Back to Question 38

Q39.

Solution

Concept:

Medical prescriptions follow a traditional structured layout containing specific operational sections written in Latin nomenclature. Each distinct segment addresses a different stage of the dispensing process, from patient identification to compounding instructions.

Solution:

(a) A prescription starts with the superscription, which features the classic RX symbol invoking directive or healing themes.

(b) The core segment is the inscription, which itemizes the precise names and chemical weights of the required active ingredients.

(c) Below the ingredient list is the subscription, which contains specific directional text intended exclusively for the compounding pharmacist.

(d) This section states the exact dosage forms to be generated, such as capsules, powders, or emulsions, and the total count to prepare.

(e) The subsequent signatura section lists specific instructions that the pharmacist must transcribe onto the label to guide patient use.

Final Answer: Subscription.

Answer: (C)

Go Back to Question 39

Q40.

Solution

Concept:

Statutory pharmaceutical governance requires the regular reconstitution of regulatory bodies to maintain contemporary oversight of education standards and practice guidelines. Legislative frameworks define the maximum operational periods for council memberships.

Solution:

(a) The Pharmacy Council of India is established as a statutory body under the provisions of the central Pharmacy Act of 1948.

(b) The council includes elected representatives from universities, nominated government members, and institutional delegates from the Medical Council.

(c) To ensure regulatory continuity and accountability, the Act mandates that the full council must be reconstituted every five years.

(d) Elected and nominated members serve a standard term of five years from the date of official publication in the gazette.

(e) Members remain eligible for re-election or re-nomination, provided they maintain their underlying professional registrations.

Final Answer: 5 years.

Answer: (B)

Go Back to Question 40

Q41.

Solution

Concept:

Liquid oral pharmaceutical formulations require specialized vehicles to facilitate the uniform dispersion or dissolution of active compounds while optimizing patient palatability. Viscous aqueous vectors containing high concentrations of sucrose function effectively to shield the gustatory taste buds from bitter chemical structures through physical and thermodynamic interactions.

Solution:

(a) Simple Syrup IP is a concentrated, near-saturated aqueous solution of sucrose prepared in purified water, exhibiting a precise statutory concentration of 66.7 percent weight by weight.

(b) The high chemical density and structural viscosity of this vehicle slow down the movement of dissolved solute molecules toward the taste receptor cells on the tongue.

(c) Furthermore, the intensive sweetness of the sucrose molecules creates a strong sensory competition in the central nervous system, effectively masking unpleasant flavors.

(d) This vehicle is free from volatile alcohol compounds, making it an exceptionally safe and preferred choice for pediatric oral delivery platforms.

(e) Additionally, the high osmotic pressure of this concentrated sugar solution prevents the growth of common microbial strains by drawing out their internal moisture.

Final Answer: Simple Syrup IP.

Answer: (B)

Go Back to Question 41

Q42.

Solution

Concept:

Thermal sterilization processes follow predictable logarithmic inactivation patterns governed by the heat resistance profiles of specific microbial populations. Validation procedures rely on standardized mathematical parameters to calculate the absolute kinetic destruction rates of resistant bacterial endospores at designated process temperatures.

Solution:

(a) The D-value, officially defined as the decimal reduction time, quantifies the thermal exposure duration required to reduce a microbial population by 90 percent.

(b) This kinetic value is calculated at a constant exposure temperature, reflecting the time needed for the survival curve to drop by one log cycle.

(c) In comparison, the Z-value determines the temperature increase required to induce a ten-fold change in the calculated decimal reduction time.

(d) The F-value measures the total lethal delivery of a heating cycle expressed as an equivalent processing duration at a base reference temperature.

(e) Sterilization engineers use these parameters to confirm that parenteral manufacturing cycles deliver an acceptable sterility assurance level.

Final Answer: D-value (Decimal reduction time).

Answer: (B)

Go Back to Question 42

Q43.

Solution

Concept:

The official limit test for arsenic relies on a sequence of chemical reduction steps designed to convert heavy metal impurities into volatile gaseous configurations. Evaluating these chemical traces requires specialized glass setups that route the generated gases through reagent strips under controlled pressures.

Solution:

(a) The chemical mechanism of the arsenic limit test uses zinc and hydrochloric acid to generate nascent hydrogen inside a reaction flask.

(b) This reactive hydrogen reduces pentavalent and trivalent arsenic impurities present in the sample matrix into volatile arsine gas.

(c) The arsine gas rises through the assembly, passing through a lead acetate cotton plug designed to trap hydrogen sulfide impurities.

(d) The filtered gas then reacts with mercuric chloride test paper positioned at the top of the specialized glass column.

(e) This interaction produces a distinct yellow to brown mercuric arsenide stain, which is quantified visually using the Gutzeit apparatus.

Final Answer: Gutzeit apparatus.

Answer: (B)

Go Back to Question 43

Q44.

Solution

Concept:

Nucleophilic substitution pathways are classified by their kinetic profiles and the structural geometries of their transition states. The physical displacement of a leaving group by an incoming nucleophile depends on steric hindrance around the electrophilic carbon center.

Solution:

(a) A bimolecular nucleophilic substitution reaction follows a second-order rate law, where the kinetic velocity depends on the concentrations of both reactants.

(b) The mechanism involves a single concerted step where the nucleophile attacks the electrophilic carbon from the side opposite the leaving group.

(c) This backside attack forces the three remaining substituents into a planar configuration within a pentacoordinate transition state.

(d) As the bond to the leaving group breaks, the spatial arrangement of the remaining bonds inverts, a process known as Walden inversion.

(e) This stereochemical mechanism avoids carbocation intermediates, meaning no structural rearrangements occur and optical purity is preserved as an inverted configuration.

Final Answer: Complete inversion of configuration (Walden inversion) with a second-order rate law.

Answer: (B)

Go Back to Question 44

Q45.

Solution

Concept:

Organophosphate toxicity involves the covalent phosphorylation of the esteratic site on the acetylcholinesterase enzyme, leading to an accumulation of acetylcholine at synaptic junctions. Reversing this state requires antidote strategies that clear the bound toxicant from the enzyme before aging occurs.

Solution:

(a) Organophosphate compounds bind to the active site of acetylcholinesterase, halting the metabolic breakdown of endogenous acetylcholine molecules.

(b) This inhibition causes an accumulation of acetylcholine, triggering a cholinergic crisis marked by miosis, bradycardia, fasciculations, and respiratory failure.

(c) Atropine functions as a competitive muscarinic receptor antagonist that alleviates life-threatening symptoms but does not restore the functional enzyme.

(d) Pralidoxime belongs to the oxime chemical class and acts as a specific biochemical antidote by targeting the phosphorylated enzyme.

(e) The oxime group exerts a strong nucleophilic attack on the bound phosphate, stripping the organophosphate molecule away and restoring normal enzyme activity.

Final Answer: Pralidoxime (2-PAM).

Answer: (B)

Go Back to Question 45

Q46.

Solution

Concept:

Prostaglandin biosynthesis is regulated by distinct isoforms of the cyclooxygenase enzyme family that display different tissue expressions and physiological behaviors. Traditional anti-inflammatory agents can cause adverse reactions if they block isoforms responsible for maintaining systemic tissue homeostasis.

Solution:

(a) Cyclooxygenase-1 is a constitutive enzyme isoform expressed across the gastric mucosa, platelet structures, and renal parenchymal fabrics.

(b) This enzyme synthesizes cytoprotective prostaglandins that maintain mucosal blood flow, stimulate bicarbonate release, and preserve the epithelial barrier.

(c) In contrast, cyclooxygenase-2 is an inducible enzyme expressed primarily within inflammatory cells during tissue injury or systemic immune responses.

(d) Traditional non-steroidal anti-inflammatory medications block both isoforms, which compromises the protective mucosal lining and can lead to severe gastric erosions.

(e) Selective cyclooxygenase-2 inhibitors suppress inflammatory prostaglandins while sparing gastric cytoprotection, reducing the incidence of mucosal ulceration and bleeding.

Final Answer: Gastrointestinal mucosal ulceration and bleeding.

Answer: (B)

Go Back to Question 46

Q47.

Solution

Concept:

The endocrine portion of the pancreas is organized into cell clusters called the islets of Langerhans, which are distributed throughout the exocrine tissue. These cellular networks contain distinct endocrine cell populations that utilize paracrine signaling loops to regulate systemic carbohydrate metabolism.

Solution:

(a) The islets of Langerhans contain four primary cell variants: alpha, beta, delta, and pancreatic polypeptide cells.

(b) Alpha cells occupy the peripheral regions of the pancreatic islets and make up approximately twenty percent of the total endocrine cell mass.

(c) These specialized cells synthesize and secrete glucagon, a linear peptide hormone that raises blood glucose levels during fasting states.

(d) Glucagon acts on hepatic receptors to accelerate glycogenolysis and gluconeogenesis, releasing free glucose into the systemic circulation.

(e) In contrast, the more abundant beta cells are located centrally in the islets and secrete insulin to lower blood glucose levels.

Final Answer: Alpha (α) cells.

Answer: (A)

Go Back to Question 47

Q48.

Solution

Concept:

The synthesis of metabolic thyroid hormones relies on a constant dietary intake of inorganic iodine to facilitate the iodination of tyrosine residues on thyroglobulin. Deficiencies in these essential minerals disrupt the homeostatic feedback loops of the hypothalamic-pituitary-thyroid axis.

Solution:

(a) Severe dietary iodine deficiency reduces the structural iodination of follicular proteins, lowering the synthesis of thyroxine and triiodothyronine.

(b) This drop in circulating thyroid hormone levels reduces the negative feedback inhibition on the anterior pituitary gland and hypothalamus.

(c) In response, thyrotrepin-releasing structures increase the synthesis and release of thyroid-stimulating hormone into the bloodstream.

(d) Elevated concentrations of thyroid-stimulating hormone cause hyperplastic and hypertrophic shifts within the thyroid follicular epithelium.

(e) This continuous hormonal stimulation leads to non-toxic follicular expansion, presenting clinically as an enlarged endemic goiter.

Final Answer: Thyroid-stimulating hormone (TSH).

Answer: (C)

Go Back to Question 48

Q49.

Solution

Concept:

Crude natural drug evaluation requires strict testing protocols to detect intentional or accidental alterations in raw botanical shipments. The systematic degradation of sample quality is classified into distinct categories based on the nature of the modifying material.

Solution:

(a) Adulteration is a broad term that encompasses the intentional or accidental debasement of a genuine crude drug with inferior materials.

(b) Substitution occurs when a completely different botanical species or material is used in place of the genuine article.

(c) This substitution may involve materials that visually mimic the target drug but lack the necessary therapeutic secondary metabolites.

(d) Sophistication represents a calculated form of intentional adulteration where spurious substances are added to replicate premium grades.

(e) Verifying these differences requires quantitative pharmacognostic evaluations, including macroscopic tracking, ash values, and volatile constituent profiles.

Final Answer: Substitution.

Answer: (B)

Go Back to Question 49

Q50.

Solution

Concept:

The structural organization of complex protein molecules is categorized into four hierarchical tiers based on folding patterns and chemical stabilizing forces. Each progressive tier describes a different level of structural complexity, from linear chains to multi-subunit assemblies.

Solution:

(a) The primary structure defines the linear sequence of amino acid residues linked by covalent peptide bonds along the polypeptide chain.

(b) The secondary structure describes localized folding patterns stabilized by hydrogen bonds between the carbonyl oxygen and amide nitrogen atoms of the backbone.

(c) These regular configurations include right-handed alpha-helices and parallel or anti-parallel beta-pleated sheet networks.

(d) The tertiary structure defines the overall three-dimensional conformation of a single polypeptide chain, stabilized by side-chain interactions.

(e) Quaternary configurations describe the spatial arrangement and interaction forces linking multiple independent polypeptide subunits into a functional protein complex.

Final Answer: Secondary structure.

Answer: (B)

Go Back to Question 50

Q51.

Solution

Concept:

Parenteral medication compounding requires a strictly controlled sterile environment to prevent microbially driven product contamination and protect vulnerable patient populations from foreign particulates. High-efficiency particulate air filtration systems establish this sterile profile by routing air currents through complex microscopic fibers designed to capture suspended biological and mechanical pollutants.

Solution:

(a) High-efficiency particulate air systems utilize specialized thin borosilicate fiber sheets that are folded repeatedly to maximize the available surface area for physical gas entrapment.

(b) The operational capability of these industrial filters is verified using a standardized test aerosol containing small droplets of dioctyl phthalate.

(c) International manufacturing parameters dictate that standard cleanroom air filters must capture at least 99.97 percent of all airborne particles.

(d) This filtration standard targets particles with a baseline diameter of 0.3 micrometers, which represents the most penetrating particle size.

(e) Smaller particles are captured through continuous random Brownian diffusion patterns, whereas larger particles are removed via inertial impaction and direct interception.

Final Answer: 99.97

Answer: (B)

Go Back to Question 51

Q52.

Solution

Concept:

The statutory regulation of narcotic substances establishes clear legal frameworks to monitor the production and processing of plants containing highly addictive alkaloidal secondary metabolites. Verifying the accurate taxonomic nomenclature of these plants is critical for executing official quality control assessments and legislative enforcements.

Solution:

(a) Opium is obtained as a dried latex exudate from the specialized laticiferous vessels found in the capsular walls of the poppy plant.

(b) The valid scientific botanical name for this specific species is Papaver somniferum, which belongs to the family Papaveraceae.

(c) This plant contains a complex mixture of phenanthrene and isoquinoline alkaloids, including morphine, codeine, thebaine, noscapine, and papaverine.

(d) Conversely, Cannabis sativa represents the botanical source of hemp fibers and active cannabinoids like tetrahydrocannabinol.

(e) Erythroxylum coca serves as the primary source for cocaine, whereas Atropa belladonna synthesizes tropane alkaloids like tropine and scopolamine.

Final Answer: Papaver somniferum.

Answer: (B)

Go Back to Question 52

Q53.

Solution

Concept:

Patient communication strategies in retail pharmacy settings aim to confirm understanding and minimize errors during the self-administration of complex maintenance therapies. Active assessment protocols verify that patients can process and apply specific information regarding their daily dosing schedules.

Solution:

(a) Standard passive questioning techniques often prompt polite affirmation from patients without accurately reflecting their true level of understanding.

(b) Written leaflets with medical terminology can confuse individuals who have low health literacy or language barriers.

(c) The teach-back method requires patients to explain the core medication instructions back to the clinician using their own words.

(d) This verbal presentation allows the pharmacist to immediately detect gaps in understanding, confusing schedules, or administration errors.

(e) Correcting these misinterpretations before the patient leaves the pharmacy improves treatment adherence and helps prevent toxic drug overdoses.

Final Answer: Requesting the patient to repeat back the key instructions in their own words (Teach-back method).

Answer: (B)

Go Back to Question 53

Q54.

Solution

Concept:

Pathological shifts in metabolic state can alter the processing of structural lipid molecules, leading to the accumulation of specific metabolic byproducts in fluid compartments. Quantitative or qualitative assessment of these clinical markers provides direct diagnostic evidence of altered metabolic pathways.

Solution:

(a) When intracellular glucose levels drop during starvation or insulin resistance, cells switch to the beta-oxidation of fatty acids for energy.

(b) This rapid breakdown of lipids produces excess acetyl coenzyme A, which exceeds the processing capacity of the citric acid cycle.

(c) The liver shifts this excess acetyl-CoA into ketogenesis, forming acetoacetate, beta-hydroxybutyrate, and acetone.

(d) These circulating molecules can overwhelm systemic acid-base buffers, leading to metabolic ketoacidosis and excretion of the compounds in urine.

(e) The clinical detection of these elevated levels in urine is called ketonuria, which is a key diagnostic indicator of poorly managed gestational diabetes.

Final Answer: Ketonuria.

Answer: (C)

Go Back to Question 54

Q55.

Solution

Concept:

Harvesting crude natural drugs requires a detailed understanding of the specific plant tissues where secondary metabolites reach their peak concentration. The extraction of active exudates relies on precise mechanical techniques that match the plant's seasonal and structural characteristics.

Solution:

(a) The active components of Papaver somniferum are held within a network of laticiferous tubes in the outer walls of its unripe capsules.

(b) When the capsules reach structural maturity, workers use specialized multi-bladed tools to make shallow, vertical incisions in the rind.

(c) This cutting must be done during dry, sunny weather to allow the internal milky latex to slowly ooze out without being washed away by rain.

(d) The latex thickens overnight on the surface of the capsule through natural evaporation, forming a dark, scraping-ready resin paste.

(e) This manual harvesting technique avoids breaking the inner capsule wall, keeping the internal seeds intact for subsequent agricultural collection.

Final Answer: Papaver somniferum.

Answer: (B)

Go Back to Question 55

Q56.

Solution

Concept:

The renal parenchyma functions as an endocrine organ by synthesizing specific signaling glycoproteins that regulate peripheral hematological dynamics. Chronic damage to these functional tissue sheets disrupts systemic regulatory loops, causing downstream hematological deficiencies.

Solution:

(a) Peritubular interstitial cells in the renal cortex monitor oxygen tension in the bloodstream through oxygen-sensitive transcription factors.

(b) In response to hypoxia, these cells synthesize and release erythropoietin into the systemic circulation.

(c) Erythropoietin travels to the bone marrow, where it binds to proerythroblast surfaces to stimulate red blood cell production.

(d) Chronic kidney disease causes progressive damage to these interstitial cells, which severely impairs erythropoietin production.

(e) Without this hormonal signal, bone marrow activity drops, leading to severe normocytic, normochromic anemia.

Final Answer: Erythropoietin.

Answer: (B)

Go Back to Question 56

Q57.

Solution

Concept:

Psychopharmacological management of psychiatric disorders involves modifying monoaminergic transmission pathways across specific central brain regions. Antagonizing receptor sites that receive dopamine signals can reduce severe behavioral distortions associated with hyperdopaminergic states.

Solution:

(a) The mesolimbic dopamine pathway projects from the ventral tegmental area to the nucleus accumbens, regulating reward signaling and behavioral outputs.

(b) Pathological hyperactivity within this mesolimbic tract can cause positive symptoms of schizophrenia, such as auditory hallucinations and structural delusions.

(c) Antipsychotic medications, historically called neuroleptics, bind to and block postsynaptic dopamine D2 receptors.

(d) This receptor antagonism reduces hyperactive dopamine signaling, which helps alleviate severe acute psychotic symptoms.

(e) However, blocking these receptors in the nigrostriatal pathway can cause extrapyramidal side effects like dystonia and tardive dyskinesia.

Final Answer: Antipsychotic agents (Neuroleptics).

Answer: (B)

Go Back to Question 57

Q58.

Solution

Concept:

The physical stability of heterogeneous liquid formulations depends on managing the surface charge properties of the suspended particulate phases. Uncontrolled sedimentation can lead to permanent structural rearrangements in the sediment, challenging uniform dosing.

Solution:

(a) In deflocculated suspensions, individual particles settle slowly because they maintain a high zeta potential that repels adjacent particles.

(b) This slow sedimentation allows the smaller particles to fit into the spaces between larger particles at the bottom of the container.

(c) The weight of the upper layers forces the settled particles into a dense, tightly packed arrangement.

(d) This close contact allows strong van der Waals forces to overcome repulsive charges, forming a solid mass called a cake.

(e) This process is called caking, and the resulting compact mass resists redispersion even with vigorous mechanical shaking.

Final Answer: Caking.

Answer: (B)

Go Back to Question 58

Q59.

Solution

Concept:

The preparation of physiological liquid formulations requires aligning osmotic parameters with blood plasma to prevent cellular structural damage after administration. Colligative properties vary with solute particle concentration, providing a reliable baseline for these calculations.

Solution:

(a) Colligative properties, such as freezing point depression, depend on the total number of solute particles dissolved in a solvent.

(b) Human blood plasma, tear secretions, and cerebrospinal fluid maintain a constant osmotic profile under normal health conditions.

(c) The freezing point of these biological fluids is universally taken as negative 0.52 degrees Celsius.

(d) Pharmaceutical solutions that match this freezing point depression value are classified as isotonic with human tissues.

(e) Formulators use these values to adjust tonicity, ensuring that intravenous or ophthalmic products do not cause cellular crenation or lysis.

Final Answer: -0.52°C.

Answer: (A)

Go Back to Question 59

Q60.

Solution

Concept:

Analytical limit testing uses controlled precipitation reactions to identify and monitor trace impurities within a sample matrix. Adding selective acids prevents the precipitation of other ionic species, ensuring test specificity for the target analyte.

Solution:

(a) The limit test for sulfates uses a reaction where barium chloride introduces free barium ions into the sample solution.

(b) These barium ions react with any sulfate impurities present to form an insoluble precipitate of barium sulfate.

(c) However, other ions like carbonate, phosphate, or oxalate can also react with barium to form insoluble salts under neutral conditions.

(d) Introducing dilute hydrochloric acid into the reaction mixture lowers the pH, which prevents these alternative barium salts from precipitating.

(e) Barium sulfate remains highly insoluble even in this strongly acidic environment, ensuring that any visible turbidity is due to sulfate impurities.

Final Answer: Dilute Hydrochloric acid or Acetic acid depending on sample matrix, but specifically Hydrochloric acid to prevent precipitation of other barium salts.

Answer: (C)

Go Back to Question 60

Q61.

Solution

Concept:

Industrial tablet compression uses mechanical punch assemblies to apply high pressure to granular beds held inside a die cavity. Deficiencies in granule moisture content, improper binder distribution, or excessive elastic recovery profiles after compression can cause mechanical failures that ruin the structural integrity of the final dosage form.

Solution:

(a) Capping is a specific manufacturing defect where the upper or lower crown of a compressed tablet separates horizontally from the main body.

(b) Lamination represents a closely related failure mechanism where the internal structure of the compact splits into multiple distinct horizontal layers.

(c) These problems happen when air remains trapped inside the granular bed during the rapid downstroke of the upper punch assembly.

(d) Additionally, if the formulation has high elastic recovery, the compact expands vertically as it exits the die, breaking internal particle bonds.

(e) Mitigating these defects requires adjusting the compression speed, introducing a pre-compression step to clear air, or optimizing the moisture profile.

Final Answer: Capping or Lamination.

Answer: (B)

Go Back to Question 61

Q62.

Solution

Concept:

Chemical modification strategies aim to balance the lipophilic and hydrophilic parameters of a drug candidate to optimize its pharmacokinetics. Converting ionized polar groups into non-polar configurations alters how the molecule interacts with biological cell membranes.

Solution:

(a) Carboxylic acid groups readily ionize at physiological pH, creating negatively charged structures that face high resistance when crossing lipid membranes.

(b) Converting this organic acid group into an ester link removes the net charge, significantly increasing the lipophilicity of the chemical structure.

(c) This modification allows the molecule to partition more efficiently into the hydrophobic core of the intestinal or blood-brain barriers.

(d) Once inside the target tissues, non-specific intracellular esterase enzymes hydrolyze the ester link to release the active parent drug.

(e) This prodrug design enhances passive membrane absorption, optimizing oral bioavailability and improving cellular uptake profiles.

Final Answer: Increasing lipophilicity, thereby enhancing passive membrane permeability.

Answer: (B)

Go Back to Question 62

Q63.

Solution

Concept:

Quantitative safety margins describe the safe operating range of a therapeutic entity by evaluating its effective dose against its toxic dose profiles. This ratio serves as a primary marker during drug development to balance therapeutic benefits against toxic risks.

Solution:

(a) The therapeutic index is a standard safety metric calculated as the ratio of the median toxic dose to the median effective dose.

(b) The median effective dose represents the exact amount required to produce a defined therapeutic response in fifty percent of a population.

(c) The median toxic dose defines the concentration that causes a specific adverse reaction in fifty percent of tested subjects.

(d) A larger ratio indicates a wide margin of safety, meaning the concentration needed for toxicity is much higher than the therapeutic dose.

(e) Agents with a narrow ratio, such as digoxin or warfarin, require continuous therapeutic drug monitoring to prevent severe toxicity.

Final Answer: Therapeutic Index.

Answer: (B)

Go Back to Question 63

Q64.

Solution

Concept:

The structural layout of the human respiratory tract is divided into distinct zones based on whether the anatomy supports active gas exchange. The boundary between these zones marks the transition from simple air transport tubes to tissues lined with gas-exchanging structures.

Solution:

(a) The conducting zone consists of the trachea, bronchi, and bronchioles, which filter, warm, and humidify air entering the lungs.

(b) This zone contains structural cartilage and smooth muscle walls but lacks alveoli, making it unable to participate in gas exchange.

(c) Terminal bronchioles represent the final branching path of this conducting network, marking the end of anatomical dead space.

(d) The respiratory bronchioles emerge directly from these terminal structures, featuring small alveoli budded along their thin epithelial walls.

(e) This appearance of alveoli marks the start of the respiratory zone, where oxygen and carbon dioxide pass into surrounding capillaries.

Final Answer: Terminal bronchioles.

Answer: (A)

Go Back to Question 64

Q65.

Solution

Concept:

Quantitative leaf microscopy uses distinct cellular counts per unit surface area to verify the identity and purity of crude botanical samples. These numerical parameters remain constant within a species, resisting changes from environmental or agricultural variations.

Solution:

(a) Quantitative microscopy utilizes several distinct tracking parameters, including vein-islet boundaries, palisade cell ratios, and stomatal counts.

(b) The stomatal number defines the average count of stomata present per square millimeter of the epidermal leaf surface.

(c) This value can vary between the upper and lower surfaces of a single leaf, requiring standardization during sampling.

(d) In contrast, the stomatal index measures the percentage of epidermal cells that have differentiated into stomatal complexes.

(e) Measuring the absolute stomatal number provides a specific diagnostic key to differentiate authentic medicinal leaves from closely related substitutes.

Final Answer: Stomatal Number.

Answer: (B)

Go Back to Question 65

Q66.

Solution

Concept:

Enzyme kinetics map how structural inhibitors alter substrate binding affinities and maximum reaction velocities through specific interactions at active or allosteric sites. These changes can be tracked on standard velocity plots to identify the mechanism of inhibition.

Solution:

(a) Competitive inhibitors possess chemical structures that mimic the native substrate, allowing them to bind reversibly to the active site.

(b) This binding blocks the substrate from accessing the active site, which lowers the initial rate of reaction at low substrate concentrations.

(c) However, adding excess substrate can displace the inhibitor from the active sites through mass action effects.

(d) Because high substrate levels can fully displace the inhibitor, the enzyme system can still reach its maximum velocity (V_{max}).

(e) Displacing the inhibitor requires higher substrate levels, which shifts the Michaelis constant (K_m) upward on the velocity plot.

Final Answer: V_{max} remains unchanged, K_m increases.

Answer: (B)

Go Back to Question 66

Q67.

Solution

Concept:

Family planning strategies use surgical and temporary contraceptive interventions to regulate reproductive parameters across populations. Permanent techniques isolate or sever anatomical transport pathways to prevent the migration of mature gametes.

Solution:

(a) Permanent male contraception requires disrupting the structural pathways that carry mature spermatozoa from the epididymis to the ejaculatory ducts.

(b) Vasectomy is a surgical procedure where a clinician accesses, cuts, and seals the bilateral vas deferens segments.

(c) This occlusion blocks spermatozoa from entering the seminal fluid without altering testosterone production or fluid volume.

(d) In contrast, tubectomy is a permanent female contraceptive method that requires surgical ligation of the fallopian tubes.

(e) Non-surgical alternatives like intrauterine devices or hormonal implants are temporary methods that must be replaced over time.

Final Answer: Vasectomy.

Answer: (B)

Go Back to Question 67

Q68.

Solution

Concept:

Pharmaceutical business administration uses financial and inventory ratios to measure capital efficiency and track material movement speeds. These metrics identify how quickly cash invested in raw components or finished products is recovered through sales.

Solution:

(a) The inventory turnover ratio calculates the frequency with which an organization replaces its average inventory stock over a set time window.

(b) This value is derived by dividing the total cost of goods sold during the year by the average inventory value.

(c) A high turnover ratio indicates efficient inventory management, minimizing capital stagnation and reducing holding costs.

(d) Conversely, a low ratio suggests sluggish sales velocity, excess stock accumulation, or capital tied up in slow-moving formulations.

(e) Monitoring this turnover parameter helps managers optimize procurement cycles and align warehouse capacity with market demand.

Final Answer: Inventory turnover ratio.

Answer: (B)

Go Back to Question 68

Q69.

Solution

Concept:

The male reproductive system relies on distinct endocrine cell populations within the testicular parenchyma to drive gametogenesis and maintain secondary sex characteristics. These cell networks respond to pituitary gonadotropins through precise feedback loops.

Solution:

(a) The interstitial cells of Leydig are located within the connective tissue spaces that surround the seminiferous tubules.

(b) These specialized endocrine structures express surface receptors that bind luteinizing hormone released from the anterior pituitary gland.

(c) Activating these receptors stimulates the enzymatic conversion of cholesterol into testosterone, the primary male sex hormone.

(d) Testosterone is required to drive spermatogenesis inside the seminiferous tubules and regulate secondary somatic changes.

(e) Pathological damage to the Leydig cell network decreases testosterone synthesis, causing low systemic hormone levels and impaired fertility.

Final Answer: Testosterone.

Answer: (C)

Go Back to Question 69

Q70.

Solution

Concept:

The spatial configuration of organic configurations determines how a molecule interacts with plane-polarized light and stereospecific biological receptors. Structural asymmetry arises when a central atom binds to completely different chemical functional groups.

Solution:

(a) An organic molecule exhibits optical isomerism when its three-dimensional structure cannot be superimposed on its mirror image.

(b) This configuration requires a tetrahedral carbon atom bonded to four entirely different functional groups or atomic chains.

(c) This asymmetric carbon atom serves as a chiral center, establishing a localized point of structural asymmetry within the molecule.

Final Answer: Chiral center (Asymmetric carbon).

Answer: (B)

Go Back to Question 70

Q71.

Solution

Concept:

The clinical management of toxic chemical exposures requires the timely administration of specific pharmacological antidotes that reverse metabolic or hematological disruptions. Antagonizing or replacing depleted essential homeostatic molecules can restore physiological function and halt localized or systemic internal hemorrhages.

Solution:

(a) Warfarin is an oral anticoagulant that exerts its therapeutic activity by inhibiting the critical multi-step enzyme vitamin K epoxide reductase.

(b) This enzymatic blockade prevents the recycling of oxidized vitamin K back into its physiologically functional, reduced hydroquinone state.

(c) Reduced vitamin K is a necessary cofactor for the gamma-glutamyl carboxylase enzyme that activates coagulation factors two, seven, nine, and ten.

(d) Depletion of these active clotting factors delays the cascade mechanism, creating a severe systemic bleeding risk during an overdose.

(e) Administering exogenous vitamin K1 bypasses the blocked reductase enzyme entirely, allowing the hepatic synthesis of functional clotting factors to resume.

Final Answer: Vitamin K1 (Phytomenadione).

Answer: (B)

Go Back to Question 71

Q72.

Solution

Concept:

Analytical diagnostic test arrays identify macro-molecular structural components in complex biological fluids through coordinated colorimetric complexation steps. These diagnostic color modifications happen when structural functional groups interact with alkaline polyvalent metal solutions to generate distinctive light-absorbing states.

Solution:

(a) The identification of specific peptide configurations within an unknown biological serum sample can be accomplished through standard colorimetric testing.

(b) The biuret test is a highly reliable analytical technique designed to confirm the macroscopic presence of repeating peptide chemical links.

(c) The test protocol introduces dilute copper sulfate solution into the liquid sample under strongly basic conditions.

(d) The divalent copper ions coordinate with the unshared electron pairs on the peptide nitrogen atoms within the protein backbone.

(e) This specific coordination reaction yields a highly stable, distinctive violet-purple coordination complex that can be quantified using spectrophotometric analysis.

Final Answer: Biuret test.

Answer: (B)

Go Back to Question 72

Q73.

Solution

Concept:

National vector-borne disease control programs structure their management protocols around disrupting the biological life cycles of systemic parasitic organisms. Targeting localized geographic vectors minimizes disease transmission and shields susceptible human populations from long-term lymphatic complications.

Solution:

(a) Lymphatic filariasis is a chronic public health condition caused by filarial nematodes such as Wuchereria bancrofti or Brugia malayi.

(b) These parasitic worms are transmitted to human hosts through vector bites from infected Culex or Anopheles mosquito populations.

(c) The mature parasites settle within the regional lymphatic system, causing inflammation and mechanical blockages that prevent proper fluid drainage.

(d) Chronic blockages lead to extreme fluid retention, presenting clinically as severe lower limb swelling known as elephantiasis.

(e) Public health campaigns focus on mass drug administration using diethylcarbamazine alongside vector control programs to eradicate breeding grounds.

Final Answer: Lymphatic filariasis.

Answer: (B)

Go Back to Question 73

Q74.

Solution

Concept:

Compounding specific liquid oral configurations requires careful verification of physical parameters to prevent solute precipitation at ambient temperatures. Modifying the solvent system or adding non-toxic cosolvents can alter the solvation properties of the vehicle without changing the chemical structure of the drug.

Solution:

(a) A physical incompatibility occurs when a prescribed solute mass exceeds its maximum saturation solubility limit within a designated vehicle volume.

(b) Attempting to dissolve the excess material results in a heterogeneous system with undissolved solid particles sitting at the bottom.

(c) The pharmacist can resolve this problem by introducing small, permissible fractions of non-toxic cosolvents such as glycerin or propylene glycol.

(d) This addition lowers the overall polarity of the liquid vehicle, aligning its solubility parameters with those of the solute.

(e) This modification dissolves the solid particles completely, ensuring uniform dosage delivery while preserving the underlying pharmacological activity of the formulation.

Final Answer: Utilizing a permissible cosolvent or adjusting the solvent volume within safe limits.

Answer: (C)

Go Back to Question 74

Q75.

Solution

Concept:

Structural lipid biochemistry distinguishes different macromolecular groups by analyzing their core alcohol backbones and attached functional side chains. Genetic mutations that affect the lysosomal degradation of specialized lipid structures can cause dangerous accumulations inside central nervous system networks.

Solution:

(a) Glycerophospholipids utilize a standard glycerol core molecule to bind fatty acid chains and a polarized phosphate head group.

(b) In contrast, sphingolipids lack a glycerol center, relying instead on a long-chain amino alcohol backbone during structural assembly.

(c) This unique core amino alcohol structure is sphingosine, which possesses an unsaturated hydrocarbon chain containing eighteen total carbon atoms.

(d) Modifying the primary amino group of sphingosine with a fatty acid creates a ceramide, the structural building block for advanced sphingolipids.

(e) Sphingomyelin is a key sphingolipid found in myelin sheath wraps that protect axonal nerve conduction fibers in the brain.

Final Answer: Sphingosine.

Answer: (B)

Go Back to Question 75

Q76.

Solution

Concept:

Institutional hospital practice relies on multidisciplinary clinical committees to manage internally approved medication lists and maximize therapeutic outcomes. These advisory groups establish evidence-based guidelines that coordinate drug choices with local economic parameters.

Solution:

(a) The Pharmacy and Therapeutics Committee is a collaborative advisory body that serves as the core connection between medical staff and pharmacy operations.

(b) The committee composition includes licensed physicians, clinical pharmacists, nursing administrators, and hospital management representatives working together.

(c) The primary objective of this group is to evaluate current clinical data and design the official institutional drug formulary list.

Final Answer: It is an advisory group of physicians, pharmacists, and other health professionals that ensures safe and effective drug use in the hospital.

Answer: (B)

Go Back to Question 76

Q77.

Solution

Concept:

Statutory national drug regulations categorize therapeutic compounds into distinct legal schedules to manage distribution networks and minimize prescription errors. These schedules define the exact cautionary statements that must appear on packaging labels.

Solution:

(a) The Drugs and Cosmetics Act provides a legal framework to govern the import, manufacture, distribution, and retail sale of therapeutic compounds.

(b) Schedule H contains a comprehensive registry of prescription medications that carry significant potential for abuse or adverse reactions.

(c) The law mandates that Schedule H formulations can only be sold to consumers upon presenting a valid medical prescription.

(d) Additionally, the primary container label must display a prominent warning layout indicating these specific retail restrictions.

(e) This packaging control system prevents unsafe self-medication habits and helps track the distribution of potent therapeutic agents.

Final Answer: Schedule H.

Answer: (A)

Go Back to Question 77

Q78.

Solution

Concept:

Cardiovascular circulation patterns use specialized muscular chambers and directional mechanical valves to maintain forward volumetric movement through systemic loops. These valves respond to changing pressure vectors during the cardiac cycle, preventing backflow.

Solution:

(a) Deoxygenated blood returns from systemic tissues through the vena cava, entering the thin-walled right atrium during diastole.

(b) The blood moves through an open atrioventricular valve into the right ventricle as the heart muscle expands.

(c) The tricuspid valve consists of three distinct fibrous leaflets positioned at this right atrioventricular junction.

(d) During ventricular systole, the right ventricle contracts sharply to pump the blood volume forward into the pulmonary artery.

(e) The resulting rise in internal pressure forces the tricuspid leaflets to close, preventing backflow into the right atrium.

Final Answer: Tricuspid valve.

Answer: (A)

Go Back to Question 78

Q79.

Solution

Concept:

Pharmacognostic quality control protocols use distinctive chemical color reactions to verify the identity and purity of raw bark samples. These testing methods use selective reagents to oxidize specific functional groups on secondary metabolites, producing identifiable color changes.

Solution:

(a) Cinchona bark contains multiple quinoline alkaloids, such as quinine and quinidine, which possess a specific methoxy group on the quinoline core.

(b) The thalleioquin test is a standard chemical color reaction used to identify these specific cinchona structures.

(c) The test protocol treats an acidic extract of the sample with a few drops of bromine water followed by dilute ammonia solution.

(d) This sequence drives a selective halogenation and subsequent oxidation of the methoxyquinoline ring.

(e) This chemical reaction produces a striking emerald green coloration, confirming the presence of authentic cinchona alkaloids.

Final Answer: Thalleioquin test.

Answer: (A)

Go Back to Question 79

Q80.

Solution

Concept:

Epidemiological tracking frameworks classify disease patterns across populations by assessing their distribution, velocity, and baseline frequency. These metrics help public health agencies identify shifts away from expected disease levels.

Solution:

(a) An infectious disease is classified based on its persistence and predictability within a designated population group or geographic territory.

(b) An endemic condition describes a disease that remains constantly present at a steady, baseline level within a specific locality.

(c) The pathogen persists inside local reservoirs or vector loops, causing a steady, predictable number of clinical cases over time.

(d) In contrast, an epidemic occurs when a disease exhibits a sudden, unexpected spike above baseline frequencies within a population.

(e) A pandemic represents a widespread epidemic that crosses international boundaries, affecting multiple continents simultaneously.

Final Answer: Endemic.

Answer: (C)

Go Back to Question 80

Q81.

Solution

Concept:

Industrial drying operations use specialized thermodynamic systems to remove moisture from wet pharmaceutical masses or liquid feeds. Selecting a specific drying technology depends on the thermal stability of the active molecules, the desired flow characteristics, and the target geometric profile of the final dried particles.

Solution:

(a) Spray drying is a continuous unit operation that converts a fluid feed such as a solution, suspension, or emulsion into a dry granular solid.

(b) The operational mechanism introduces the liquid pump feed into a highly pressurized atomization chamber equipped with a rapidly spinning nozzle disk.

(c) This atomization steps breaks the liquid stream into a fine mist of millions of micro-droplets, maximizing the available surface area.

(d) The droplets enter a drying tower where they contact a co-current or counter-current stream of heated air or inert gas.

(e) This large surface-to-volume ratio drives rapid moisture evaporation, lowering the core droplet temperature and preserving heat-sensitive chemical structures.

Final Answer: Spray drying.

Answer: (C)

Go Back to Question 81

Q82.

Solution

Concept:

Quantitative receptor pharmacology evaluates the specific relationships linking drug binding parameters to the magnitude of downstream intracellular biological responses. Ligands are classified into distinct groups based on their maximum achievable efficacy relative to native homeostatic molecules.

Solution:

(a) A full agonist binds selectively to a cell surface receptor and induces a maximal biological response matching the natural system.

(b) In clear contrast, a partial agonist binds tightly to the exact same receptor site but possesses a lower intrinsic activity level.

(c) Even at complete receptor occupancy where every binding site is filled, a partial agonist cannot trigger a maximal response.

(d) Because they occupy the binding sites, these compounds can function as competitive antagonists when administered alongside a full agonist.

(e) This dual pharmacological behavior allows them to stabilize signaling activity, dampening hyperactive states while maintaining a baseline response.

Final Answer: Partial agonist.

Answer: (C)

Go Back to Question 82

Q83.

Solution

Concept:

The histological architecture of the human gastrointestinal tract is optimized to facilitate the breakdown and active absorption of dietary nutrients. Expanding the functional surface area is accomplished through nested structural folding levels along the mucosal and submucosal tissue boundaries.

Solution:

(a) The small intestinal mucosa features multiple layers of physical folding that maximize the effective surface area for passive absorption.

(b) Large, permanent folds called plicae circulares spiral through the sub-mucosal layers to slow down the movement of moving chyme.

(c) Budding directly from these large sheets are small, finger-like mucosal extensions known as intestinal villi.

(d) Each individual villus is covered by a single layer of simple columnar epithelial cells integrated with a central capillary.

(e) The apical plasma membranes of these enterocytes are further modified with microscopic microvilli projections, creating a functional brush border.

Final Answer: Villi.

Answer: (B)

Go Back to Question 83

Q84.

Solution

Concept:

Medical prescriptions utilize abbreviated Latin terminology within the signatura section to standardize instructions regarding daily dosing frequencies. Compounding pharmacists must translate these directional shorthand codes into the patient's native language on the final label.

Solution:

(a) The signatura section contains instructions intended for the patient, which are traditionally transcribed using abbreviated phrases derived from classical Latin.

(b) The notation under evaluation is written as the lowercase shorthand letters t.i.d., which represents the full phrase ter in die.

(c) Converting this phrase into modern nomenclature yields a directional translation specifying three times during a single day.

(d) In comparison, alternative codes include q.d. for once daily, b.i.d. for twice daily, and q.i.d. for four times daily.

(e) Translating these instructions accurately onto the container label ensures proper patient adherence and helps prevent accidental under-dosing.

Final Answer: Three times daily.

Answer: (C)

Go Back to Question 84

Q85.

Solution

Concept:

The evaluation of volatile oils requires identifying major monoterpene or phenylpropanoid components that drive the therapeutic and organoleptic properties of the parent plant. Quantitative chemical screening methods help verify species authenticity and detect industrial adulteration.

Solution:

(a) Peppermint oil is an aromatic volatile fluid obtained through steam distillation of the fresh overground parts of Mentha piperita.

(b) The secondary metabolite profile of this extract contains a complex mixture of monoterpenes, ketones, and organic esters.

(c) The primary component responsible for the characteristic cooling sensation and antispasmodic properties of the oil is menthol.

(d) Chemically, menthol is a saturated monocyclic monoterpene alcohol that stimulates cold-sensitive TRPM8 receptors in mucosal tissues.

(e) In contrast, eugenol is the major constituent in clove buds, whereas carvone drives the aromatic profile of spearmint leaves.

Final Answer: Menthol.

Answer: (B)

Go Back to Question 85

Q86.

Solution

Concept:

Institutional medication distribution systems use specific logistics models to minimize error rates, streamline nursing workflows, and optimize pharmaceutical inventory control. Centralizing dose preparation helps reduce stock hoarding within individual ward floors.

Solution:

(a) In older floor stock models, wards maintain large bulks of common medications, which can lead to increased storage and administration errors.

(b) The unit dose dispensing system is an organized distribution strategy where medications are packaged in single, ready-to-administer forms.

(c) The central pharmacy prepares, labels, and distributes these single-dose packages into individualized patient bins within a medication cart.

(d) This centralized control reduces the time nurses spend preparing doses and ensures verification steps before clinical administration.

(e) This logistically structured workflow minimizes inpatient medication errors, cuts down drug waste, and allows accurate billing for utilized items.

Final Answer: Unit dose dispensing system.

Answer: (C)

Go Back to Question 86

Q87.

Solution

Concept:

Public health prevention models organize interventions into chronological tiers based on the clinical status of the target population and the stage of pathogenesis. Preventive strategies focus on modifiable environmental and lifestyle behaviors to reduce disease risk.

Solution:

(a) Primordial prevention targets social and environmental conditions to block the initial emergence of harmful lifestyle behaviors or risk factor patterns.

(b) Primary prevention implements specific interventions such as active immunizations or dietary modifications to prevent disease onset in healthy populations.

(c) Educating individuals to adjust mineral intake profiles helps regulate homeostatic mechanisms before structural cardiovascular injury happens.

(d) In contrast, secondary prevention uses diagnostic screening tests to identify and treat asymptomatic pathological conditions early.

(e) Tertiary prevention focuses on rehabilitation and management of established, symptomatic chronic conditions to mitigate permanent functional disabilities.

Final Answer: Primary prevention.

Answer: (A)

Go Back to Question 87

Q88.

Solution

Concept:

Quantitative analytical calculations use volumetric and molarity equations to determine the exact solute mass required to compound specific solution volumes. Standard definitions define molar concentrations based on the solute weight dissolved per unit volume.

Solution:

(a) Molarity is defined as the total number of moles of a designated chemical solute dissolved per single liter of solution volume.

(b) One mole of a substance represents its formula molecular weight expressed in grams, which for sodium hydroxide equals exactly forty grams.

(c) The required specification demands a final volume of two liters at a fixed concentration parameter of 0.5 moles per liter.

(d) Multiplying the volume by the target molarity indicates that exactly one mole of sodium hydroxide is required for the formulation.

(e) Since one mole of this inorganic base weighs forty grams, matching this mass satisfies the analytical compounding criteria.

Final Answer: 40 grams.

Answer: (B)

Go Back to Question 88

Q89.

Solution

Concept:

Chemical limit testing uses selective organic reagents to form identifiable coordination complexes with target trace impurities in basic media. These specific interactions drive key changes in light absorption, which are evaluated through colorimetric comparison.

Solution:

(a) The official limit test for iron uses an analytical reaction that takes place under basic conditions established by adding ammonia.

(b) Iron impurities may exist as a mixture of trivalent ferric and divalent ferrous oxidation states within the raw sample matrix.

(c) Thioglycolic acid serves a dual role in this test, starting as a reducing agent that converts ferric iron into ferrous iron.

(d) This uniform reduction is necessary because the reagent reacts selectively with the divalent ferrous state to form the target complex.

(e) The reduced ferrous ions react with thioglycolic acid in the ammoniacal medium to form a water-soluble coordination complex.

Final Answer: It reduces ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}) and forms a soluble purple complex.

Answer: (B)

Go Back to Question 89

Q90.

Solution

Concept:

The rate of renal drug elimination depends on passive non-ionic back-diffusion across the lipid bilayer structure of nephron tubules. Changing the ionization state of an excreted compound inside the filtrate can block tubular reabsorption.

Solution:

(a) Weak bases like amphetamines exist in an equilibrium between un-ionized, lipid-soluble forms and ionized, water-soluble forms.

(b) In neutral or basic urine, these weak bases remain un-ionized, allowing them to pass back through the tubular epithelium.

(c) Administering ammonium chloride drops the pH of the luminal fluid, shifting the base into its protonated, conjugate acid state.

(d) This charged structure cannot easily traverse the hydrophobic cell membranes, trapping the molecules inside the tubular lumen.

(e) This process, known as ion trapping, blocks passive reabsorption and accelerates the elimination of the basic toxicant into the urine.

Final Answer: Acidification of urine using ammonium chloride.

Answer: (B)

Go Back to Question 90

Q91.

Solution

Concept:

The chemical shelf stability of liquid pharmaceutical formulations can be significantly compromised by oxidative degradation pathways driven by dissolved oxygen and trace free radical interactions. Incorporating sacrificial water-soluble reducing agents preserves vulnerable chemical structures by altering the overall redox potential of the system.

Solution:

(a) Auto-oxidation involves a series of free radical chain reactions containing distinct initiation, propagation, and termination phases.

(b) Water-soluble drug vehicles readily dissolve atmospheric oxygen, which initiates the oxidative breakdown of active chemical groups.

(c) Antioxidants are classified into different functional mechanisms based on their solubility profile and physical method of action.

(d) Sodium metabisulfite is a highly polar inorganic salt that functions as an effective, water-soluble sacrificial reducing agent.

(e) This compound reacts preferentially with dissolved oxygen and circulating free radicals, protecting the active drug molecules from degradation.

Final Answer: Sodium metabisulfite.

Answer: (B)

Go Back to Question 91

Q92.

Solution

Concept:

The systemic regulation of electrolyte balances and metabolic homeostatic states depends heavily on steroid signaling loops driven by the adrenal cortex. Chronic pathomorphological destruction of these outer glandular sheets disrupts internal feedback mechanisms, triggering multi-system endocrine crises.

Solution:

(a) The adrenal cortex is histologically organized into three structural layers that synthesize specific mineralocorticoid and glucocorticoid hormones.

(b) Addison's disease represents an endocrine condition characterized by progressive autoimmune destruction or atrophy of the entire adrenal cortex.

(c) This tissue damage severely limits the synthesis of both cortisol and aldosterone, altering systemic physiological properties.

(d) A lack of aldosterone impairs sodium retention in the distal tubules, leading to severe hyponatremia and postural hypotension.

(e) Concurrently, the cortisol deficiency alters carbohydrate processing, causing profound hypoglycemia, muscle weakness, and hyperpigmentation from uninhibited pituitary feedback.

Final Answer: Addison's disease.

Answer: (B)

Go Back to Question 92

Q93.

Solution

Concept:

Pharmacognostic quality screening coordinates specialized extraction and oxidation steps to isolate and verify the presence of specific anthraquinone glycoside structures. Modifying the analytical sequence allows for the clear differentiation of complex O-glycosides from highly stable C-glycosides.

Solution:

(a) The classic Borntrager test identifies free anthraquinone aglycones but fails if the core molecules are bound as stable glycosides.

(b) The modified Borntrager test introduces ferric chloride to act as an oxidizing agent alongside dilute hydrochloric acid.

(c) This combination drives the oxidative cleavage of resilient C-carbon bonds linking the sugar to the anthracenone core.

(d) The liberated aglycones are extracted using an organic solvent like ether or chloroform, which separates into a distinct layer.

(e) Shaking this organic layer with dilute ammonia shifts the isolated aglycones into a red-colored ammoniacal phase.

Final Answer: Modified Borntrager's test.

Answer: (A)

Go Back to Question 93

Q94.

Solution

Concept:

The structural boundary of living cellular systems relies on amphipathic fluid matrices designed to regulate passive transport parameters while supporting signaling proteins. The spontaneous self-assembly of these dynamic boundaries depends on matching the polar profiles of the structural molecules with the surrounding aqueous media.

Solution:

(a) The plasma membrane is organized around a fluid mosaic model consisting of an amphipathic lipid bilayer matrix.

(b) Phospholipids represent the primary structural lipids that form the baseline framework of this dynamic cellular barrier.

(c) Each phospholipid molecule contains a hydrophilic, polar phosphate head group linked to two hydrophobic, non-polar fatty acid tails.

(d) When exposed to aqueous environments, these molecules spontaneously align to minimize the thermodynamic free energy of the system.

(e) The non-polar tails sequester inward to form a hydrophobic core, while the polar heads face outward toward the aqueous compartments.

Final Answer: Phospholipid.

Answer: (B)

Go Back to Question 94

Q95.

Solution

Concept:

Clinical qualitative urinalysis uses transition metal redox reactions to monitor carbohydrate excretion pathways through the renal filtration barriers. Specific chemical color alterations track the non-enzymatic reduction of cupric ions under basic high-temperature conditions.

Solution:

(a) Benedict's qualitative reagent contains a mixture of copper sulfate, sodium citrate, and sodium carbonate dissolved in an aqueous vehicle.

(b) Carbohydrates containing free, unbonded aldehyde or ketone functional groups can act as highly active reducing agents.

(c) Heating a urine specimen containing glucose with this reagent drives a non-enzymatic oxidation-reduction reaction sequence.

(d) The reducing sugars convert the soluble blue cupric ions into an insoluble brick-red precipitate of cuprous oxide.

(e) The intensity of this precipitate provides a semi-quantitative baseline to estimate the level of glucosuria in gestational diabetes panels.

Final Answer: Reducing sugars like glucose.

Answer: (B)

Go Back to Question 95

Q96.

Solution

Concept:

National health initiatives structure administrative and clinical frameworks to combine reproductive counseling with mandatory pediatric preventative measures. Unifying these services optimizes maternal health tracking and expands immunization coverage across rural population blocks.

Solution:

(a) The Ministry of Health and Family Welfare coordinates maternal and infant health services through structured national strategy models.

(b) The RMNCH+A framework represents a strategic approach covering Reproductive, Maternal, Newborn, Child, and Adolescent Health priorities.

(c) This national program links different stages of the reproductive lifecycle to ensure continuous care across vulnerable demographics.

(d) The framework integrates family planning counseling directly with postnatal monitoring and essential infant immunization schedules.

(e) This clinical coordination helps reduce maternal and infant mortality rates by improving service access in rural regions.

Final Answer: Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCH+A).

Answer: (B)

Go Back to Question 96

Q97.

Solution

Concept:

Statutory pharmaceutical jurisprudence organizes quality deviations into distinct legal categories to regulate manufacturing practices and protect public health. These definitions classify products based on labeling accuracy, structural contamination, or unauthorized substitution.

Solution:

(a) The Drugs and Cosmetics Act provides clear statutory definitions to distinguish between misbranded, spurious, and adulterated drug products.

(b) A drug is legally classified as adulterated if it contains filthy, putrid, or decomposed organic matter.

(c) This classification also applies if a product is prepared or packed under insanitary conditions that allow microbial contamination.

(d) In contrast, misbranded drugs feature deceptive labeling layouts, incorrect text positioning, or missing cautionary statements.

(e) Spurious drugs represent fraudulent imitations where an unauthorized substance replaces the genuine active pharmaceutical ingredient entirely.

Final Answer: Adulterated drug.

Answer: (C)

Go Back to Question 97

Q98.

Solution

Concept:

Hospital materials management coordinates purchasing loops to maximize operational capital flow and reduce material holding costs inside medical warehouses. Supply logistics models track dispensing speeds to optimize product ordering schedules.

Solution:

(a) Standard inventory strategies use bulk storage models that can tie up institutional capital and introduce risks of product expiration.

(b) The Just-In-Time procurement system is a logistics strategy designed to minimize stock levels inside storage areas.

(c) This approach schedules supplier deliveries to match the real-time dispensing demands of clinical units.

(d) Materials arrive at the pharmacy unit right before clinical use, reducing average holding costs toward zero.

(e) This procurement strategy requires reliable supplier channels and electronic stock tracking tools to prevent institutional shortages.

Final Answer: Just-In-Time (JIT) procurement system.

Answer: (B)

Go Back to Question 98

Q99.

Solution

Concept:

Pharmacological diuresis involves blocking specific ionic transport systems along the nephron structures to accelerate fluid elimination. These renal modifications can alter systemic electrolyte profiles, demanding regular plasma monitoring to avoid cardiac conduction disruptions.

Solution:

(a) Loop diuretics like furosemide bind selectively to the sodium-potassium-chloride cotransporter in the thick ascending limb of the loop of Henle.

(b) This binding blocks the reabsorption of these three key ions, increasing the solute concentration inside the tubular lumen.

(c) This high solute load drives water excretion but also increases sodium delivery to the downstream distal nephron segments.

(d) The elevated sodium load stimulates aldosterone-driven exchange systems, accelerating potassium excretion into the urine.

Final Answer: Hypokalemia.

Answer: (B)

Go Back to Question 99

Q100.

Solution

Concept:

Environmental toxicology analyzes the pathological tracking systems and biochemical mechanisms behind heavy metal accumulation in somatic structures. Chronic exposure to trace industrial pollutants can cause permanent neurological and hematological damage in developing pediatric populations.

Solution:

(a) Ingesting or inhaling lead-based dust from deteriorating industrial surface coatings introduces divalent heavy metal ions into systemic circulation.

(b) Lead ions mimic essential calcium and zinc cofactors, disrupting multiple enzyme systems throughout the body.

(c) This heavy metal blocks enzymes like delta-aminolevulinic acid dehydratase, which impairs heme synthesis and causes microcytic anemia.

(d) In the central nervous system, lead blocks NMDA receptors and increases oxidative stress, altering neurodevelopmental parameters.

(e) This specific chronic heavy metal poisoning condition is clinically termed plumbism, presenting as cognitive delays and peripheral neuropathies.

Final Answer: Chronic heavy metal toxicology (Plumbism).

Answer: (B)

Go Back to Question 100

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	A	3	C	4	B	5	B
6	B	7	C	8	B	9	A	10	B
11	B	12	B	13	A	14	B	15	A
16	B	17	B	18	B	19	A	20	A
21	B	22	C	23	A	24	B	25	C
26	C	27	A	28	B	29	B	30	C
31	B	32	C	33	B	34	A	35	B
36	B	37	B	38	B	39	C	40	B
41	B	42	B	43	B	44	B	45	B
46	B	47	A	48	C	49	B	50	B
51	B	52	B	53	B	54	C	55	B
56	B	57	B	58	B	59	A	60	C
61	B	62	B	63	B	64	A	65	B
66	B	67	B	68	B	69	C	70	B
71	B	72	B	73	B	74	C	75	B
76	B	77	A	78	A	79	A	80	C
81	C	82	C	83	B	84	C	85	B
86	C	87	A	88	B	89	B	90	B
91	B	92	B	93	A	94	B	95	B
96	B	97	C	98	B	99	B	100	B