

PROVISIONAL ANSWER KEY

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Exam:	Assistant Research Officer (Chemistry)
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Department	Ayurveda Medical Education

Question1:-The following is not a process in embedding in histopathology

A:-Fixation

B:-Hydration

C:-Cleaning

D:-Sectioning

Correct Answer:- Option-B

Question2:-True regarding electron microscope

A:-Transmission electron microscope needs heavy metal precipitation to stain tissues

B:-Scanning electron microscope provides 3-D image of the specimen

C:-Resolution of scanning microscope is greater than transmission microscope

D:-Transmission microscope is used to view the surface of solid specimen

Correct Answer:- Option-C

Question3:-Find the mismatch pair of stains

A:-Von Gieson : Collagen

B:-Alcain Blue : Mucin

C:-Azan : Epithelium/Connective tissue

D:-Masson's trichome : Chromosome

Correct Answer:- Option-D

Question4:-Which among theses is not true about real time PCR ?

A:-Detection time is shorter

B:-There is no amplification bias

C:-Can be done for fresh tissues as well as fixed tissues

D:-Can be used for monitoring drug therapy

Correct Answer:- Option-B

Question5:-Which among the following techniques use electrospray ionization ?

A:-Liquid chromatography and MS

B:-Luminometry

C:-Atomic absorption spectrometry

D:-Nuclear magnetic resonance

Correct Answer:- Option-A

Question6:-Ion suppression in mass spectroscopy occurs due to

A:-Use of acetic or formic acid

B:-Use of surface tension lowering agents

C:-Post column addition of acids and solvent carriers

D:-Presence of less volatile compounds

Correct Answer:- Option-D

Question7:-The stray light in spectrophotometer effects mainly

A:-High absorbance range

B:-UV range

C:-Low absorbance range

D:-Lower range of linearity

Correct Answer:- Option-A

Question8:-The movement of buffer ions and solvent relative to fixed support in electrophoresis is

- A:-Iontophoresis
- B:-Electroendosmosis
- C:-Zone electrophoresis
- D:-Isoelectric focusing

Correct Answer:- Option-B

Question9:-Quenching in fluorescence refers to

- A:-Decrease in fluorescence due to contamination
- B:-Emission of radiant energy in all directions
- C:-Loss of energy in collision
- D:-Measuring the concentration by photodetector

Correct Answer:- Option-A

Question10:-The ideal GC content of a PCR primer should be

- A:-20-30%
- B:-30-40%
- C:-40-60%
- D:-60-80%

Correct Answer:- Option-C

Question11:-Which of the following statement is true about plant secondary metabolites ?

- i. Play an important role in protecting plants against pathogens.
- ii. Their biosynthesis is influenced by environmental factors.
- iii. Help plants cope under drought stress conditions.

- A:-Only ii
- B:-Only i and ii
- C:-Only i and iii
- D:-All of the above i, ii and iii

Correct Answer:- Option-D

Question12:-Which of the following statement is false ?

- i. Acetyl-CoA is utilized in biosynthesis of flavonoids.
- ii. Malonyl-CoA is important for synthesis of terpenoids.
- iii. Shikimic acid is required for the formation of phenols.

A:-Only i

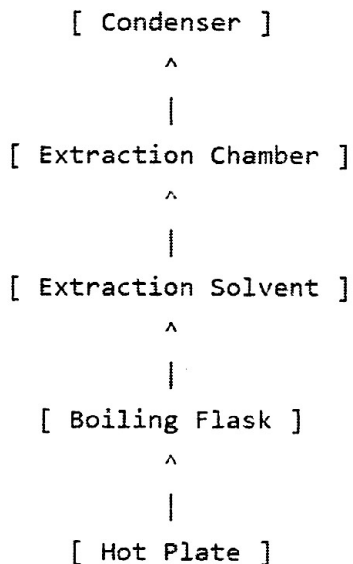
B:-Only i and iii

C:-Only ii

D:-None of the above

Correct Answer:- Option-D

Question13:-Which extraction process for secondary metabolites does the below flowchart best represent ?



A:-Maceration process

B:-Soxhlet extraction

C:-Percolation

D:-Decoction

Correct Answer:- Option-B

Question14:-While performing thin layer chromatography for tannins which of the following mobile phase is used ?

A:-Ethyl acetate : formic acid : glacial acetic acid : water (7.5 : 0.3 : 0.2 : 2)

B:-Toluene : ethyl acetate : diethylamine (7 : 2 : 1)

C:-

Ethyl acetate : formic acid : glacial acetic acid : water (10 : 1.1 : 1.1 : 2.6)

D:-Chloroform : glacial acetic acid : methanol : water (6.4 : 3.2 : 1.2 : 0.8)

Correct Answer:- Option-A

Question15:-If i. R_f = distance travelled by the compound/distance travelled by the solvent front; and

ii. t_R = time at peak maximum; which of the following is true

A:-Both i and ii are associated with ion exchange chromatography

B:-Only ii is associated with thin layer chromatography

C:-Only ii is associated with HPLC

D:-Both i and ii are associated with HPLC

Correct Answer:- Option-C

Question16:-Which of the following techniques is not used for characterization of plant secondary metabolites ?

A:-Mass spectrometry

B:-Transmission electron microscopy

C:-NMR spectroscopy

D:-IR spectroscopy

Correct Answer:- Option-B

Question17:-Which of the following is a plant terpenoid ?

A:-Dolichols

B:-Quercetin

C:-Chalcones

D:-Saponin

Correct Answer:- Option-A

Question18:-Which of the following is true ?

i. Terpenes have antimicrobial and antifungal properties.

ii. Alkaloids show anti-inflammatory activity.

A:-Only i

B:-Only ii

C:-Both i and ii

D:-None of the above

Correct Answer:- Option-C

Question19:-Which of the following statement is false ?

- i. Metabolites present in the sweet pea seed is responsible for bone abnormalities in animals consuming the seeds.
- ii. Pyrrolizidine alkaloids are known to be hepatotoxic in humans.
- iii. Consumption of borneol, a terpene, leads to embryopathy in animals.

A:-Only i

B:-Only ii

C:-Only iii

D:-All of the above i, ii and iii

Correct Answer:- Option-C

Question20:-Which of the following statement is true ?

- i. Coniine is a very potent poison in hemlock.
- ii. Nicotine is used as a very potent insecticide.
- iii. Atropine in low doses used to dilate the pupils of the eye.

A:-Only i

B:-Only ii

C:-Only iii

D:-All of the above i, ii and iii

Correct Answer:- Option-D

Question21:-Which of the following statement is/are incorrect about enzyme or coenzyme ?

- i. Either the enzyme or the coenzyme, but not both are consumed during an enzymatic reaction.
- ii. An enzyme without a prosthetic group is referred to as a coenzyme.
- iii. Coenzymes may be derivatives of vitamins.

A:-Only i and ii

B:-Only ii and iii

C:-Only i and iii

D:-All of the above i, ii and iii

Correct Answer:- Option-A

Question22:-Which of the following statement is/are correct about non-competitive inhibition ?

- i. A non-competitive inhibitor is usually structurally different from the substrate.
- ii. It is assumed to bind at a site on the enzyme molecule that is different from the substrate-binding site.
- iii. V_{max} is reduced in the presence of non-competitive inhibitor, whereas K_m is not altered.

A:-Only i and ii

B:-Only ii and iii

C:-Only i and iii

D:-All of the above i, ii and iii

Correct Answer:- Option-D

Question23:-An enzyme assay determined by a single measurement taken at the termination of the enzymatic reaction is referred to as

A:-Kinetic assay

B:-Fixed-time assay

C:-Terminator assay

D:-Continuous-monitoring assay

Correct Answer:- Option-B

Question24:-An international unit {IU} of enzyme activity is the amount of enzyme that will catalyse the reaction of

A:-One mole of substrate per second

B:-One millimole of substrate per minute

C:-One micromole of substrate per minute

D:-One micromole of substrate per second

Correct Answer:- Option-C

Question25:-Which of the following enzymes catalyses the reaction of glutamate and pyruvate to form 2-oxolutarate and an amino acid ?

A:-Alkaline phosphatase

B:-Creatine kinase

C:-Aspartate aminotransferase

D:-Alanine aminotransferase

Correct Answer:- Option-D

Question26:-All of the following are true regarding alkaline phosphatase

i. Alkaline phosphatase is most commonly associated with the mucosa of the small intestine and the lining of the proximal convoluted tubules of the kidney, bone (osteoblasts), liver and placenta.

ii. Bone and placental isoenzymes of alkaline phosphatase share a common primary structure encoded by the same genetic locus.

iii. Alkaline phosphatase activity present in the sera of healthy adults originates mainly from the liver and bone, with a ratio of approximately 1 : 1.

A:-Only i and ii

B:-Only ii and iii

C:-Only i and iii

D:-All of the above i, ii and iii

Correct Answer:- Option-C

Question27:-Which of the following is functional enzyme in plasma ?

A:-Amylase

B:-Lipase

C:-Plasminogen

D:-Alkaline phosphatase

Correct Answer:- Option-C

Question28:-Long term regulation of enzyme reaction is effected by

A:-Induction and repression of enzyme protein synthesis

B:-Altering the activity of enzyme proteins

C:-Premature breakdown of enzyme protein

D:-Partial denaturation of enzyme proteins

Correct Answer:- Option-A

Question29:-Digestive enzymes belong to the class of

A:-Lyase

B:-Oxidoreductase

C:-Ligases

D:-Hydrolase

Correct Answer:- Option-D

Question30:-All of the following are true regarding mode of action of enzymes

i. Proteolytic enzymes having a serine residues at the active centre are called serine proteases: e.g. renin and pepsin.

ii. In the enzymes of aspartyl protease family, catalysis involves two aspartyl residues, which act as acid-base catalysis. Cathepsin and protease of HIV belong to aspartyl protease.

iii. Chymotrypsin is a serine protease. It cleaves aromatic amino acids (phenyl alanine, tyrosine and tryptophan).

A:-Only i and ii

B:-Only ii and iii

C:-Only i and iii

D:-All of the above i, ii and iii

Correct Answer:- Option-B

Question31:-Which of the following statements are correct about plasma membrane ?

i. Phospholipids containing ethanolamine and serine are mainly present in the inner layer of the lipid bilayer.

ii. Floppases catalyze the outward directed movement of lipids across the cell membrane.

iii. Cholesterol increases fluidity of the membrane at high temperatures and decreases fluidity at low temperatures.

A:-All of the above i, ii and iii

B:-Only i and ii

C:-Only i and iii

D:-Only ii and iii

Correct Answer:- Option-B

Question32:-The ELISA technique most appropriate for measuring the serum concentration of a hapten (mol. wt. < 500 Da) possessing only a single epitope is

A:-Direct ELISA

B:-Indirect ELISA

C:-Sandwich ELISA

D:-Competitive ELISA

Correct Answer:- Option-D

Question33:-The major cell cycle check points are

i. G1/S transition

ii. G2/M transition

iii. Metaphase to anaphase transition

A:-All of the above i, ii and iii

B:-Only i and ii

C:-Only i and iii

D:-Only ii and iii

Correct Answer:- Option-A

Question34:-Sterilization of a solution of the heat-labile coenzyme NADH ensuring preservation of its biochemical integrity is best performed by

A:-Dry heat sterilization at 160 degrees celsius for one hour

B:-Exposure to ethylene oxide gas

C:-Filtration through a 0.22 micrometre cellulose acetate membrane

D:-Tyndallization at 60 degrees celsius for 30 minutes on 3 consecutive days

Correct Answer:- Option-C

Question35:-In the beginning of apoptosis BAK/BAX oligomerization occurs by

A:-Binding of cytochrome c directly to the cytosolic domain of BAX

B:-Cleavage and activation by initiator caspases

C:-Dissociation from anti-apoptotic Bcl-2 proteins

D:-Phosphorylation of BAX/BAK by the PI3K/Akt survival pathway

Correct Answer:- Option-C

Question36:-With regard to Protein Data Bank (PDB), the main limitation of the legacy PDB format resolved by the macromolecular Crystallographic Information Format (mmCIF) is that the legacy PDB format

A:-Cannot store atomic co-ordinates for nucleic acids whereas mmCIF can

B:-Is restricted to representing static structures, whereas mmCIF allows dynamic molecular modelling

C:-Is structurally constrained and cannot accommodate biological assemblies with more than 99,999 atoms

D:-Lacks the ability to map electron density maps, while mmCIF includes raw crystallographic data

Correct Answer:- Option-C

Question37:-The basic structural building block of the clathrin lattice that forms the polyhedral coat of the vesicle is a

A:-Hetero-tetrameric complex consisting of two heavy chains and two light chains arranged in an antiparallel fashion

B:-Polymeric assembly of caveolin proteins forming flask-shaped invaginations

C:-Single polypeptide chain that undergoes self-cleavage to form spherical micelles

D:-Triskelion composed of three heavy chains and three light chains

Correct Answer:- Option-D

Question38:-Coefficient of Variation (CV) is

A:-An absolute measure of dispersion expressed in the same unit as the analyte and therefore provides a direct assessment of accuracy

B:-Calculated as the square root of the variance divided by the number of replicates

C:-Inversely related to the standard deviation and measures the biological variability of a population

D:-The ratio of the standard deviation to the mean, expressed as a percentage making it a measure of analytical precision

Correct Answer:- Option-D

Question39:-A 68-year-old male presents with a high clinical suspicion of metastatic prostate cancer. His serum total PSA level by immunoassay comes back as 4.2 ng/mL (Reference range 4 ng/mL). What is the most likely cause of this lower PSA value than expected ?

A:-Cross-reactivity with prostatic acid phosphatase causing suppression of the signal

B:-High-dose hook effect, where extreme antigen excess saturates both capture and detection antibodies without allowing a sandwich to form

C:-Heterophile antibodies present in the patient's serum binding to the detection antibody and preventing complex formation

D:-Production of an inactive PSA isoform that is not recognized by monoclonal antibodies used in the assay

Correct Answer:- Option-B

Question40:-What is the initial biochemical mechanism of activation of the classical complement pathway ?

A:-C1q binds to the Fc portion of IgG or IgM, leading to a conformational change that activates C1r which then cleaves C1s

B:-Factor D cleaves Factor B to form the C3 convertase, circumventing the need for antibody recognition

C:-Mannose-binding lectin binds to carbohydrate structures on microbial surfaces and directly cleaves C3 into C3a and C3b

D:-Spontaneous hydrolysis of C3 generates C3b, which directly binds to Factor B to form the initial C3 convertase

Correct Answer:- Option-A

Question41:-Which enzyme detoxifies/activates the largest number of xenobiotics ?

A:-Catalase

B:-Glutathione reductase

C:-Cytochrome P450

D:-Superoxide dismutase

Correct Answer:- Option-C

Question42:-Aspirin is an effective anticoagulant which inhibits the enzyme _____, required to produce thromboxane.

A:-Catalase

B:-Carbonic anhydrase

C:-Cytochrome oxidase

D:-Cyclooxygenase

Correct Answer:- Option-D

Question43:-Which phase II reaction of biotransformation decrease the water solubility of drugs ?

A:-Glucuronidation

B:-Acetylation

C:-Glutathione conjugation

D:-Sulphate conjugation

Correct Answer:- Option-B

Question44:-Which property of the drug most enhances its transdermal absorption through the stratum corneum ?

A:-High molecular weight

B:-High lipophilicity and moderate molecular weight

C:-Extremely hydrophilic nature

D:-Strong ionization at physiological pH

Correct Answer:- Option-B

Question45:-What does the therapeutic index of a drug signify ?

A:-Dose that produces maximum effect

B:-Relative safety of the drug

C:-Drug efficacy

D:-Maximum response elicited by the drug

Correct Answer:- Option-B

Question46:-Contact with poison ivy elicits _____ hypersensitivity reaction.

A:-Type I

B:-Type II

C:-Type III

D:-Type IV

Correct Answer:- Option-D

Question47:-Which of the following is derived from the hemp plant *Cannabis sativa* ?

A:-Opium

B:-Marijuana

C:-MDMA

D:-Crack

Correct Answer:- Option-B

Question48:-Absorption of griseofulvin increases with high _____ diet.

A:-Carbohydrate

B:-Fat

C:-Protein

D:-Vitamin

Correct Answer:- Option-B

Question49:-What is the driving force for glomerular filtration ?

A:-Concentration Gradient

B:-Hydrostatic pressure of plasma

C:-High amount of aqueous pores

D:-Hydrostatic pressure of blood flow

Correct Answer:- Option-D

Question50:-Which anti-tubercular drug causes severe hepatotoxicity ?

A:-Isoniazid

B:-Streptomycin

C:-Ethambutol

D:-Pyrazinamide

Correct Answer:- Option-A

Question51:-What is the wave number of an electromagnetic radiation with a wavelength of $5\text{ }\mu\text{m}$?

A:- 200 cm^{-1}

B:- 4000 cm^{-1}

C:- 2000 cm^{-1}

D:- 400 cm^{-1}

Correct Answer:- Option-C

Question52:-Identify the correct statements related to the Born-Oppenheimer approximation.

i. Electrons move much faster than the nuclei

ii. The nuclei are much heavier and move much more slowly than electrons

iii. The total energy of the molecule is expressed by $E_{\text{Total}} = E_{\text{Trans}} + E_{\text{vib}} + E_{\text{Rot}} + E_{\text{Ele}}$

A:-i and ii only

B:-ii and iii only

C:-i and iii only

D:-All of the above

Correct Answer:- Option-D

Question53:-Which of the following correctly represents the relationship between the vibrational frequency of a bond and its force constant ?

A:- $\nu = 1/2\pi(k/\mu)$

B:- $\nu = 1/2\pi(k/\mu)^{1/2}$

C:- $\nu = h/2\pi(k/\mu)$

D:- $\nu = h/2\pi c(k/\mu)^{1/2}$

Correct Answer:- Option-B

Question54:-The number of vibrational degrees of freedom of the ethane molecule is

A:-18

B:-19

C:-12

D:-13

Correct Answer:- Option-A

Question55:-Which of the following molecules are both IR and Raman active ?

i. H₂O

ii. NH₃

iii. CH₄

iv. H₂

A:-i and iii only

B:-ii and iii only

C:-i, ii and iii

D:-All of the above

Correct Answer:- Option-C

Question56:-The correct order of electronic transitions according to the increasing energy is

A:- $n \rightarrow \pi^* < \pi \rightarrow \pi^* < \sigma \rightarrow \sigma^* < n \rightarrow \sigma^*$

B:- $n \rightarrow \pi^* < \pi \rightarrow \pi^* < n \rightarrow \sigma^* < \sigma \rightarrow \sigma^*$

C:- $n \rightarrow \sigma^* < \sigma \rightarrow \sigma^* < \pi \rightarrow \pi^* < n \rightarrow \pi^*$

D:- $\pi \rightarrow \pi^* < n \rightarrow \pi^* < n \rightarrow \sigma^* < \sigma \rightarrow \sigma^*$

Correct Answer:- Option-B

Question57:-Identify the incorrect statement from the following.

A:-The nuclei with odd number of protons and even number of neutrons are NMR active

B:-

The nuclei with even number of protons and neutrons are NMR inactive

C:-The atom with higher electronegativity increases the deshielding of a proton

D:-The atom with lesser electronegativity increases the deshielding of a proton

Correct Answer:- Option-D

Question58:-Which of the following will show ESR spectrum ?

i. Na^+

ii. Cl

iii. H_2

iv. C_6H_6^-

A:-i and ii

B:-ii and iii

C:-iii and iv

D:-ii and iv

Correct Answer:- Option-D

Question59:-ROHF (Restricted Open-Shell Hartree-Fock) method is used for

A:-Closed-shell molecules

B:-The molecules containing one or more unpaired electrons

C:-Radicals and open-shell systems

D:-The molecules containing paired electrons

Correct Answer:- Option-B

Question60:-Choose the correct statement from the following

A:-A Z-matrix explains the molecular geometry using bond lengths, bond angles and dihedral angles.

B:-The bond angle in CO_2 is 104.5° .

C:- NH_3 has trigonal planar geometry.

D:-The AutoCAD software is commonly used along with Gaussian.

Correct Answer:- Option-A

Question61:-An amperometric titration curve shows current decreasing linearly, reaching a minimum and then increasing linearly after the equivalence point. This suggests that

A:-Only analyte is electroactive

B:-Only titrant is electroactive

C:-Both analyte and titrant is electroactive

D:-The electrode is defective

Correct Answer:- Option-C

Question62:-Identify the concentration condition at which detergents work best at removing oily dirt

A:-Below the CMC

B:-At or above the CMC

C:-Equal to zero

D:-Very high, close to the surfactant's solubility limit

Correct Answer:- Option-B

Question63:-Choose the correct statement regarding light scattering behaviour of solutions

A:-Scattering increase in the order - true solution < suspension < colloid.

B:-Colloids scatter due to particle size near light's wavelength; true solutions show negligible scattering; suspensions scatter inconsistently due to settling.

C:-True solutions and suspensions scatter identically.

D:-Suspensions scatter most, due to large stable particles.

Correct Answer:- Option-B

Question64:-A negatively charged gold sol is coagulated separately by NaCl, CaCl₂ and AlCl₃ giving coagulation concentrations of 24 mM, 0.36 mM and 0.009 mM respectively. If the same sol was treated with MgSO₄, what coagulation concentration range would you expect and why ?

A:-Close to 24 mM, since Mg²⁺ behaves like Na⁺ in solution

B:-Close to 0.36 mM, since the effective ion is Mg^{2+} , similar in valency to Ca^{2+}

C:-Close to 0.009 mM, since SO_4^{2-} enhances the coagulating power of Mg^{2+} to match Al^{3+}

D:-Impossible to predict, as coagulation values are unrelated to ionic valency

Correct Answer:- Option-B

Question65:-Identify the electrode preferred for routine pH measurement in clinical and biological laboratories and the reason for this preference

A:-Quinhydrone electrode, because it does not require calibration

B:-Glass electrode, because it produces a visible color change for easy reading

C:-Quinhydrone electrode, because it gives faster readings

D:-Glass electrode, because its response depends only on H^+ ion activity and is unaffected by redox-active substances or protein fouling

Correct Answer:- Option-D

Question66:-The Hammett equation represents a quantitative relationship between

A:-Substituent electronic effects and reaction rate/equilibrium constants

B:-Molecular weight and boiling point

C:-Steric bulk and reaction mechanism

D:-Temperature and reaction rate

Correct Answer:- Option-A

Question67:-If the two higher-priority groups on a double bond lie on opposite sides, the configuration is designated as

A:-Z

B:-E

C:-cis

D:-syn

Correct Answer:- Option-B

Question68:-Arrange the following groups in decreasing order of -I effect :
-NO₂, -F, -COOH, -NH₃⁺

A:- -NH₃⁺ > -NO₂ > -F > -COOH

B:-NO₂ > -NH₃⁺ > -F > -COOH

C:-F > -NO₂ > -COOH -NH₃⁺

D:-COOH > -F > -NO₂ > -NH₃⁺

Correct Answer:- Option-A

Question69:-Assertion (A): Furan is aromatic.

Reason (R): Furan is aromatic because oxygen contributes both of its lone pairs into the π -system, giving a total of 8 π -electrons delocalized over the ring.

A:-Both (A) and (R) are true and (R) is the correct explanation of (A)

B:-Both (A) and (R) are true, but (R) is not the correct explanation of (A)

C:- (A) is true, but (R) is false

D:- (A) is false, but (R) is true

Correct Answer:- Option-C

Question70:-The main contributor to the total ring strain in cyclobutane is

A:-Angle strain

B:-Torsional strain

C:-Transannular strain

D:-Steric strain from bulky groups

Correct Answer:- Option-B

Question71:-An example of acyclic mono terpenoid is

A:-Dipentene

B:- α -Terpinol

C:-Myrcene

D:-Limonene

Correct Answer:- Option-C

Question72:-Vitamin K₁ is chemically known as

A:-Ergocalciferol

B:-Tocopherol

C:-Axerophthol

D:-Phylloquinone

Correct Answer:- Option-D

Question73:-Peppermint oil contains

A:-Menthol

B:-Thymol

C:- α -Pinene

D:-Camphene

Correct Answer:- Option-A

Question74:-Which of the following detectors used in liquid chromatography is also called micro-adsorption detector ?

A:-Electrochemical detectors

B:-Fluorescence detectors

C:-Refractive index detectors

D:-Thermal detectors

Correct Answer:- Option-D

Question75:-Among the following the natural product that is a steroid and contains an α,β unsaturated ketone is

A:-Estrone

B:-Prostaglandin

C:-Morphine

D:-Cortisone

Correct Answer:- Option-D

Question76:-How many signals would you expect in the proton decoupled ^{13}C NMR spectrum of 2- pentanone

A:-2

B:-3

C:-4

D:-5

Correct Answer:- Option-D

Question77:-The number of peaks possible in the ^1H NMR spectrum of 2-nitropropane is

A:-1

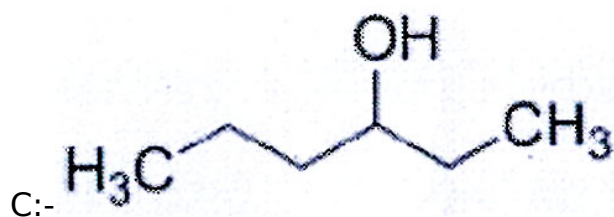
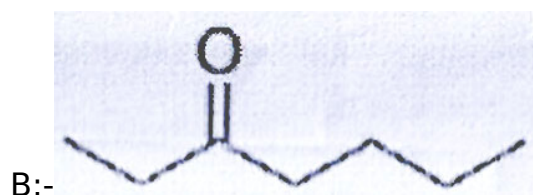
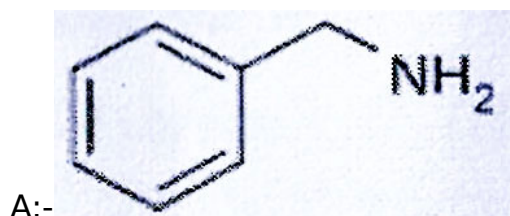
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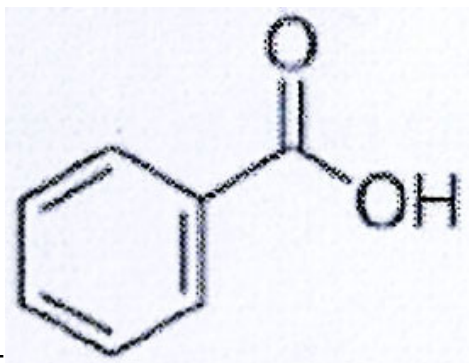
C:-3

D:-4

Correct Answer:- Option-B

Question78:-Identify the compound which can undergo McLafferty rearrangement





D:-

Correct Answer:- Option-B

Question79:-In Reverse phase -HPLC method

A:-Stationary phase is polar and mobile phase is non-polar

B:-Stationary phase is non-polar and mobile phase is polar

C:-Stationary phase is non-polar and mobile phase is non-polar

D:-Stationary phase is polar and mobile phase is polar

Correct Answer:- Option-B

Question80:-Calculate the λ_{max} for the following diene



A:-253

B:-240

C:-230

D:-245

Correct Answer:- Option-C

Question81:-Consider the following statements regarding the Scanning Tunneling Microscope

i. STM operates based on the quantum mechanical phenomenon of electron tunneling.

ii. The tunneling current decreases exponentially with increasing tip sample separation.

- iii. The tunneling current exists even when the tip physically touches the sample.
- iv. STM directly measures the surface topography without any influence of electronic properties.

Which of the above statements are correct ?

A:-i and ii only

B:-i and iii only

C:-i and iv only

D:-ii and iii only

Correct Answer:- Option-A

Question82:-Consider the following statements regarding the Atomic Force Microscope

- i. AFM belongs to the family of scanning probe microscopes.
- ii. Piezoelectric scanners provide precise movement of the sample or probe.
- iii. The cantilever deflection is measured using electron diffraction.
- iv. AFM requires electron tunneling for image formation.

Which of the above statements are correct ?

A:-ii and iii only

B:-i and iv only

C:-i and iii only

D:-i and ii only

Correct Answer:- Option-D

Question83:-Which one of the following correctly represents the variables plotted in a Differential Thermal Analysis curve ?

A:-Heat flow versus time

B:- ΔT versus T

C:- dH/dT versus T

D:- ΔH versus T

Correct Answer:- Option-B

Question84:-Consider the following statements regarding a plateau in a Thermogravimetric Analysis curve

- i. It indicates negligible change in sample mass.
- ii. It represents the melting point of the sample.
- iii. It may correspond to a temperature range over which the sample is thermally stable.

iv. Instrument calibration error.

Which of the above statements are correct ?

A:-i and ii only

B:-i and iii only

C:-i and iv only

D:-iii and iv only

Correct Answer:- Option-B

Question85:-Which one of the following supramolecular hosts is a cyclic oligosaccharide possessing a hydrophobic cavity and a hydrophilic exterior ?

A:-Cryptand

B:-Molecular Tweezers

C:-Cyclodextrin

D:-Cyclophane

Correct Answer:- Option-C

Question86:-Consider the following statements regarding Atomic Absorption Spectroscopy

i. AAS measures the absorption of characteristic radiation by ground state atoms.

ii. A hollow cathode lamp is commonly employed as the radiation source.

iii. Flame emission from the analyte serves as the analytical signal.

iv. The absorbance is proportional to the concentration of free atoms in the flame.

Which of the above statements are correct ?

A:-i, ii and iv only

B:-i and iv only

C:-ii and iv only

D:-i, iii and iv only

Correct Answer:- Option-A

Question87:-A solution exhibits an absorbance of 0.40 when measured using a 1 cm cuvette. If the concentration is doubled and the path length is increased to 2 cm, what will be the new absorbance ?

A:-0.40

B:-0.10

C:-0.80

D:-1.60

Correct Answer:- Option-D

Question88:-Consider the following statements regarding Scanning Electron Microscopy

- i. SEM produces images by scanning a focused electron beam over the specimen surface.
- ii. They are formed by transmitted electrons.
- iii. Secondary electrons possess higher energy than the incident electron beam.
- iv. SEM requires visible light for image formation.

Which of the above statements are correct ?

A:-i, ii and iii only

B:-i and iii only

C:-i only

D:-i and iv only

Correct Answer:- Option-C

Question89:-Which one of the following is an essential requirement for specimens used in Transmission Electron Microscopy ?

A:-They must be electrically conducting

B:-They must be ultrathin to allow transmission of electrons

C:-They must be coated with gold

D:-They must be emit secondary electrons efficiently

Correct Answer:- Option-B

Question90:-Consider the following statements regarding Green Chemistry

- i. Green Chemistry focuses on preventing pollution at its source.
- ii. It emphasizes the design of environmentally benign chemical processes.
- iii. Waste treatment is preferred over waste prevention.
- iv. It encourages the use of safer chemicals whenever possible.

Which of the above statement are correct ?

A:-i, ii and iii only

B:-i and iii only

C:-i only

D:-i, ii and iv only

Correct Answer:- Option-D

Question91:-The complex that does not obey 18 - electron rule is

A:- $\text{Fe}(\text{CO})_5$

B:- $\text{CH}_3\text{Mn}(\text{CO})_5$

C:- $\text{Cr}(\text{CO})_6$

D:- $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$

Correct Answer:- Option-D

Question92:-The total metal-metal bonds in each complex are $\text{Fe}_2(\text{CO})_9$, $\text{Fe}_3(\text{CO})_{12}$, $\text{Co}_4(\text{CO})_{12}$

A:-1, 3, 6

B:-2, 3, 6

C:-2, 3, 4

D:-3, 4, 4

Correct Answer:- Option-A

Question93:-Arrange the following ligands in order of their π - acceptor ability on $\text{Mo}(\text{CO})_3\text{L}_3$ substituted by them

A:- $\text{NO} < \text{CO} < \text{PF}_3 < \text{PR}_3$

B:- $\text{NO} > \text{CO} > \text{PF}_3 > \text{PR}_3$

C:- $\text{NO} < \text{PF}_3 < \text{PR}_3 < \text{CO}$

D:- $\text{CO} < \text{NO} < \text{PF}_3 < \text{PR}_3$

Correct Answer:- Option-B

Question94:-The industrially useful $\text{Fe}_2(\text{CO})_9$ is prepared using which reaction ?

A:-Reduction of $\text{Fe}_3(\text{CO})_{12}$ with Sodium

B:-Reaction between Fe_2O_3 and CO at 2000atm, 225°C

C:-Photochemical reaction of $\text{Fe}(\text{CO})_5$ using AcOH

D:-Direct Carbonylation of Fe and CO at 100bar, 150°C

Correct Answer:- Option-C

Question95:-For Ferrocene, the correct statement(s) is/are

- i. Staggered in solid, D_{5d} Symmetry.
- ii. Paramagnetic with one unpaired electron.
- iii. Act as fuel additive and antiknocking agent.
- iv. Each cyclopentadienyl ring acts as a six-electron donor.

A:-Only i, ii and iv

B:-Only i, iii and iv

C:-Only ii, iii and iv

D:-All of the above

Correct Answer:- Option-B

Question96:-Which of the following statement for hemoglobin is not correct ?

A:-The sixth site is vacant or H_2O is bonded in oxyhemoglobin

B:-Hemoglobin is oxygen transporter

C:-The affinity of hemoglobin for O_2 decreases with decreasing pH of blood

D:-Fe(II) is in low spin in oxyhemoglobin

Correct Answer:- Option-A

Question97:-Which of the following statements for photosynthesis is correct ?

- i. The chlorophylls contains magnesium metal.
- ii. In photosynthesis, splitting of water followed by reduction of carbon dioxide is taken place.
- iii. Chlorophyll contains fused cyclopentanone ring.
- iv. Chlorophyll -a contains $R = CHO$, Chlorophyll -b contains $R = CH_3$.

A:-Only i and iv

B:-Only i, ii and iv

C:-Only i, ii and iii

D:-All of the above

Correct Answer:- Option-C

Question98:-For metal ions in biological system, the incorrect statement is

A:- Ca^{2+} is essential for formation of hydroxyapatite

B:-Molybdenum is the known heaviest metal having biological importance

C:- Na^+ and Ca^{2+} are the major extracellular cations

D:-Na is more abundant metal than Ca in human body

Correct Answer:- Option-D

Question99:-The correct statement regarding sodium-potassium pump

i. The K^+ concentration is more than that of Na^+ in animal cells.

ii. Nonactin is selective K^+ ions carrier.

iii. In the fluids outside the cells the Na^+ concentration is more than that of K^+ .

iv. The membrane enzyme Na^+/K^+ -ATPase serves as an Na^+/K^+ pump.

A:-Only i, ii and iv

B:-Only i, iii and iv

C:-Only ii and iv

D:-All of the above

Correct Answer:- Option-D

Question100:-As per IR spectral analysis, which of the following statements is correct regarding C-O stretching frequency ?

A:- $[\text{V}(\text{CO})_6]^- < [\text{Cr}(\text{CO})_6] < [\text{Mn}(\text{CO})_6]^+$

B:- $[\text{V}(\text{CO})_6]^- < [\text{Mn}(\text{CO})_6]^+ < [\text{Cr}(\text{CO})_6]$

C:- $[\text{Cr}(\text{CO})_6] < [\text{Mn}(\text{CO})_6]^+ < [\text{V}(\text{CO})_6]^-$

D:- $[\text{Mn}(\text{CO})_6]^+ < [\text{Cr}(\text{CO})_6] < [\text{V}(\text{CO})_6]^-$

Correct Answer:- Option-A