TCSiON CAE

Notations :

1.Options shown in green color and with ✔ icon are correct.

2.Options shown in red color and with ✖ icon are incorrect.

Question Paper Name :	PC22173ConcernedSubjectAssistantChemistGAZ2217 19th July 2023 Shift 1
Subject Name :	PC22173 Concerned Subject Assistant Chemist GAZ2217
Actual Answer Key :	Yes
Calculator :	None
Magnifying Glass Required? :	No
Ruler Required? :	No
Eraser Required? :	No
Scratch Pad Required? :	No
Rough Sketch/Notepad Required? :	No
Protractor Required? :	No
Show Watermark on Console? :	Yes
Highlighter :	No
Auto Save on Console?	Yes
Change Font Color :	No
Change Background Color :	No
Change Theme :	No
Help Button :	No
Show Reports :	No
Show Progress Bar :	No
Is this Group for Examiner? :	No
Examiner permission :	Cant View

Show Progress Bar? : No

Concerned Subject Assistant Hydrometeorologist

Section type : Online

Enable Mark as Answered Mark for Review and Clear Response : Yes

Maximum Instruction Time : 0

Is Section Default? : null

Question Number : 1 Question Id : 630680269517 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What does the following expression represent?

$$\int_0^\infty [\psi(r)]^2 \, 4\pi r^2 \, dr = 1$$

Options :

1. ✖ Normalisation of 2p wave function

2. ✖ Probability density of 3d electron

3. ✔ Normalisation of 1s wave function

4. ✖ Probability density of 2p electron

Question Number : 2 Question Id : 630680269518 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct statement from among the following.

Options :

1. ✖ The product of integral of the inverse of two wave functions of different energies will vanish, i.e., they are orthogonal.

2. ✔ The product of integral of two wave functions of different energies will vanish, i.e., they are orthogonal.

3. ✖ The product of integral of the inverse of two wave functions of different energies will be 1, i.e., they are orthogonal.

4. ✖ The product of integral of two wave functions of different energies will be 1, i.e., they are orthogonal.

Question Number : 3 Question Id : 630680269519 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the electronic configuration of Rhodium (Z= 45).

Options :

1. ✔ $[Kr]\ 4d^8\ 5s^1$

2. ✖ $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^4\ 4d^{10}$

3. ✖ $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8$

4. ✖ $[Ar]\ 5s^2\ 5p^6$

Question Number : 4 Question Id : 630680269520 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Excited state electronic configuration of Xe is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^6$

B. Ground state electronic configuration of Cl is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4\ 3d^1$

Select the correct option.

Options :

1. ✖ A only

2. ✖ B only

3. ✖ A and B

4. ✔ Neither A nor B

Question Number : 5 Question Id : 630680269521 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Read the following statements about SF_4.

A. There are five orbitals on the central atom.

B. With four bond pairs and one lone pair, SF_4 has trigonal bipyramid geometry.

Select the correct answer.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ Both A and B

4. ✖ Neither A nor B

Question Number : 6 Question Id : 630680269522 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Relative strength of bonds formed by s orbitals is the lowest.

B. It is possible to mix combinations of atomic orbitals such as just d and p.

C. Relative strength of bonds formed by sp^3 orbitals is the highest.

D. Relative strength of bonds formed by sp^2 orbitals is lower than those formed by sp orbital.

Select the correct answer.

Options :

1. ✔ A and C

2. ✖ B, C and D only

3. ✖ A and D

4. ✖ B and D

Question Number : 7 Question Id : 630680269523 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Description of orbitals formed on bonding	Theory
A. In pi bonds electron density concentrates between atoms but on either side of line joining the atoms	: VBT
B. All sigma bonds originate from end-to-end overlap	: MOT
C. Symmetry of pi molecular orbitals is different from sigma orbitals and changes sign as it is rotated about the internuclear axis.	: hybridization

Options :

1. ✖ A and B

2. ✖ B and C

3. ✔ A only

4. ✖ C only

Question Number : 8 Question Id : 630680269524 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following properties or trends is NOT observed in elements of group 14?

Options :

1. ✖ Covalent character of bonding in atoms of the elements decreases down the group.

2. ✖ Fourth ionisation energy is highest for C and decreases down the group, exception being Sn.

3. ✖ Covalent radius increases down the group.

4. ✔ Melting point of all elements is in the range of 2000-4000°C.

Question Number : 9 Question Id : 630680269525 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correct statement for the group 1 and 2 elements.

Options :

1. ✖ Metallic radius of elements in group 2 decreases down the group and is greater than that of elements in group 1 of the same period.

2. ✔ In general, Group 2 elements are harder than group 1 elements and have higher cohesive energy (enthalpy of atomisation).

3. ✖ Group 2 elements possess greater atomic size than corresponding group 1 elements in the same period.

4. ✖ Group 2 elements possess lower density than corresponding group 1 elements in the same period.

Question Number : 10 Question Id : 630680269526 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

In which option is the species in **bold** undergoing disproportionation, and its resulting forms are arranged in increasing order of their oxidation states?

A. Cu, $\mathbf{Cu^{+}}$, Cu^{2+}

B. O_2, H_2O_2, $\mathbf{H_2O}$

C. OCl^{-}, $\mathbf{ClO_2}$, ClO_3^{-}

D. Mn^{2+}, $\mathbf{Mn^{3+}}$, MnO_2

Options :

1. ✖ A, B, C and D

2. ✖ A, B and C

3. ✔ A, C and D

4. ✖ B and C only

Question Number : 11 Question Id : 630680269527 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following events in chronological order, with the oldest event being placed first.

A. Mulliken suggested approach to electronegativity based on ionisation energy and electron affinity of an atom.

B. Alfred and Rochow's working of electronegativity was determined by obtaining covalent radii using X-ray crystallography.

C. Pauling's determined the electronegativity values of elements by comparing their actual bond energies in a compound with purely covalent bond energy of constituent atoms in their respective molecules.

Options :

1. ✖ C → B → A

2. ✔ $C \rightarrow A \rightarrow B$

3. ✖ $B \rightarrow A \rightarrow C$

4. ✖ $A \rightarrow C \rightarrow B$

Question Number : 12 Question Id : 630680269528 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

The following data shows comparison of theoretical lattice enthalpy and that calculated using Born-Haber cycle.

Compound	Theoretical lattice enthalpy kJ/mol	Born-Haber lattice enthalpy kJ/mol	% Difference
LiCl	-825	-817	0.8
NaCl	-764	-764	0.0
CdI_2	-1966	-2410	22.6

This data is evidence for which of the following assumption to be true?

Options :

1. ✔ Close agreement in theoretical and Born-Haber lattice enthalpy values confirms bonding in the compound is purely ionic.

2. ✖ Low agreement in theoretical and Born-Haber lattice enthalpy values confirms bonding in the compound is purely ionic.

3. ✖ Close agreement in theoretical and Born-Haber lattice enthalpy values confirms that bonding in the compound has higher degree of covalent character.

4. ✖ Lower the agreement in theoretical and Born-Haber lattice enthalpy values confirms that bonding in CdI_2 compound has higher degree of ionic character.

Question Number : 13 Question Id : 630680269529 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Read the below statement, and select the correct response with the most appropriate reasoning.

'The solubility of Group 1 compounds generally decreases down the group.'

Options :

1. ✖ False, solubility increases down the group as ionic size increases hence enthalpy of hydration will also increase.

2. ✖ True, solubility increases down the group as ionic size increases hence enthalpy of hydration will also increase.

3. ✖ False, Gibbs free energy of hydration increases down the group. Thus, solubility increases.

4. ✔ True, as lattice energy decreases slightly down the group while the difference in Gibbs free energy of hydration is more significant.

Question Number : 14 Question Id : 630680269530 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Melting point of group 13 elements does NOT show a clear trend down the group.

Identify the factor most responsible for this observation.

Options :

1. ✖ B shows allotropic forms.

2. ✔ B and Ga have unusual structures while Al, In and Tl have close-packed metal structures.

3. ✖ Solid Ga is less dense than liquid Ga.

4. ✖ d-block contraction occurs in Ga and In.

Question Number : 15 Question Id : 630680269531 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Lanthanides commonly show an oxidation state of +3. However, oxidation states of +2 and +4 are also observed. Which reasoning justifies this observation?

Options :

1. ✖ Low value of first three ionization energies

2. ✖ Almost identical behaviour of all elements in the series

3. ✔ Obtaining noble gas configuration, half or completely filled f shell

4. ✖ Comparable E^{o} (V) values

Question Number : 16 Question Id : 630680269532 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Cu, Ag, Au and Pd atoms have d^{10} configuration, but are able to behave as typical transition elements. However, Zn ions do not. Which statement justifies this observation?

Options :

1. ✔ The ions of Cu, Pd and Au in their stable oxidation states have an incompletely filled d shell.

2. ✖ Zn atoms have incompletely filled d shell.

3. ✖ The ions of Cu, Pd and Au in their stable oxidation states have a completely filled d shell.

4. ✖ Zn ions, in their stable oxidation state, have an incompletely filled d shell.

Question Number : 17 Question Id : 630680269533 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

MnO_4^- ion has an intense purple colour in solution.

What is the correct reason for this observation?

Options :

1. ✖ Mn is in oxidation state +VII and hence can participate in d-d transition very effectively.

2. ✖ As Laporte rule is not applicable for d electrons on Mn and thus allows for d-d transitions.

3. ✖ As spin selection rule is not applicable for d electrons on Mn and thus allows for d-d transitions.

4. ✔ Charge transfer between O and Mn allows for lowering of the latter's oxidation state producing an intense colour.

Question Number : 18 Question Id : 630680269534 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Element (Oxidation state)	Complexes formed
A. Fe(II)	(i) optically active, exists in *d* and *l* forms, $[Co(en_3)]^{3+}$
B. Fe(III)	(ii) blue coloured high spin tetrahedral complex, $[CoCl_4]^{2-}$
C. Co(II)	(iii) Reaction of sodium prusside to give purple complex, $[Fe(CN)_5(NOS)]^{4-}$
D. Co(II)	(iv) brown ring test, $[Fe(H_2O)_5.NO]^{2+}$

Options :

1. ✖ A - (iii); B - (iv); C - (i); D - (ii)

2. ✔ A - (iii); B - (iv); C - (ii); D - (i)

3. ✖ A - (iv); B - (iii); C - (ii); D - (i)

4. ✖ A - (iii); B - (i); C - (ii); D - (iv)

Question Number : 19 Question Id : 630680269535 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Lanthanides have co-ordination number of 6 and above in their complex ions

B. Lanthanides form unstable compounds with oxygen ligands and these tend to dissociate in aqueous solutions.

C. Lanthanides form stable complexes with π bonding ligands due to availability of f orbitals.

D. It is difficult to explain the formation of lanthanide complexes higher co-ordination numbers of 10 and 12 as it may suggest bond order less than 1.

Select the correct answer.

Options :

1. ✔ A, B, D

2. ✖ A, B, C

3. ✖ A only

4. ✖ B, C

Question Number : 20 Question Id : 630680269536 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Ni, Pd and Pt all form complexes in zero valent state.

B. Complexes of Ni^{+4} are rare, some octahedral complexes are formed by Pd^{2+} while Pt^{4+} form a large number of very stable octahedral complexes.

Select the correct option.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 21 Question Id : 630680269537 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct statement from among the following.

Options :

1. ✔ $Co_2(CO)_8$ forms two isomers which involve Co-Co metal bonding.

2. ✖ $Ir_4(CO)_{12}$ forms two isomers which involve metal-ligand bridge bonding.

3. ✖ Co and Rh complexes do not have isomers however Ir complexes do.

4. ✖ The blue coloured Co complex formed for test of water is trans isomer of the octahedral complex.

Question Number : 22 Question Id : 630680269538 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

The following data is for samples in annealed state. Using this data, select the correct option from below.

Material	Tensile strength (MPa)	Ductility (%elongation)
Iron	262	45
Steel (1020)	380	25
Titanium	520	25

Statement A: Titanium can easily fracture under stress as compared to steel (1020).

Statement B: Steel and titanium will be able to bear equivalent amount of stress before fracturing.

Options :

1. ✖ A is true

2. ✖ B is false

3. ✖ A and B both are true

4. ✔ A is false and B is true

Question Number : 23 Question Id : 630680269539 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct description of formation of metallic bond according to the molecular orbital theory.

Options :

1. ✖ Cohesive energy of Li atoms hold them together with strong electrostatic forces and larger the number of electrons the metal can exist in different structures.

2. ✔ In Li_4, four Li atoms would combine their atomic orbitals to form four molecular orbitals – two bonding and two anti-bonding.

3. ✖ The lattice of Li^+ ions suspended in 'gas' of delocalized electrons are held together by strong electrostatic forces.

4. ✖ In Li_4, four Li atoms would combine their atomic orbitals to form four molecular orbitals – two bonding and two non-bonding.

Question Number : 24 Question Id : 630680269540 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Raw Material added :	Role/Use
A. silica :	removal of basic impurity from haematite
B. carbon dioxide :	effective reducing agent
C. slag :	chief component containing calcium silicate used in cement industry
D. carbon monoxide :	most effective reducing agent generated

Options :

1. ✖ A and C only

2. ✖ B and C only

3. ✔ C and D only

4. ✖ B, C and D only

Question Number : 25 Question Id : 630680269541 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the INCORRECT statement from among the following.

Options :

1. ✔ At the beginning of the steel making cycle, the converter is kept vertical and 30% pre-weighed scrap is added as charge.

2. ✖ Originally, LD converter used to manufacture steel where oxygen was blown at supersonic velocity through a water-cooled lance onto a surface of molten iron.

3. ✖ At the beginning of steel making cycle, the converter is kept at about and 30% pre-weighed scrap is added as charge along with flux forming material.

4. ✖ Q-BOP process was developed wherein oxygen and other gases were injected through a tuyere in bottom of the vessel for metallurgical advantage in steel making.

Question Number : 26 Question Id : 630680269542 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following steps involved in obtaining blister copper in correct order.

A. Add sand and blast air through the mixture

B. Remove iron as liquid slag

C. flotation of copper pyrites ($CuFeS_2$)

D. partial roasting in air

E. Cu_2S and Cu_2O combine to give a solid and gas

Options :

1. ✖ $C \rightarrow B \rightarrow A \rightarrow E \rightarrow D$

2. ✔ $C \rightarrow D \rightarrow A \rightarrow B \rightarrow E$

3. ✖ $A \rightarrow B \rightarrow E \rightarrow C \rightarrow D$

4. ✖ $D \rightarrow A \rightarrow B \rightarrow C \rightarrow E$

Question Number : 27 Question Id : 630680269543 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correct statement from among the following.

Options :

1. ✖ Bauxite ore is mixed with cryolite for electrolytic extraction of pure Al.

2. ✖ Bauxite ore is mixed with cryolite during smelting in the presence of CaF_2 for electrolytic extraction of pure Al.

3. ✖ Bauxite ore is treated with concentrated hydrochloric acid to enable removal of iron oxide as waste before smelting.

4. ✔ Bauxite ore is treated with sodium hydroxide solution to enable removal of iron oxide as waste before smelting.

Question Number : 28 Question Id : 630680269544 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Plain carbon steel contains typically 0.03-1.2% C, 0.25-1% Mn and some minor impurities.

B. γ form of Fe_3C is austenite Fe (2.08% C)

C. Cementite is Fe_3C and has a soft malleable structure with a different crystal structure.

D. Eutectoid plain carbon steel is obtained when 0.8% C steel is heated slightly above 750°C and allowed to cool very slowly to obtain austenite phase.

Select the correct option.

Options :

1. ✖ A, B, C and D

2. ✖ A, B and C

3. ✔ A, B and D

4. ✖ B, C and D

Question Number : 29 Question Id : 630680269545 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What does the AISI-SAE code '1040' represent?

Options :

1. ✔ Plain carbon steel with 0.4% of C and 0.45 % Mn content

2. ✖ Plain carbon steel with 0.1% of C and 0.40 % Mn content

3. ✖ Reinforced carbon steel with 0.4% of C and 0.45 % Mn content

4. ✖ High strength corrosion resistant carbon steel with 0.4% of C and 0.45 % Ni content

Question Number : 30 Question Id : 630680269546 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct statement from among the following.

Options :

1. ✖ Cr in smaller amounts affects overall performance and weakens grain boundaries.

2. ✔ High corrosion resistant steel can be obtained due to $\geq$ 12% Cr.

3. ✖ Stainless steel is exposed to reducing agents to form a corrosion resistant layer.

4. ✖ High corrosion resistant steel can be obtained due to $\geq$ 12% Cd.

Question Number : 31 Question Id : 630680269547 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following information for the reaction

$2N_2O_5 \rightarrow 4\,NO_2 + O_2$.

A. The rate is 1.02×10^{-4} mol $lit^{-1}sec^{-1}$ and concentration of N_2O_5 at 10 sec is 3 M.

B. This reaction will follow first order kinetics and has a rate constant of $3.4 \times 10^{-5}sec^{-1}$.

Select the correct statement.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 32 Question Id : 630680269548 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Reaction : Molecularity

A. decomposition of O_3 in the stratosphere in presence of Cl(g) : bimolecular

B. decomposition of H_2O_2 in presence of I^-(aq) : unimolecular

C. reduction of NO by H_2 : termolecular

D. reaction of H_2 with ICl : bimolecular

Options :

1. ✔ A, C, D

2. ✖ B, C, D

3. ✖ A, B, D

4. ✖ A and B only

Question Number : 33 Question Id : 630680269549 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

A cylinder contains 16.0 g of oxygen gas. Determine the work that is required to compress the gas at constant temperature of 127°C until the volume is reduced to half.

Options :

1. ✖ 2303.5 J

2. ✖ 0.366 kJ

3. ✖ 365.7 J

4. ✔ 1.152 kJ

Question Number : 34 Question Id : 630680269550 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Enthalpy change indicates the energy change in a system under constant volume conditions.

B. In a calorimetry experiment, the quantity determined using m_{water}, c_{water}, c_{cal}, and ΔT is ΔH_{surr}.

C. Methane will have higher internal energy than LiH, as the former has more atoms.

D. A certain species whose values of ΔH_{form} and ΔS_{form} are negative, will be stable only at low temperatures.

Select the correct option.

Options :

1. ✖ A, B and D

2. ✖ A, C and D

3. ✔ B, C and D

4. ✖ A, B, C and D

Question Number : 35 Question Id : 630680269551 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

'When a liquid freezes, the entropy of the system decreases.'

Select the correct option with respect to the given statement.

Options :

1. ✖ True, thus this process does not abide by the second law of thermodynamics.

2. ✖ Heat flowing out of the system brings about decrease in disorder of surroundings, thus overall entropy of universe increases.

3. ✖ False, the increase in arrangement of particles overall increases the internal energy of the system thus Gibbs free energy increases.

4. ✔ Heat flowing out of the system brings about increase in disorder of surroundings, thus overall entropy of universe increases.

Question Number : 36 Question Id : 630680269552 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Calculate the equivalent conductivity of 4.0 N solution of an electrolyte whose specific resistance is 0.0125 Ωcm^{-1}.

Options :

1. ✔ 20,000 $Scm^2 gequiv^{-1}$

2. ✖ 3,125 $Scm^2 gequiv^{-1}$

3. ✖ 20 $Scm^2 gequiv^{-1}$

4. ✖ 3.125 $Scm^2 gequiv^{-1}$

Question Number : 37 Question Id : 630680269553 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Mobility of individual ions is independent of concentration.

B. Molar conductivity is used to fairly compare conductivity of different solutions.

C. Ideally, mobility of ions is determined by its charge on the ion, its solvated radius, viscosity of the solvent and elementary charge constant.

D. In a standard conductance cell, electrodes having same geometries are placed facing each other with a fixed distance between them to construct a parallel circuit.

Select the correct option.

Options :

1. ✖ A, B, C and D

2. ✖ B, C, and D

3. ✔ A, B and C

4. ✖ A, C and D

Question Number : 38 Question Id : 630680269554 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Br^-, CN^- and IO_3^- can only be considered as a Lewis base.

B. $Ba(OH)_2$, KOH and HNO_2 can only be considered as Arrhenius acid.

Select the correct option.

Options :

1. ✔ A only

2. ✖ B only

3. ✖ A and B

4. ✖ Neither A nor B

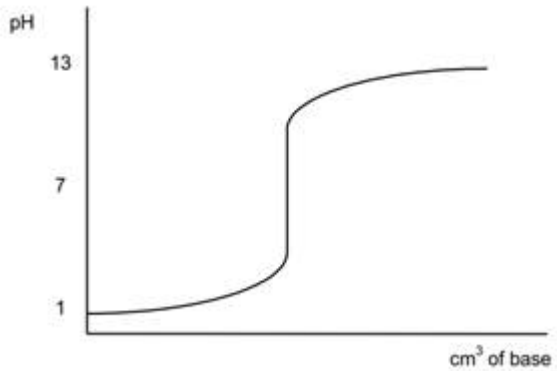
Question Number : 39 Question Id : 630680269555 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

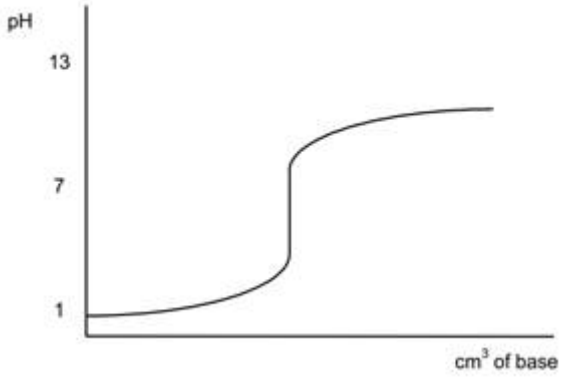
Identify the graph of pH vs cm^3 of base that will be obtained for 0.1 M NH_3 vs 0.1 M HCl.

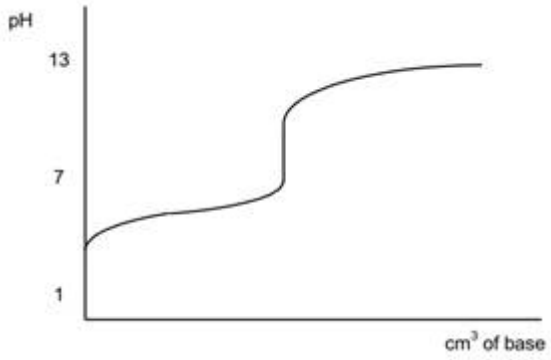
Options :

1. ✖

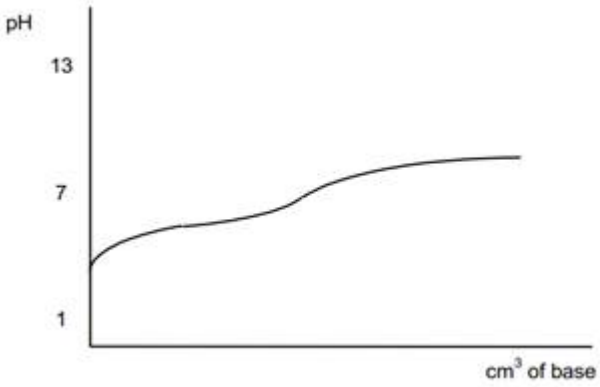


2. ✔





3. ✖



4. ✖

Question Number : 40 Question Id : 630680269556 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

The H^+ ion can be selectively determined using EMF studies. Which setup will support detection of conductance of H^+ ions selectively?

Options :

1. ✖ LaF_3 crystal doped with EuF_2

2. ✖ Ag(s)|AgCl(s)| Cl (aq) | H (aq,inside) ⁞ H (aq,outside),Cl (aq) | AgCl(s) | Ag(s)

3. ✖ Liquid ion exchanger (di-(n-decyl)phosphate in a PVC membrane)

4. ✔ Ag(s)|AgCl(s)| Cl (aq) | H (aq,outside) ⁞ H (aq,inside),Cl (aq) | AgCl(s) | Ag(s)

Question Number : 41 Question Id : 630680269557 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Type of solids	Examples/Feature
A. Crystalline solids	(i) Dry ice
B. Amorphous solids	(ii) Aggregate of large number of small crystals or grains
C. Polycrystalline solids	(iii)Regular repeating pattern
D. Molecular solids	(iv) Polyethylene

Options :

1. ✖ A – (i); B – (iv); C – (iii); D – (ii)

2. ✖ A – (ii); B – (i); C – (iv); D – (iii)

3. ✔ A – (iii); B – (iv); C – (ii); D – (i)

4. ✖ A – (iii); B – (ii); C – (iv); D – (i)

Question Number : 42 Question Id : 630680269558 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct statement from among following.

Options :

1. ✖ Most engineering materials are crystalline in nature, which gives them higher strength and density.

2. ✔ If an amorphous solid is maintained at a temperature just below its melting point for long periods of time, the component molecules, atoms, or ions can gradually rearrange into a more highly ordered crystalline form.

3. ✖ Repetition along translational axis only is the true measure of symmetry in a crystal.

4. ✖ Atomic packing factor for a simple cubic crystal is greater than body centred cubic crystal, making it a more efficiently packed material.

Question Number : 43 Question Id : 630680269559 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following materials in increasing order of the strength of their magnetic property.

A. Fe/Si

B. Al

C. Au

D. Mn

E. Ni/Fe alloy

Options :

1. ✔ C < B < D < A < E

2. ✖ B < C < D < A < E

3. ✖ A < C < E < B < D

4. ✖ $D < B < C < E < A$

Question Number : 44 Question Id : 630680269560 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct statement from among the following.

Options :

1. ✖ In case of extrinsic semiconductor, the Fermi energy is independent of temperature and lies between conduction level and donor level for n-type and between valence band and acceptor level in p-type.

2. ✖ Intrinsic semiconductor is the pure form of semiconductor. When sufficient energy is supplied to electrons in the conduction band, they absorb energy and move to valence band leaving behind a hole.

3. ✔ The phenomenon in which the magnetic fields are completely expelled from the interior of the material during the transition from normal conducting state to super conducting state is known as Meissner Effect.

4. ✖ The resistivity of impure metal will not have any residual value at absolute zero temperature and remains independent of the temperature of the material.

Question Number : 45 Question Id : 630680269561 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following types of solution.

A. CO_2 gas in water

B. natural gas

C. naphthalene in water

D. Pd-H_2

E. ethanol in water

Select the option that represents increasing strength of interactions between solute and solvent.

Options :

1. ✖ A; B; C; D; E

2. ✖ A; B, D; C; E

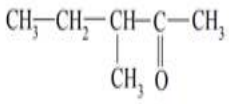
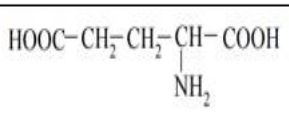
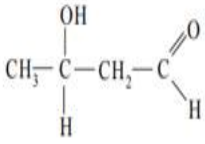
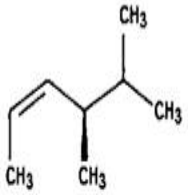
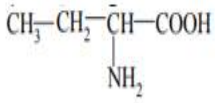
3. ✖ C; E, D; A; B

4. ✔ C; B, D; A; E

Question Number : 46 Question Id : 630680269562 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following IUPAC names of some organic molecules with their structures provided in the table below.

A. 3-hydroxybutanal	(i) 
B. 2-aminobutanoic acid	(ii) 
C. 4,5-dimethyl-2-hexene	(iii) 
D. 3-methyl-pentan-2-one	(iv) 
E. (2S)-2-Aminopentanedioic acid	(v) 

Select the correct option.

Options :

1. ✔ A – (iii); B – (v); C – (iv); D – (i); E – (ii)

2. ✖ A – (i); B – (ii); C – (iv); D – (iii); E – (v)

3. ✖ A – (iii); B – (iv); C – (v); D – (i); E – (ii)

4. ✖ A – (v); B – (iii); C – (iv); D – (i); E – (ii)

Question Number : 47 Question Id : 630680269563 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following.

a) $-CR_3$

(b) $-COO^-$

(c) $-H$

(d) $C_6H_5O^-$

(e) $-CHR_2$

Select the option where the groups are arranged in the order of decreasing (+I) effect.

Options :

1. ✖ $-CHR_2 > C_6H_5O^- > -COO^- > -CR_3 > -H$

2. ✔ $C_6H_5O^- > -COO^- > -CR_3 > -CHR_2 > -H$

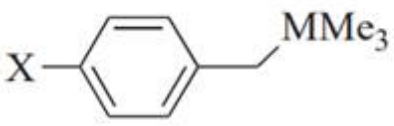
3. ✖ $-CR_3 > -H > C_6H_5O^- > -COO^- > -CHR_2$

4. ✖ $-COO^- > C_6H_5O^- > -CR_3 > -CHR_2 > -H$

Question Number : 48 Question Id : 630680269564 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the given statements is NOT correct for the molecule shown here?



M = C, Si, Ge, Sn
X = NO_2, CN, H, Me, OMe

Options :

1. ✖ The effect on bond length was the result of the s character of the saturated carbon rather than of neutral hyperconjugation.

2. ✖ The main interaction between methyl groups and the ring system in the positive ions of aromatic hydrocarbons is due to hyperconjugation rather than an inductive effect.

3. ✖ Hyperconjugation appears to operate for both carbon and hydrogen in various systems as supported by quantum mechanical studies.

4. ✔ Electron release in hyperconjugation is permitted by a mechanism that is essentially the reverse of tautomeric effect wherein a dipole is generated in each canonical forms.

Question Number : 49 Question Id : 630680269565 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. According to Hoffman's rule, Electron-withdrawing groups in the β-position make elimination reaction more preferred to substitution and shift the mechanisms toward the E1cB end.

B. A more basic nucleophile or base, with a higher energy HOMO, and a more acidic substrate, with a lower energy LUMO, interact more strongly in E2 or SN_2 mechanism, according to the activation strain model.

Select the correct option.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 50 Question Id : 630680269566 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following carbanions.

A. n-propyl

B. cyclobutyl

C. vinyl

D. cyclopropyl

E. neopentyl

F. ethyl

Arrange these in the decreasing order of their stability.

Options :

1. ✔ C < D < F < A < E < B

2. ✖ F < D < C < A < E < B

3. ✖ C < B < F < D < E < A

4. ✖ C < E < F < A < D < B

Question Number : 51 Question Id : 630680269567 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the factors does not explain the acidity of α-H in this species?

Options :

1. ✖ −I effect of ester oxygen

2. ✔ presence of a second strongly electron donating group at position 2 of the ester.

3. ✖ resonance stabilisation of resulting anion

4. ✖ presence of a second strongly electron withdrawing group at position 2 of the ester.

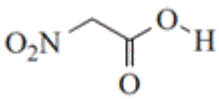
Question Number : 52 Question Id : 630680269568 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the example of an 'ate' complex.

Options :

1. ✔ $Me_4B^- Li^+$

2. ✖ 

3. ✖ $(CH_3)_3N^+CH_2COOH$

4. ✖ $^-O_3SCH_2COOH$

Question Number : 53 Question Id : 630680269569 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following reaction.

Which reagent will bring about this reaction?

Options :

1. ✖ Ar_2CH-OAc/propanone

2. ✖ (a) Ph_2CHCl; (b) SO_2/pyridine

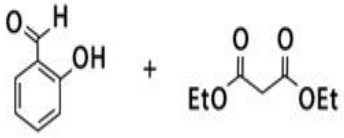
3. ✖ hv; $MeCN-H_2O$

4. ✔ (a) Ag_2O/H_2O; (b) PCl_5

Question Number : 54 Question Id : 630680269570 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

For the reaction, in presence of piperidine, consider the following statements.



A. Deprotonation of activated methylene by base gives carbanion that is stabilized by resonance via enolate ion

B. This is followed by an electrophilic attack on carbonyl of the ketone by the enolate ion.

Select the correct option.

Options :

1. ✔ A only

2. ✖ B only

3. ✖ A and B

4. ✖ Neither A nor B

Question Number : 55 Question Id : 630680269571 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statement.

The compound $PhCH=CHCH=CH_2$ gives only $PhCH=CHCHClCH_3$ when treated with HCl.

Select the correct option.

Options :

1. ✔ True. It is the only product that has a double bond in conjugation with the ring that results from attack that places the proton at an end of the conjugated system and formation of carbocation stabilised by resonance.

2. ✖ False. It is just one of the possible products. Its formation is supported by a double bond in conjugation with the ring that results in formation of carbocation stabilised by resonance.

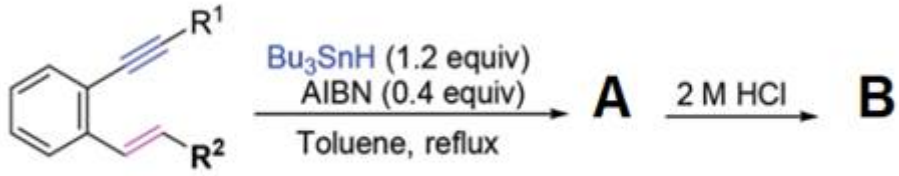
3. ✖ True. It is the only product that has a double bond in conjugation with the ring that results from attack that places the proton at an end of the conjugated system and formation of carbanion stabilised by resonance.

4. ✖ False. Though it is one of the possible products, it cannot be formed as reaction would need to follow anti-Markovnikov's rule.

Question Number : 56 Question Id : 630680269572 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

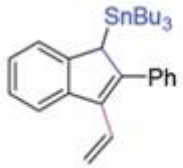
Correct Marks : 2 Wrong Marks : 0

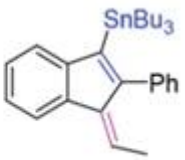
Consider the following reaction scheme.



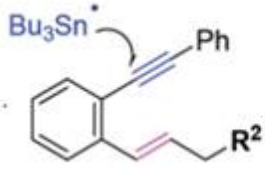
Select the correct option.

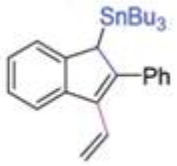
Options :

1. ✖ A. 

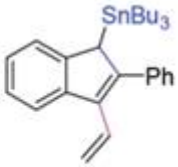
69% yield B. 

12% yield

2. ✖ A. 

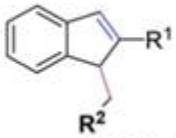
B. 

3. ✖ A. 

B. 

69% yield

4. ✔ A. 

R^1 = Ar, alkyl, TMS
R^2 = CO_2Et/Me, CN, $CONMe_2$
B. 

up to 91% yield

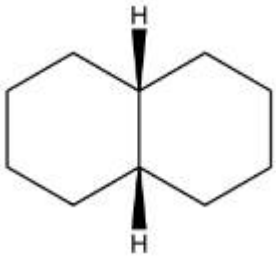
Question Number : 57 Question Id : 630680269573 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

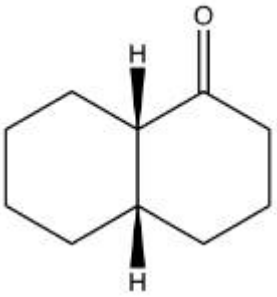
Select the structure with chiral centre(s).

Options :

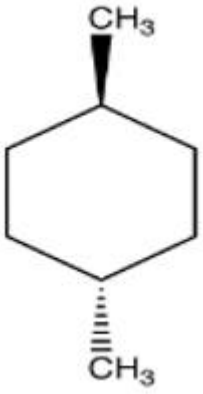
1. ✖



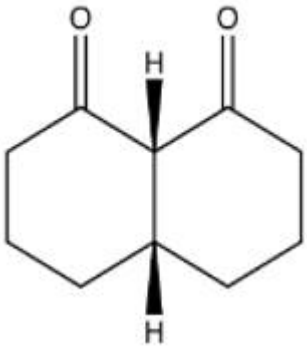
2. ✔



3. ✖



4. ✖



Question Number : 58 Question Id : 630680269574 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the molecule that exists as geometric isomers.

Options :

1. ✖ 1,1-dibromo-1-butene

2. ✖ 4-methyl-2-pentene

3. ✔ 3 heptene

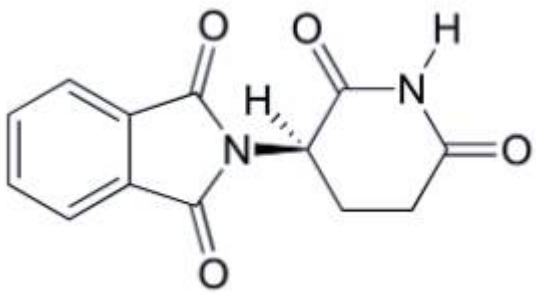
4. ✖ 1-decene

Question Number : 59 Question Id : 630680269575 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

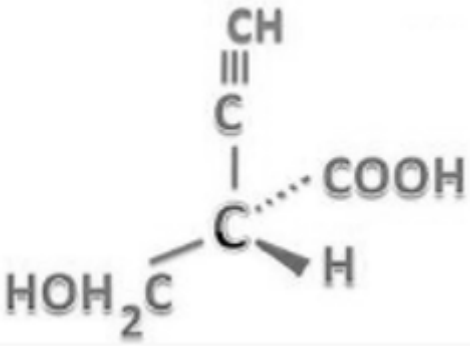
Correct Marks : 2 Wrong Marks : 0

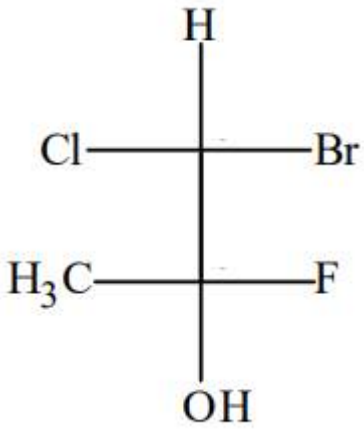
Identify the structure with (R) configuration.

Options :

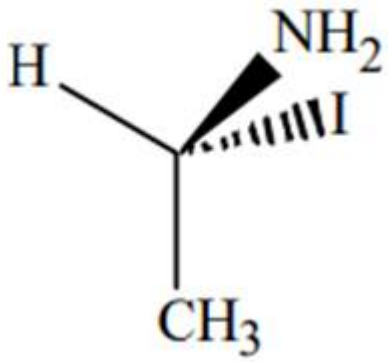
1. ✔ 

2. ✖





3. ✖



4. ✖

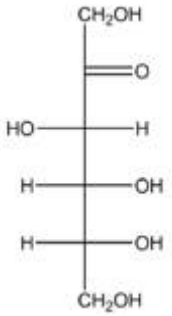
Question Number : 60 Question Id : 630680269576 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

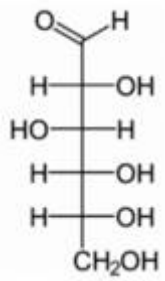
Select odd one out from the following options.

Options :

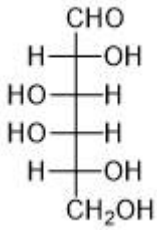
1. ✖



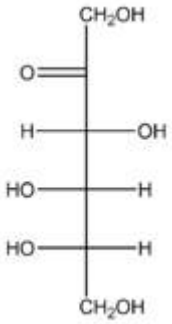
2. ✖



3. ✖



4. ✔



Question Number : 61 Question Id : 630680269577 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Heterocyclic compounds include biologically active synthetic and natural compounds.

B. Use of heterocyclic compounds in agrochemicals and medicinal chemistry is limited due toxic byproducts formed.

Select the correct option.

Options :

1. ✔ A only

2. ✖ B only

3. ✖ A and B

4. ✖ Neither A nor B

Question Number : 62 Question Id : 630680269578 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Type of heterocyclic compounds	Examples
A. O-based heterocyclic	(i) dihydropyran
B. Saturated	(ii) thiophene
C. 5-membered aromatic ring	(iii) pyrazine
D. 6-membered aromatic ring	(iv) oxazole

Options :

1. ✖ A – (iv); B – (iii); C – (ii); D – (i)

2. ✖ A – (iv); B – (ii); C – (i); D – (iii)

3. ✖ A – (i); B – (iii); C – (iv); D – (ii)

4. ✔ A – (iv); B – (i); C – (ii); D – (iii)

Question Number : 63 Question Id : 630680269579 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Route : Feature

A. Paal Knorr synthesis of furans : p-$MeC_6H_4SO_3H$

B. Feist-Benary synthesis of furans : I^- used as better leaving group changing the regiochemical output

C. Paal Knorr synthesis of furans : reversible; furans can be converted to 1,4 diketones

D. Modified Feist-Benary synthesis : '3+2'; dehydration of isolable intermediate

Options :

1. ✖ A, B, C

2. ✖ B, C, D

3. ✔ A, C

4. ✖ B, D

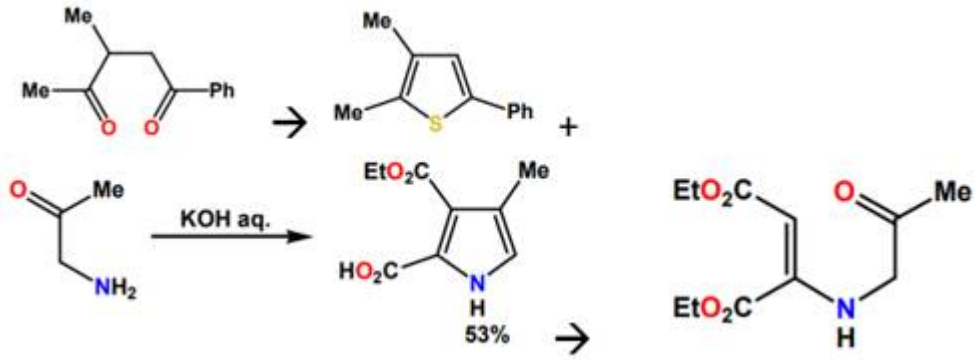
Question Number : 64 Question Id : 630680269580 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

A new alternative to Prozac is the molecule, Duloxetine, that is marketed in enantiomerically pure form. What is the route to obtaining this molecule?

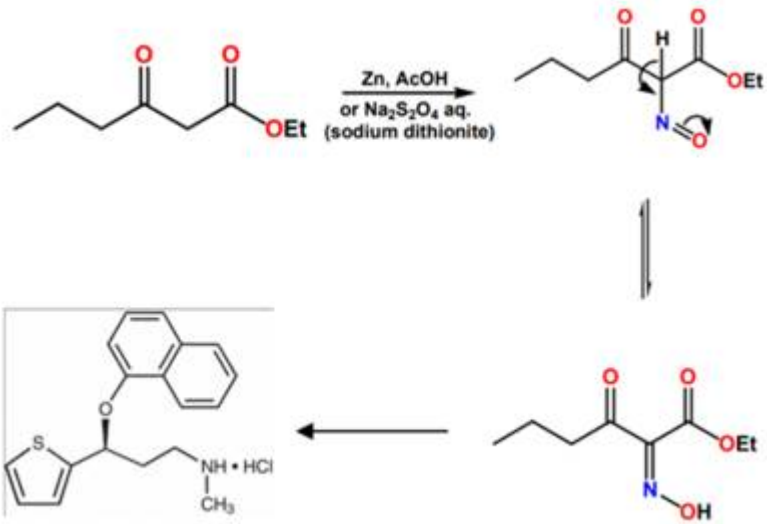
Options :

1. ✖



2. ✔ 2-acetylthiophene → Mannich aminomethylation → reduction of carbonyl group →etherification (alcohol + 1-fluoronaphthalene) → demethylation of the tertiary amino group

3. ✖



4. ✖ 2-acetylthiophene → reduction of carbonyl group → Mannich aminomethylation → demethylation of the tertiary amino group → etherification (alcohol + 1-fluoronaphthalene)

Question Number : 65 Question Id : 630680269581 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Thiophene or thiophene-based heterocycles, such as carbazole– oligothiophene, coumarin–thiophene, and benzothiadizole–thiophene, have been employed as the π-connecting linker in organic dyes.

Identify the reason for this.

Options :

1. ✔ There is a good match between the HOMO of the dyes and LUMO on the thiophene moieties.

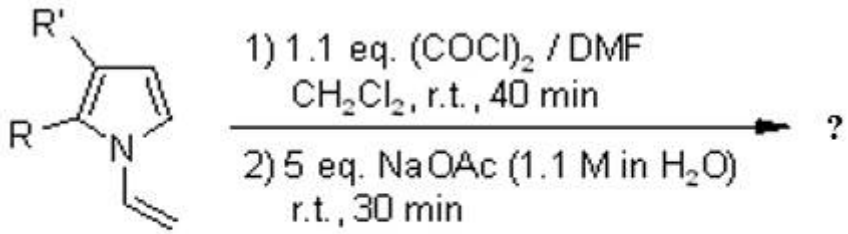
2. ✖ Thiophene's oxygen analogue displays low oxidation potential that enhances the performance of the organic dyes.

3. ✖ There is a good match between the HOMO of the thiophene moieties and LUMO on the dyes.

4. ✖ D (thiophene) – π – A (dye) type system is created by conjugated system that allows for intramolecular charge transfer for more flexible photoelectric properties.

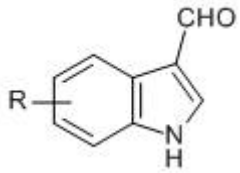
Question Number : 66 Question Id : 630680269582 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

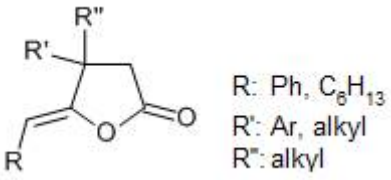


Select the correct option.

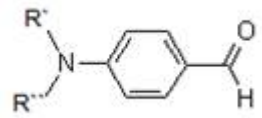
Options :

1. ✖ 

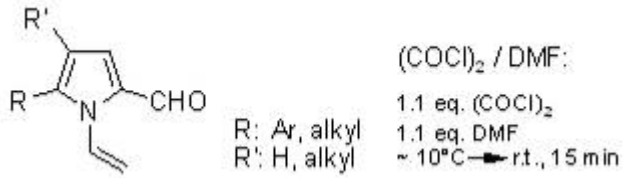
2. ✖



3. ✖



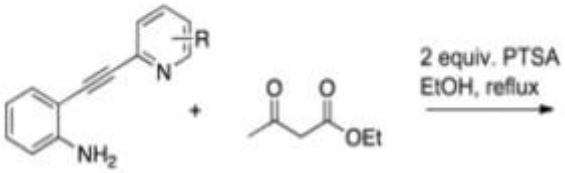
4. ✔



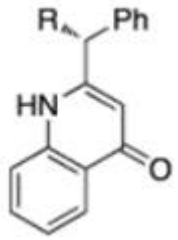
Question Number : 67 Question Id : 630680269583 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Predict the product formed here.

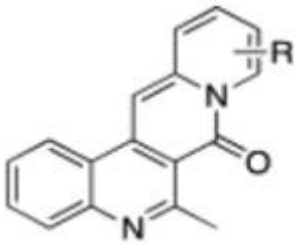


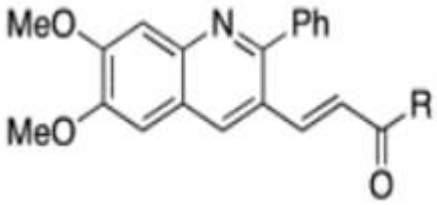
Options :



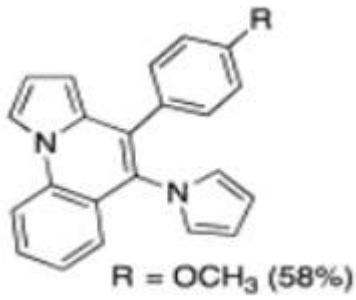
1. ✖

2. ✔





3. ✖



4. ✖

Question Number : 68 Question Id : 630680269584 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Predict the reaction conditions for the following reaction.

Options :

1. ✔ IBX, EtOAc/4h, 80°C

2. ✖ IBX, EtOH/16h, 90°C

3. ✖ Ir/TiO_2–NCS

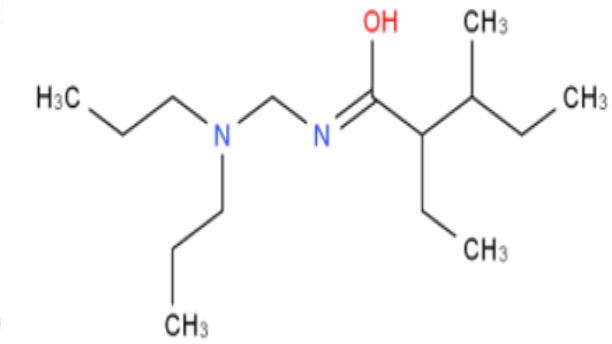
4. ✖ CuI, pipecolinic acid, K_2CO_3, DMSO

Question Number : 69 Question Id : 630680269585 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following compounds and their IUPAC names.

A. $CH_3CH(CH_3)CH(CH_3)CH(CH_3)N(CH_2CH_3)_2$: N,N-diethyl-3,4-dimethylpentan-2-amine

B. 

: 2-propenyldimethylammonium ethanoate

Select the correct option.

Options :

1. ✔ A only

2. ✖ B only

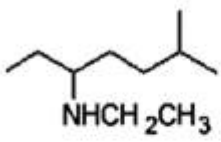
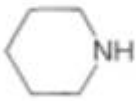
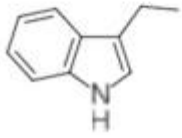
3. ✖ A and B

4. ✖ Neither A nor B

Question Number : 70 Question Id : 630680269586 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Amine	Description
A. 	(i) aliphatic 1° amine
B. $(CH_3)_3CNH_2$	(ii) secondary amine
C. 	(iii) heterocyclic amine ring system
D. 	(iv) piperidine

Options :

1. ✖ A –(ii); B – (iii); C – (iv); D – (ii)

2. ✔ A–(ii); B – (i); C – (iv); D – (iii)

3. ✖ A –(iv); B – (i); C – (ii); D – (iii)

4. ✖ A –(iii); B – (i); C – (ii); D – (iv)

Question Number : 71 Question Id : 630680269587 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Add ether and shake in separating flask. Discard the ether layer.

B. Add fresh ether to obtain pure product in it.

C. Add dilute acid to solubilize solute.

D. Add drops of NaOH to regenerate free compound.

E. Add ether to reaction mixture, shake and discard the water phase.

Select the option that represents the methodology to isolate amines.

Options :

1. ✔ E → C → A → D → B

2. ✖ A → C → B → E → D

3. ✖ E → C → A → B → D

4. ✖ C → E → A → D → B

Question Number : 72 Question Id : 630680269588 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Meisenheimer rearrangement involves rearrangement of tertiary amine oxides to give substituted hydroxyl-amines on heating.

B. If migrating group on amine oxide contains a β – hydrogen, Cope elimination will be a competing reaction.

Select the correct option.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 73 Question Id : 630680269589 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the reason for sickle-cell anaemia.

Options :

1. ✖ Haemoglobin has a globular shape that associates to form dimer. This dimer formation is inhibited due to twisting of the molecule into coil shape.

2. ✔ Glutamate at position 6 is replaced by valine that causes clumping of haemoglobin and change in shape of RBCs.

3. ✖ Haemoglobin has a planar shape that associates to form tetramer. This tetramer formation is inhibited due to twisting of the molecule into coil shape.

4. ✖ Valine at position 6 is replaced by glutamate that causes clumping of haemoglobin and change in shape of RBCs.

Question Number : 74 Question Id : 630680269590 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

'Histidine is used by enzymes to transfer protons during chemical reactions.'

Select the correct option with respect to the given statement.

Options :

1. ✔ True, as its pK_a value is close to physiological pH.

2. ✖ False, as its pK_a value is close to the physiological pH.

3. ✖ True, the conjugate acid of amino group at N-terminus has pK_a of about 9.6 thus is deprotonated at physiological pH.

4. ✖ False, the conjugate acid of amino group at N-terminus has pK_a of about 9.6 thus is deprotonated at physiological pH.

Question Number : 75 Question Id : 630680269591 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Proteases have been developed to catalyse the breakdown of peptide bonds in proteins.

B. The 'catalytic triad' of serine, histidine and aspartate facilitate enzyme-catalysed peptide bond hydrolysis.

Select the correct option.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 76 Question Id : 630680269592 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. The peptide bond behaves like ethylene in the manner of plane of the molecule and rotation of atoms that are attached to nitrogen and carbon.

B. The lone pair of electrons on N of the amino group is delocalised among the nitrogen, carbon, and oxygen atoms.

C. The delocalisation thus leads to resonance stabilisation, a higher energy state.

D. The C-N bond character is about 60% vs the C=N bond-like character.

E. Thus, the nitrogen and carbonyl carbon atoms both have trigonal planar geometries.

Select the correct option.

Options :

1. ✖ A, B, C, D, E

2. ✔ A, B, D, E

3. ✖ A, B, C, E

4. ✖ A, C, D, E

Question Number : 77 Question Id : 630680269593 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Amino acid	Nature
A. Asn	(i) non-polar
B. Met	(ii) affects shape of peptide
C. Arg	(iii) polar
D. Gly	(iv) somewhat polar
E. Asp	(v) negatively charged at pH 7.0
F. Cys	(vi) positively charged at pH 7.0

Options :

1. ✖ A –(ii); B – (iii); C – (vi); D – (i); E – (v) ; F – (iv)

2. ✖ A –(iii); B – (ii); C – (v); D – (i); E – (vi) ; F – (iv)

3. ✖ A –(i); B – (iii); C – (iv); D – (ii); E – (vi) ; F – (v)

4. ✔ A –(iii); B – (i); C – (vi); D – (ii); E – (v) ; F – (iv)

Question Number : 78 Question Id : 630680269594 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following pairs.

Protein : Role/feature

A. Carbonic anhydrase : reversible hydration of CO_2

B. Haemoglobin : tetrameric (alpha 2, beta 2)

C. Collagen : superhelical cable with Gly at every third position

D. Gelatin : no specific motif

E. α-keratin : Present in mammals, Cys residues responsible for texture

F. Superoxide dismutase : Antiparallel beta pleated sheet

Select the correct answer.

Options :

1. ✖ A, B and C only

2. ✖ A, B and D only

3. ✔ A, B, C and E only

4. ✖ A, B, C, E and F only

Question Number : 79 Question Id : 630680269595 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following is an application of carboxylic acid?

Options :

1. ✖ Cyanohydrin formation

2. ✖ Rearrangement of pinacol to pinacolone

3. ✖ Rosenmund reduction of acyl chloride

4. ✔ To directly obtain α-hydroxyphosphonates from aldehydes and ketones

Question Number : 80 Question Id : 630680269596 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct statement from among the following.

Options :

1. ✔ Vitamin B_6 is pyridoxine, its active form is pyridoxal phosphate and plays key role in amino acid breakdown.

2. ✖ Vitamin B_5 is Pantothenic acid and has coenzyme A as its active form. Its key biochemical function is racemisation.

3. ✖ Vitamin B_6 is calciferol, its active form is calcitriol and plays key role in glycogen breakdown.

4. ✖ Vitamin B_{12} is Cobalmin and has coenzyme B_{12} as its active form. Its key cellular role is glucose and fatty acid synthesis.

Question Number : 81 Question Id : 630680269597 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct option from among the following.

Options :

1. ✖ Cortisol, aldosterone, and glucagon are steroids based hormones.

2. ✖ Triiodothyronine, Luteinising hormone, and Dopamine are derivatives of tyrosine.

3. ✖ Dihydrotestosterone, oestrogen, and prolactin are steroid based hormones.

4. ✔ Somatostatin, antidiuretic hormone, and parathormone are protein based hormones.

Question Number : 82 Question Id : 630680269598 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the option where the type of substance is associated with correct examples.

Options :

1. ✖ Pyrrolizidine – eg. Trigonelline, ecgonine

2. ✖ Tropane – eg. Symphitine, anabasine

3. ✔ Pyridine – eg. Arecaidine, guvacine

4. ✖ Pyrrole – eg. Hygrine, atropine

Question Number : 83 Question Id : 630680269599 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the option from below that represents correct information.

Options :

1. ✖ Reagent: Mayer's reagent; Obs: orange-red; Conclusion: alkaloid present

2. ✖ Reagent: Wagner's reagent; Obs: pale blue; Conclusion: colchine present

3. ✖ Test: Murexide test; Obs: purple; Conclusion: indole present

4. ✔ Reagent: Picrolonic acid; Obs: yellow: Conclusion: alkaloid present

Question Number : 84 Question Id : 630680269600 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Solanine treatment is protective and therapeutic for tumor reduction in animals.

B. Cyclopamine teratogenic properties act on inhibition of signaling pathway.

C. Taxines are calcium channel antagonists that leads to build up of cytoplasmic calcium levels.

D. The reactive pyrroles inhibit cell division by perturbing the Z-ring.

E. Pergularinine is an indolizidine alkaloid that inhibits synthesis of nucleic acid by targeting dihydrofolate reductase.

Select the correct answer.

Options :

1. ✔ A, B, C and E

2. ✖ A, B and E only

3. ✖ A, D and C

4. ✖ A and C only

Question Number : 85 Question Id : 630680269601 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following statements in correct chronological order.

A. Strictosidine is accumulated in vacuoles of epidermal cells.

B. Triggering by hormonal treatment to mimic attack of herbivores trigger build-up of strictosidine.

C. At non-stressful physiological conditions, strictosidine levels in *C. roseus* remain low.

D. During an attack, sudden break of substrate (strictosidine) and loss of enzyme (SGD) compartmentalisation leads to cellular disruption and massive production of reactive aglycone – the toxic response of the plant.

E. β-D-glucosidase (SGD) is the first downstream enzyme after first monoterpene indole alkaloid formation.

Options :

1. ✖ D; E; C; B; A

2. ✖ A; B; C; D; E

3. ✔ C; A; B; E; D

4. ✖ D; E; A; C; B

Question Number : 86 Question Id : 630680269602 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Alkaloid :	structure/derived from
A. pyrrolizidine	esters of 1-hydroxymethyl-1,2- dehydropyrrolizidine
B. pyridine	L-lysine with structure containing a ring of 6 radicals, 5 groups of methylene and one amine
C. quinoline	L-tryptophan, fusion of benzene ring with pyridine ring
D. tropane	heterocyclic aromatic compounds derived from tyrosine and phenlanaline

Choose the correct answer.

Options :

1. ✖ A, B, C and D

2. ✔ A, B and D

3. ✖ A, B and C

4. ✖ A and B only

Question Number : 87 Question Id : 630680269603 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. The imidazole alkaloids are derived from L-histidine and are comprised of histamine, histidine, pilocarpine and pilosine.

B. Non-heterocyclic alkaloids are protoalkaloids that contain N atom outside the ring.

Select the correct response.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 88 Question Id : 630680269604 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following alkaloids is used as a chiral ligand in asymmetric synthesis?

Options :

1. ✖ galantamine

2. ✖ paclitaxel

3. ✖ Quinine

4. ✔ (-)-sparteine

Question Number : 89 Question Id : 630680269605 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Drug molecule	Effect
A. atropine	(i) psychoactive drugs
B. cocaine	(ii) causes chlorosis in *Lenna gibba*
C. quinine	(iii) vasodilator
D. papaverine	(iv) hallucinogenic effect

Options :

1. ✔ A – (iv); B- (i); C – (ii); D – (iii)

2. ✖ A – (ii); B- (iv); C – (i); D – (iii)

3. ✖ A – (iv); B- (ii); C – (i); D – (iii)

4. ✖ A – (iii); B- (i); C – (ii); D – (iv)

Question Number : 90 Question Id : 630680269606 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following has more than one physiological action?

Options :

1. ✖ Quinine

2. ✔ Morphine

3. ✖ Codeine

4. ✖ Papaverine

Question Number : 91 Question Id : 630680269607 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Even though it has an aldehyde functional group, which of the following reactions is NOT shown by glucose?

Options :

1. ✖ Oxime formation

2. ✖ Cyanohydrin formation

3. ✖ Oxidation with bromine to gluconic acid

4. ✔ Hydrogen sulphite addition compound formation

Question Number : 92 Question Id : 630680269608 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What is the product formed when hemiacetals undergo spontaneous decomposition?

Options :

1. ✖ Alkoxide anion on protonation gives alcohol

2. ✔ Corresponding carbonyl precursors

3. ✖ Corresponding Imine derivatives

4. ✖ Oxidation to carboxylic acids

Question Number : 93 Question Id : 630680269609 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

How can the chiral centre in the tartaric acid molecule synthesised, be identified?

Options :

1. ✔ Wohl degradation to reduce carbon chain length by one, by removal of aldehyde carbon.

2. ✖ Kiliani-Fischer cyanohydrin synthesis to convert tetrose to pentose and retain configuration.

3. ✖ Wohl reduction to convert the aldehyde group to alcohol.

4. ✖ Kiliani-Fischer cyanohydrin synthesis to convert tetrose to pentose and invert configuration.

Question Number : 94 Question Id : 630680269610 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Determine the odd one out of the techniques given below.

Options :

1. ✖ Filtration

2. ✖ Size-exclusion chromatography

3. ✔ Electrodeposition

4. ✖ Centrifugation

Question Number : 95 Question Id : 630680269611 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Floatation is based on surface selectivity that isolates hydrophobic materials from the hydrophilic part.

B. Distillation of liquids is a process involving partial vapourisation.Separation of the constituents of the mixture is based on differences in volatility or vapour pressure.

C. Evaporation process is to concentrate a solution of a non-volatile solute or to separate a highly volatile solvent from a non-volatile solute only.

D. Hydrometallurgy is a technique in which aqueous solution is used to extract metals from ores.

Select the correct answer.

Options :

1. ✔ A, B and D

2. ✖ A and B only

3. ✖ A and D only

4. ✖ A, B, C and D only

Question Number : 96 Question Id : 630680269612 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

A. sampling	(i) material flowability and wall friction characteristics
B. stability conditions to be checked	(ii) track multiple samples to determine stability, uniformity and consistency
C. density of sample	(iii) temperature cycling, humidity, response to silo weeping
D. shear testing	(iv) important factor for processing viz. 'loose poured', 'aerated bulk density' and 'settled density'

Options :

1. ✖ A – (iii); B- (i); C – (iv); D – (ii)

2. ✔ A – (ii); B- (iii); C – (iv); D – (i)

3. ✖ A – (i); B- (iv); C – (ii); D – (iii)

4. ✖ A – (iv); B- (iii); C – (ii); D – (i)

Question Number : 97 Question Id : 630680269613 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following statements in **increasing** order of complexity.

A. A chemical equation indicates the chemicals involved in a reaction.

B. Writing the final chemical equation such that the stoichiometric coefficients are represented in the simplest whole number ratio.

C. Use of Avogadro's number allows for fair comparison of the ratio in which reactants and products are featuring in a reaction irrespective of their state.

D. Obtaining the same number of atoms of elements featuring in the reactants vs the product molecules.

E. The law of mass action can thus be ascertained by comparing reacting masses of reactants and products.

Options :

1. ✔ A, D, B, E, C

2. ✖ D, A, B, E, C

3. ✖ B, A, D, E, C

4. ✖ E, A, D, B, C

Question Number : 98 Question Id : 630680269614 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which equation is correctly balanced from among the following?

Options :

1. ✖ $Cr^{3+} + Mg \rightarrow Cr + Mg^{2+}$

2. ✖ $Al^{3+} + K \rightarrow Al + K^{+}$

3. ✔ $Br_2 + Hg \rightarrow Hg^{2+} + 2\,Br^{-}$

4. ✖ $Sn^{4+} + H_2 \rightarrow Sn + 2\ H^+$

Question Number : 99 Question Id : 630680269615 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What are the features of crude oil in its early stage of formation?

Options :

1. ✔ Formed from kerogen, these are long and dense straight chains that are highly viscous

2. ✖ Low density, volatile component rich having low sulphur content

3. ✖ Paraffins with less than 5 carbons rich in isomers as the carbon number in molecule increases

4. ✖ Exposure to high temperatures for long duration leads to low S and high N content in these mixtures.

Question Number : 100 Question Id : 630680269616 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following statements, **indicating changes when hydrocarbons are heated,** in correct sequence.

A. The working temperature is in the range of 750 – 900°C at normal pressure.

B. Pyrolysis of hydrocarbons takes place in the absence of catalysts.

C. The reaction involves free radical mechanism that results in formation of large number of small molecules.

D. Cracking of C-H bond and C-C bonds take place simultaneously.

E. Reactions such as cyclisation, polymerisation, and that of cyclodehydrogenation, are suppressed by adding steam to the feed.

Options :

1. ✖ A, C, D, B, E

2. ✔ B, A, C, D, E

3. ✖ C, D, B, A, E

4. ✖ D, E, B, C, A

Question Number : 101 Question Id : 630680269617 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Conventionally, coal and its derivates are treated with an alkane, benzene, pyridine or THF in a Soxhlet extractor.

B. Magnetic agitation methods greatly enhance solvent permeation into samples that allow for better solute dispersion.

C. Heteroatom-containing organic species contain mainly arenes, condensed alkylarenes.

D. Dialkyl phthalates are primarily used as plasticisers and stabilisers for cosmetic emulsifiers, adhesives, and inks.

E. Directional CHC can be easily achieved under ambient conditions with relatively less polar solvents during hydrodenitrogenation.

Select the correct option.

Options :

1. ✖ A, B, C and E

2. ✖ B, C, D and E

3. ✔ A, B, C and D

4. ✖ A, B, C, D and E

Question Number : 102 Question Id : 630680269618 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements about Soda ash manufacturing.

A. Solvay process uses NaCl and limestone as basic raw materials. $CaCl_2$ is one of the by-products formed.

B. Natural deposits like Trona and recovery from naturally occurring alkaline brines give a competitive edge over other commercial production routes.

Select the correct option.

Options :

1. ✖ A only

2. ✖ B only

3. ✔ Both A and B are correct

4. ✖ Neither A nor B is correct

Question Number : 103 Question Id : 630680269619 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What is the feature of castor oil-based synthetic detergents?

Options :

1. ✔ They are less prone to foaming and can be disposed quickly due to simplified microbial breakdown.

2. ✖ They are more prone to foaming and can be disposed quickly due to simplified microbial breakdown.

3. ✖ They have very low foaming ability with unstable lather and form a hard soap.

4. ✖ High percentage of castor oil in soap is required for obtaining soft soaps and they form unstable emulsions on skin and hair

Question Number : 104 Question Id : 630680269620 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What are the features of liquid effluents in paper manufacturing process?

Options :

1. ✖ High BOD, low COD, and total suspended solids.

2. ✔ High BOD, high COD, total suspended solids with N and P.

3. ✖ High BOD, low COD, total suspended solids with chlorinated organic compounds like dioxins and furans.

4. ✖ Sodium salts from recovery oiler, pulp screening rejects, sludges.

Question Number : 105 Question Id : 630680269621 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the steps involved in porcelain making in proper order from first to last.

A. The suspensions made of kaolin and grinded feldspar and quartz have to be mixed, sieved, cleaned, and transported to a filter press.

B. The raw material kaolin is dissolved in water.

C. The filter cakes are evacuated in a de-airing pug mill and with this consistency used to shape the plates or cups.

D. Quartz and feldspar must be normally grinded.

E. The articles are then fired at about 900°C (biscuit firing).

Options :

1. ✖ B→D→A→C→ E

2. ✔ B→A→C→D→ E

3. ✖ A→C→B→D→ E

4. ✖ D→A→C→B→ E

Question Number : 106 Question Id : 630680269622 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Type : Example

A. Acid refractories : Ganister

B. Basic refractories : Dinas rock

C. Neutral refractories : Sillimanite

D. Basic refractories : Magnesite

Options :

1.

✖ A, B, C and D

2. ✖ A, B and C

3. ✖ A, B and D

4. ✔ A, C and D

Question Number : 107 Question Id : 630680269623 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Hydrophobic cements are prepared by involving which chemicals?

Options :

1. ✖ Alkali salts of wood resins

2. ✖ Alkyl-aryl sulfonate type surfactants

3. ✖ Animal and vegetable fats and oils

4. ✔ Oleic acid, stearic acid

Question Number : 108 Question Id : 630680269624 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What is the composition of calcareous cement?

Options :

1.

✖ Al_2O_3 (12%), Fe_2O_3 (1%), CaO (40%), SiO_2 (35%)

2. ✖ Al_2O_3 (23%), Fe_2O_3 (11%), CaO (5%), SiO_2 (52%)

3. ✔ Al_2O_3 (18%), Fe_2O_3 (6%), CaO (21%), SiO_2 (35%)

4. ✖ Al_2O_3 (6.9%), Fe_2O_3 (3.9%), CaO (63%), SiO_2 (21.9%)

Question Number : 109 Question Id : 630680269625 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Type of glass	Raw materials
A. Potash-lead glass	(i) chalk, soda ash, clean sand
B. Soda-lime glass	(ii) chalk, K_2CO_3, clean sand
C. Potash-lime glass	(iii) Litharge or lead sesquioxide, K_2CO_3, clean sand
D. Common glass	(iv) chalk, salt cake, coke, ordinary sand
	(v) chalk, litharge, K_2CO_3, clean sand

Options :

1. ✔ A - (iii); B - (i); C - (ii); D - (iv)

2. ✖ A - (ii); B - (i); C - (iii); D - (iv)

3. ✖ A - (iii); B - (ii); C - (iv); D - (v)

4. ✖ A - (i); B - (iii); C - (ii); D - (v)

Question Number : 110 Question Id : 630680269626 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following steps in sequential order.

A. A gravity feed system is used to transfer raw materials to a weigher and mixer.

B. Mixture is conveyed to a batch storage bin then dropped into a feeder to the melting furnace.

C. Soda ash mixed with limestone and sand are crushed and stored in separate elevated bins.

D. Mix raw materials with cullet to ensure homogeneous melting.

E. As mixture melts, it flows through a throat in the front to a refiner.

Options :

1. ✖ B→A→D→E→C

2. ✖ A→D→C→E→B

3. ✖ C→B→A→D→E

4. ✔ C→A→D→B→E

Question Number : 111 Question Id : 630680269627 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct option for the role of components in glass making.

Options :

1. ✖ Network forming oxides - B_2O_3, GeO_2

2. ✔ Redo Active oxides - Na_2SO_4, $CaSO_4$

3. ✖ Network modifying oxides - Al_2O_3, PbO

4. ✖ Redo active agents - CoO, P_2O_5

Question Number : 112 Question Id : 630680269628 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify which of the following steps is NOT part of the melt quenching method of manufacturing glass.

Options :

1. ✖ Chemicals are weighted according to stoichiometric ratio.

2. ✖ Melt is stirred in a platinum stirrer and quickly poured over a brass block kept at 300°C.

3. ✔ Raw materials are added on bed of a flow reactor and mixture is poured into a melting furnace.

4. ✖ Homogeneous mixture is made into a fine powder in mortar pestle.

Question Number : 113 Question Id : 630680269629 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correctly paired option from among the following.

Options :

1. ✔ Synthesis of urea - ammonium carbamate as the substrate and a Cu catalyst

2. ✖ Synthesis of ammonia - nitrogen and hydrogen gases, 100 bar, 220°C in the presence of Ni

3. ✖ Phosphate rock - sourced from metamorphic rock deposits

4. ✖ Phosphoric acid - reacts with metal nitrates to give MAP and DAP

Question Number : 114 Question Id : 630680269630 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What is the reason for preference of TSP fertilisers over ammoniated phosphates for leguminous plants?

Options :

1. ✖ TSP is a high N content and high-analysis P source.

2. ✖ High toxicity risks in high pH and calcareous soils when compared to DAP.

3. ✔ TSP is N free high-analysis P source. There may be decrease in nodulation on external addition of mineral N with no further gains in yield.

4. ✖ It brings about an increase in nodulation and thus the contribution of biological N fixation to N uptake.

Question Number : 115 Question Id : 630680269631 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correct order of interaction of triple superphosphate (TSP) on application to soil.

A. Precipitation of some P in and around the granule

B. Dissolution of TSP on absorbing soil water

C. Formation of a P-enriched solution that starts moving away from the granule

D. Co-application with lime or on calcareous soil reduces the solubility of P and thus lower diffusion of P is observed

E. Strongly acidic P solution causes the dissolution of soil constituents generating a solution rich in various cations. Thus forming low solubility forms of P around the residual granule.

Options :

1. ✖ $E \rightarrow A \rightarrow B \rightarrow C \rightarrow D$

2. ✔ $B \rightarrow C \rightarrow A \rightarrow E \rightarrow D$

3. ✖ $C \rightarrow A \rightarrow E \rightarrow D \rightarrow B$

4. ✖ $A \rightarrow D \rightarrow B \rightarrow E \rightarrow C$

Question Number : 116 Question Id : 630680269632 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Source of K fertiliser	Content
A. Wood ash	(i) K_2O (> 25%)
B. Sea weeds ash	(ii) K_2SO_4. $MgSO_4$. 2 $CaSO_4.2H_2O$
C. Wool waste	(iii) K_2O (5 -25%)
D. Polyhalite	(iv) K_2O (1.5 to 5.0 %)
	(v) $KCl.MgCl_2.6H_2O$

Options :

1. ✔ A - (iii); B - (i); C - (iv); D-(ii)

2. ✖ A - (iii); B - (i); C - (iv); D-(v)

3. ✖ A - (iii); B - (v); C - (iv); D-(ii)

4. ✖ A - (ii); B - (i); C - (iv); D-(iii)

Question Number : 117 Question Id : 630680269633 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the statements below is NOT an advantage of mixed fertilisers?

Options :

1. ✖ less labour required

2. ✖ balanced manuring can be achieved

3. ✔ unit cost of plant nutrients is higher than of straight fertilisers

4. ✖ residual acidity can be controlled by monitoring the amount of free lime content in the mixture.

Question Number : 118 Question Id : 630680269634 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the statement that is NOT true for Azospirillum.

Options :

1. ✖ It increases root hair development and biomass.

2. ✖ It brings about increased mineral and water uptake, root development, vegetative growth and crop yield.

3. ✖ Inoculation reduces the use of chemical fertilisers by about 20-50% (20-40 kg N/ha).

4. ✔ It enhances humic acid toxicity in the compost and hence is not recommended for millets and sorghum.

Question Number : 119 Question Id : 630680269635 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Type of biofertilizers	Example
A. N_2 fixers	(i) *Pseudomonas striata*
B. Phosphorus solubilizers	(ii) *Ericoid mycorrhiza*
C. P mobilizers	(iii) *Azospirillum*
	(iv) *Clostridium* (Anaerobic)

Options :

1. ✔ A - (iii), A - (iv); B - (i); C - (ii)

2. ✖ A - (ii), A - (iv); B - (i); C - (iii)

3. ✖ A - (iii), B - (iv); B - (i); C - (ii)

4. ✖ A - (iv), B - (iii); C - (i); C - (ii)

Question Number : 120 Question Id : 630680269636 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following is NOT an example of water pollution by introduction of alien species?

Options :

1. ✖ Jellyfish *Mnemiopsis leidyi* in Black sea

2. ✖ *Caulerpa taxifolia* algae in Mediterranean sea

3. ✔ Radioactive waste used for research purpose

4. ✖ Asian clams in San Fransico bay

Question Number : 121 Question Id : 630680269637 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the correctly paired statements from among the following.

Constituents of naturally occurring water : Type

A. Vibrio cholerae and other marine algae : microbial pathogens

B. Natural organic matter : chemical

C. Bromide, iodide : toxins released by microbes

D. Heavy metals, mercury : anthropogenic factors

Options :

1. ✖ A, B and C

2. ✔ A and B

3. ✖ B and C

4. ✖ A and D

Question Number : 122 Question Id : 630680269638 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Select the odd one out from the options given below.

Options :

1. ✔ Even a moderate drop in pH can decrease the number of hatched eggs of marine life and endanger amphibians.

2. ✖ Solubility of lead, chromium and cadmium is in controlled levels at pH levels of naturally occurring water sources.

3. ✖ Ammonia is relatively harmless to fish in neutral or slightly acidic water.

4. ✖ dissolved oxygen content is maintained at desired levels at natural pH for aquatic life.

Question Number : 123 Question Id : 630680269639 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Based on classification by amount of TDS per litre, which water sample will be considered as brackish water?

Options :

1. ✖ < 500 mg/L TDS

2. ✖ 50 - 100 mg/L TDS

3. ✖ > 50,000 mg/L TDS

4. ✔ 30,000 – 40,000 mg/L TDS

Question Number : 124 Question Id : 630680269640 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the INCORRECT statement from among the following.

Options :

1. ✖ Alkalinity of water is its acid-neutralising capacity including the total of all titratable bases.

2. ✔ Alkalinity of water is mainly caused by the co-existence of only hydroxide ions (OH−) and bicarbonate ions (HCO−) in water.

3. ✖ Alkalinity of water is mainly caused by the presence of hydroxide ions (OH^-), bicarbonate ions (HCO_3^-), and carbonate ions (CO_3^-), or a mixture of two of these ions in water.

4. ✖ If an acidic chemical were to contaminate a lake that has natural alkalinity, a neutralisation reaction occurs between the acid and alkaline substances and the pH of the lake water remains unchanged.

Question Number : 125 Question Id : 630680269641 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Read the following statements.

A. High concentration of sulphate in natural water is caused by leaching of natural deposits of sodium sulphate. (Glauber's salt) or magnesium sulphate (Epson salt).

B. Consuming water with high concentration of sulphate ions is a significant danger to human life within a short span of exposure.

Select the correct option.

Options :

1. ✔ A only

2. ✖ B only

3. ✖ A and B

4. ✖ Neither A nor B

Question Number : 126 Question Id : 630680269642 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the INCORRECT statement from among the following.

Options :

1. ✖ Exposure to higher levels of fluoride ions above 0.5 mg/l for 5-6 years may lead to adverse effects on human health leading to fluorosis.

2. ✖ Arsenic exposure causes respiratory, lung and bladder cancer as well as arsenic skin lesions.

3. ✔ Mercury exposure leads to many renal diseases like nephritis and nephrosis.

4. ✖ Lead affects the blood, central nervous system, and the kidneys of humans, with children and pregnant women being more susceptible to lead exposure.

Question Number : 127 Question Id : 630680269643 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Type of source	Source of water contamination
A. Point source	(i) Municipal and industrial effluents
B. Non-point source	(ii) Runoff from agriculture
	(iii) Runoff from mines and unanswered industrial sites
	(iv) Atmospheric deposition over a water surface

Note:

The types of source may be paired with multiple sources of water contamination.

Options :

1. ✖ A - (iv); B - (i), (ii), (iii)

2. ✔ A - (i); B - (ii), (iii), (iv)

3. ✖ A - (iii), (iv); B - (i), (ii)

4. ✖ A - (i), (ii); B - (iii), (iv)

Question Number : 128 Question Id : 630680269644 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following pairs.

Water contaminant type : source agents

A. Oxygen demanding waste : organic non-biodegradable wastes

B. Industrial waste: production of chromium salts

C. Agro-chemical waste : aldrin, dieldrin, malathion, hexachlorobenzene

D. Nutrient enrichment : ammonia, large amount of fluoride release

E. Thermal pollution : Nuclear and petroleum refineries

Select the correct option.

Options :

1. ✔ A, B, C and E

2. ✖ A, B, C and D

3. ✖ A, B, D and E

4. ✖ A, B, C, D and E

Question Number : 129 Question Id : 630680269645 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Match the following.

Disease related to water	Type of disease
A. Typhoid	(i) Viral
B. Giardiasis	(ii) Bacterial
C. Hepatitis E	(iii) Helminthic
D. Ringworm infection	(iv) Protozoal

Options :

1. ✖ A - (ii); B - (iv); C - (iii); D - (i)

2. ✖ A - (iv); B - (ii); C - (i); D - (iii)

3. ✖ A - (i); B - (iii); C - (iv); D - (ii)

4. ✔ A - (ii); B - (iv); C - (i); D - (iii)

Question Number : 130 Question Id : 630680269646 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Moringa oleifera is used as a natural source of water treatment. What is the method of purification provided by it?

Options :

1. ✖ Filtration due to high fibre waste generated by fruit i.e. drumsticks

2. ✔ Coagulation by water soluble proteins

3. ✖ Production of large amounts of sludge that allows removal of high turbidity from water

4. ✖ Coagulation by water insoluble proteins that facilitates sedimentation of impurities

Question Number : 131 Question Id : 630680269647 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Cell permeability dislocation

B. Nucleic acid and enzymes injury

C. Cyst inactivation at high pH

D. Free-radicals formation in presence of hydroxide

Select the statements that represent the mechanism of effects of chlorine in water disinfection.

Options :

1. ✖ A only

2. ✖ B and C only

3. ✖ D only

4. ✔ A, B and C

Question Number : 132 Question Id : 630680269648 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Chlorination by-products formation is an important concern in use of chlorine in treatment of water. Which method is used to eliminate these by-products in a water treatment factory?

Options :

1. ✖ Iron oxide coated filtration setup

2. ✖ Ozonation

3. ✔ Biodegradation via co-metabolism by mixed nitrifier cultures

4. ✖ Water softening

Question Number : 133 Question Id : 630680269649 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

What is the significance of the alkalinity of water (as $CaCO_3$) being less than the total hardness determined?

Options :

1. ✖ All hardness is due to calcium carbonate.

2. ✖ All hardness is due to calcium and magnesium carbonate.

3. ✖ Total hardness is the difference of the alkalinity due to calcium and magnesium carbonate.

4. ✔ The alkalinity represents net carbonate hardness and the balance of the hardness is due to non-carbonate hardness.

Question Number : 134 Question Id : 630680269650 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the effect of re-carbonation on softening of water.

Options :

1. ✔ It lowers the pH of water and converts carbonates to bicarbonates, thus stabilising the solution against precipitation of $CaCO_3$.

2. ✖ It causes corrosion of pipes.

3. ✖ It leads to increase in pH and formation of a crust of calcium carbonate in pipes and causes clogging.

4. ✖ It creates a bitter taste in drinking water.

Question Number : 135 Question Id : 630680269651 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following is NOT a feature of heating - lime soda process for softening of water?

Options :

1. ✖ Working temperature is 49-60°C

2. ✔ Increased mineral content in treated water released

3. ✖ Water is heated by using boiler blowdown or low pressure exhaust steam

4. ✖ Lower levels of calcium, magnesium and silica reduce the ionic load for the following processing

Question Number : 136 Question Id : 630680269652 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the options below is NOT an advantage for use of caustic soda process?

Options :

1. ✖ Reaction with dissolved carbon dioxide to form sodium carbonate

2. ✖ Good solubility and fast reaction rate

3. ✖ Removal of temporary hardness and equivalent amount of permanent hardness

4. ✔ Formation of added sludge that migrates to the bottom of the fluidised bed

Question Number : 137 Question Id : 630680269653 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Read the following statements.

A. The role of sodium 2-hydroxypropane- 1,2,3-tricarboxylate in Calgon® is to form dative bonding between O and the cations.

B. Sodium citrate plays the role of a 'sequestering agent' when Calgon® is used for water treatment.

Select the correct statement(s).

Options :

1. ✖ A only

2. ✖ B only

3. ✔ A and B

4. ✖ Neither A nor B

Question Number : 138 Question Id : 630680269654 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the given statements.

A. When hard water is passed through $Na_{12}(Al_{12}Si_{12}O_{48}).27H_2O$, calcium ions now take up position in the cage-like structure.

B. The $Na_{12}(Al_{12}Si_{12}O_{48}).27H_2O$ material is swamped with sea-water.

Select the correct option.

Options :

1. ✖ Step A is followed by step B

2. ✖ Step A and step B are not related

3. ✔ Step B is followed by step A

4. ✖ Step A is carried out in parallel with step B

Question Number : 139 Question Id : 630680269655 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the correct pairs from among the following.

Material :	Application
A. polymer with anionic functional groups on surface:	removal of calcium ions from passing water sample
B. polymer with anionic functional groups on surface:	taking up of sodium ions from passing water sample
C. polymer with cationic functional groups on surface:	removal of calcium ions from passing water sample
D. polymer with cationic functional groups on surface:	taking up of sodium ions from passing water sample

Options :

1. ✖ A and B

2. ✔ A and C

3. ✖ B and D

4. ✖ B and C

Question Number : 140 Question Id : 630680269656 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following steps in conditioning of water will control the hardness of water?

Options :

1. ✖ Use of sedimentation basin

2. ✖ Use of sludge removal equipment

3. ✖ Monitoring algal growth on walls of basins and launders

4. ✔ Performing jar tests to check for alkalinity and adjust coagulant (primary/aid)

Question Number : 141 Question Id : 630680269657 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. Precipitation reaction is used to detect phosphate, arsenite and dichromate ions.

B. Gas evolution with dilute HCl is used to detect sulphite, thiosulphate, and cyanide ions.

C. Gas evolution with dilute H_2SO_4 is used to detect sulphite, nitrite, and hypochlorite ions.

D. Gas evolution with concentrated H_2SO_4 is used to detect thiocyanate, bromate and chlorate ions.

Select the correct option.

Options :

1. ✔ A, B, C and D

2. ✖ A, B and C

3. ✖ A, B and D

4. ✖ B, C and D

Question Number : 142 Question Id : 630680269658 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Refer to these sequence of steps.

(i) Add excess calcium chloride solution to the sample aliquot

(ii) Filter rapidly to separate the white ppt formed

(iii) Add ammonia to the filtrate

Observation : A white ppt is formed

What can be determined using this test?

Options :

1. ✖ Chloride ion in the presence of nitrate ion

2. ✖ Bromide ion in the presence of chloride ion

3. ✔ Hydrogen carbonate ion in the presence of carbonate ion

4. ✖ Carbonate ion in the presence of sulphate ion

Question Number : 143 Question Id : 630680269659 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the following steps in correct order that require to be carried out in a titrimetric analysis.

A. A controlled amount of titrant is added to analyte-indicator mixture

B. A standardised solution is filled in the burette

C. An indicator is added to analyte giving a unique colour

D. At equivalence point all of analyte has just reacted completely with the titrant

E. Titrant is added till the point when the indicator just changes colour. This is recorded as the end point.

Options :

1. ✖ $C \rightarrow A \rightarrow B \rightarrow D \rightarrow E$

2. ✖ $B \rightarrow A \rightarrow C \rightarrow E \rightarrow D$

3. ✖ $D \rightarrow E \rightarrow A \rightarrow B \rightarrow C$

4. ✔ $B \rightarrow C \rightarrow A \rightarrow D \rightarrow E$

Question Number : 144 Question Id : 630680269660 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Arrange the different regions observed in the plot of pH vs volume of NaOH (cm^3) when a diprotic weak acid (H_2A) is titrated with NaOH solution from left to right.

A. Hydrolysis of A^{2-} will determine the second equivalence point

B. Initial pH is calculated from K_{a1} of H_2A

C. This is followed by a A2-/HA- buffer region

D. An HA^-/H_2A buffer region is generated at first plateau region of the graph

E. pH is determined by excess of strong base added

Options :

1. ✔ $B \rightarrow D \rightarrow C \rightarrow A \rightarrow E$

2. ✖ $D \rightarrow E \rightarrow B \rightarrow C \rightarrow A$

3. ✖ $B \rightarrow C \rightarrow D \rightarrow A \rightarrow E$

4. ✖ $D \rightarrow A \rightarrow B \rightarrow E \rightarrow C$

Question Number : 145 Question Id : 630680269661 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

For the reaction $Fe^{2+}_{(aq)}+Ce^{4+}_{(aq)}\rightleftharpoons Ce^{3+}_{(aq)}+Fe^{3+}_{(aq)}$,

the equilibrium constant is very large at working conditions.

Before the equivalence point, potential of the system, in a given solvent, can be determined easily using which form of Nernst equation?

Options :

1. ✖ $$E = E^{o}_{Ce^{4+}/Ce^{3+}} - \frac{RT}{nF}\log\frac{[Ce^{3+}]}{[Ce^{4+}]}$$

2. ✔ $$E = E^{o}_{Fe^{3+}/Fe^{2+}} - \frac{RT}{nF}\log\frac{[Fe^{2+}]}{[Fe^{3+}]}$$

3. ✖ $$E = E^{o}_{Ce^{4+}/Ce^{3+}} - \frac{RT}{nF}\log\frac{[Ce^{4+}]}{[Ce^{3+}]}$$

4. ✖ $$E = E^{o}_{Fe^{3+}/Fe^{2+}} - \frac{RT}{nF}\log\frac{[Fe^{3+}]}{[Fe^{2+}]}$$

Question Number : 146 Question Id : 630680269662 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the statement indicating correct information from the below given options.

Options :

1. ✖ Overall formation constant, $\beta_2 = K_1 + K_2 + K_3$, where K_1 , K_2 and K_3 are the equilibrium constants for the individual steps of complexation reactions

2. ✖ Stability constant of a reaction is a measure of the extent of dissociation of the complex at equilibrium.

3. ✔ $$\text{instability constant} = \frac{[\text{dissociated species of complex ion}]}{[\text{undissociated complex ion}]}$$ (Each species in above equation is raised to respective stoichiometric coefficients)

4. ✖ In titration of cyanide ion with silver nitrate solution, the equivalence point is the same as its end point, i.e. formation of permanent turbidity.

Question Number : 147 Question Id : 630680269663 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Identify the statement that is true for a precipitating agent.

Options :

1. ✔ Dimethylglyoxime is an example of a specific precipitating agent that reacts only with a single chemical species viz. Ni^{2+}.

2. ✖ Dimethylglyoxime is an example of a selectively precipitating agent that reacts only with a single chemical species viz. Ni^{2+}.

3. ✖ $AgNO_3$ is an example of a specific precipitating agent that reacts only with a single chemical species viz. Cl^-.

4. ✖ $AgNO_3$ is an example of a specific precipitating agent that reacts only with a limited number of chemical species viz. Cl^-, Br^- and I^-.

Question Number : 148 Question Id : 630680269664 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Which of the following steps are NOT part of good practices in washing and drying of precipitate?

Options :

1. ✖ Use of sintering-glass filtering crucible (at 110-250°C) for crystalline or granular type of precipitate

2. ✖ Igniting the precipitate using ashless filter paper to obtain precipitate in a stable weighing form

3. ✖ Use of Gooch crucible with an asbestos mat (at 800-1000°C)

4. ✔ Using water to wash off the precipitate to allow removal of electrolyte on its surface.

Question Number : 149 Question Id : 630680269665 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the spectroscopic analysis of methyl ethanoate. Which of the following options is NOT correctly matched to the results that will be obtained on the analysis of a pure sample of methyl ethanoate.

Options :

1. ✖ Two peaks at equal intensity at 2.1 ppm and 3.6 ppm, respectively in low resolution ^{1}H-NMR

2. ✔ Three distinct peaks will be observed in ^{13}C-NMR at 172 ppm, 52 ppm and 20 ppm. The peak at 20 ppm position can be ascribed to the carbonyl carbon.

3. ✖ IR spectrum will show peaks at 1750-1735cm^{-1} (s), 2850 - 2960 cm^{-1} (m), 1300 - 1100 cm^{-1}

4. ✖

UV absorption at ~180 nm and ~290 nm will be observed due to the presence of chromophore > C=O that will result in pi - pi* and n-pi* transitions, respectively.

Question Number : 150 Question Id : 630680269666 Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Wrong Marks : 0

Consider the following statements.

A. In a normal vibration, all atoms of the molecule oscillate with same frequency.

B. In a normal vibration, all atoms of the molecule pass through their equilibrium positions simultaneously.

Select the correct answer.

Options :

1. ✖ Only statement A is true.

2. ✖ Only statement B is true.

3. ✔ Both statement A and B are true.

4. ✖ Both statement A and B are false.