

- 46.** Consider the molecules CH_4 , NH_3 and H_2O . Which of the given statements is false?
- (1) The H – C – H bond angle in CH_4 , the H – N – H bond angle in NH_3 , and the H – O – H bond angle in H_2O are all greater than 90° .
 - (2) The H – O – H bond angle in H_2O is larger than the H – C – H bond angle in CH_4 .
 - (3) The H – O – H bond angle in H_2O is smaller than the H – N – H bond angle in NH_3 .
 - (4) The H – C – H bond angle in CH_4 is larger than the H – N – H bond angle in NH_3 .
- 47.** In the reaction
- $$\text{H-C} \equiv \text{CH} \xrightarrow[\text{(2) CH}_3\text{CH}_2\text{Br}]{\text{(1) NaNH}_2/\text{liq. NH}_3} \text{X} \xrightarrow[\text{(2) CH}_3\text{CH}_2\text{Br}]{\text{(1) NaNH}_2/\text{liq. NH}_3} \text{Y}$$
- X and Y are :
- (1) X = 1 – Butyne; Y = 3- Hexyne
 - (2) X = 2 – Butyne; Y = 3 – Hexyne
 - (3) X = 2- Butyne ; Y = 2- Hexyne
 - (4) X = 1- Butyne ; Y = 2 – Hexyne
- 48.** Among the following the correct order of acidity is :
- (1) $\text{HClO}_3 < \text{HClO}_4 < \text{HClO}_2 < \text{HClO}$
 - (2) $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$
 - (3) $\text{HClO}_2 < \text{HClO} < \text{HClO}_3 < \text{HClO}_4$
 - (4) $\text{HClO}_4 < \text{HClO}_2 < \text{HClO} < \text{HClO}_3$
- 49.** The rate of first order reaction is $0.04 \text{ mol l}^{-1} \text{ s}^{-1}$ at 10 seconds and $0.03 \text{ mol l}^{-1} \text{ s}^{-1}$ at 20 seconds after initiation of the reaction. The half – life period of the reaction is :
- (1) 24.1 s
 - (2) 34.1 s
 - (3) 44.1s
 - (4) 54.1 s
- 50.** Which one of the following characteristics is associated with adsorption?
- (1) ΔG is negative but ΔH and ΔS are positive
 - (2) ΔG , ΔH and ΔS all are negative
 - (3) ΔG and ΔH are negative but ΔS is positive
 - (4) ΔG and ΔS are negative but ΔH is positive
- 51.** In which of the following options the order of arrangement does not agree with the variation of property indicated against it?
- (1) $\text{Al}^{3+} > \text{Mg}^{2+} < \text{Na}^+ < \text{F}^-$ (increasing ionic size)
 - (2) $\text{B} < \text{C} < \text{N} < \text{O}$ (increasing first ionisation enthalpy)

- (3) $I < Br < Cl < F$ (increasing electron gain enthalpy)
(4) $Li < Na < K < Rb$ (increasing metallic radius)

- 52.** Which of the following statements is false?
(1) Mg^{2+} ions form a complex with ATP.
(2) Ca^{2+} ions are important in blood clotting
(3) Ca^{2+} ions are not important in maintaining the regular beating of the heart
(4) Mg^{2+} ions are important in the green parts of plants.
- 53.** Which of the following statements about hydrogen
(1) Hydrogen has three isotopes of which tritium is the most common
(2) Hydrogen never acts as cation in ionic salts
(3) Hydronium ion, H_3O^+ exists freely in solution
(4) Dihydrogen does not act as a reducing agent
- 54.** The correct statement regarding a carbonyl compound with a hydrogen atom on its alphacarbon is :
(1) A carbonyl compound with a hydrogen atom on its alpha – carbon never equilibrates with its corresponding enol.
(2) A carbonyl compound with a hydrogen atom on its alpha – carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde – ketone equilibration
(3) A carbonyl compound with a hydrogen atom on its alpha – carbon rapidly equilibrium with its corresponding enol and this process is known as carbonylation
(4) a carbonyl compound with a hydrogen atom on its alpha – carbon rapidly equilibrates with its corresponding enol and this process is known as keto – enol tautomerism.
- 55.** MY and NY_3 two nearly insoluble salts, have the same k_{sp} values of 6.2×10^{-13} at room temperature. Which statement would be true in regard of MY and NY_3 ?
(1) The molar solubilities of MY and NY_3 in water are identical
(2) The molar solubility of MY in water is less than that of NY_3
(3) The salts MY and NY_3 are more soluble in 0.5 M KY than in pure water.
(4) The addition of the salt of KY to solution of MY and NY_3 will have no effect on their solubilities.
- 56.** In a protein molecule various amino acids are linked together by:
(1) α - glycosidic bond
(2) β - glycosidic bond
(3) Peptide bond
(4) Dative bond

- 57.** Natural rubber has:
- (1) All cis – configuration
 - (2) All trans – configuration
 - (3) Alternate cis – and trans – configuration
 - (4) Random cis – and trans – configuration
- 58.** Match items of Column I with the item of Column II and assign the correct code :

Column I		Column II	
(a)	Cyanide process	(i)	Ultrapure Ge
(b)	Froth floatation process	(ii)	Dressing of ZnS
(c)	Electrolytic reduction	(iii)	Extraction of Al
(d)	Zone refining	(iv)	Extraction of Au
		(v)	Purification of Ni

- 59.** Which one of the following statements is correct when SO_2 is passed through acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution?
- (1) The solution turns blue
 - (2) The solution is decolorized
 - (3) SO_2 is reduced.
 - (4) Green $\text{Cr}_2(\text{SO}_4)_3$ is formed
- 60.** The electronic configurations of Eu (Atomic No.63), Gd (Atomic No.64) and Tb (Atomic No.65) are :
- (1) $[\text{Xe}]4f^76s^2$, $[\text{Xe}]4f^86s^2$ and $[\text{Xe}]4f^85d^16s^2$
 - (2) $[\text{Xe}]4f^65d^16s^2$, $[\text{Xe}]4f^75d^16s^2$ and $[\text{Xe}]4f^96s^2$
 - (3) $[\text{Xe}]4f^65d^16s^2$, $[\text{Xe}]4f^75d^16s^2$ and $[\text{Xe}]4f^85d^16s^2$
 - (4) $[\text{Xe}]4f^76s^2$, $[\text{Xe}]4f^75d^16s^2$ and $[\text{Xe}]4f^96s^2$
- 61.** Two electrons occupying the same orbital are distinguished by :
- (1) Principle quantum number
 - (2) Magnetic quantum number
 - (3) Azimuthal quantum number
 - (4) Spin quantum number
- 62.** When copper is heated with conc. HNO_3 it produces:
- (1) $\text{Cu}(\text{NO}_3)$ and NO_2
 - (2) $\text{Cu}(\text{NO}_3)$ and NO
 - (3) $\text{Cu}(\text{NO}_3)_2$, and NO_2
 - (4) $\text{Cu}(\text{NO}_3)_2$ and N_2O
- 63.** Which of the following reagents would distinguish cis-cyclopenta-1, 2-diol from the trans-isomer?
- (1) Acetone
 - (2) Ozone

- (3) MnO_2
(4) Aluminium isopropoxide
- 64.** The correct thermodynamic conditions for the spontaneous reaction at all temperature is :
- (1) $\Delta H < 0$ and $\Delta S = 0$
(2) $\Delta H > 0$ and $\Delta S < 0$
(3) $\Delta H < 0$ and $\Delta S > 0$
(4) $\Delta H < 0$ and $\Delta S < 0$
- 65.** Lithium has a bcc structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 g mol^{-1} . Calculate the edge length of a unit cell of Lithium metal. ($N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$)
- (1) 154 pm
(2) 352 pm
(3) 527 pm
(4) 264 pm
- 66.** Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules ?
- (1) $\text{I}_2 > \text{Br}_2 > \text{Cl}_2 > \text{F}_2$
(2) $\text{Cl}_2 > \text{Br}_2 > \text{F}_2 > \text{I}_2$
(3) $\text{Br}_2 > \text{I}_2 > \text{F}_2 > \text{Cl}_2$
(4) $\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$
- 67.** Which of the following is an analgesic ?
- (1) Novalgin
(2) Penicillin
(3) Streptomycin
(4) Chloramphenicol
- 68.** Equal moles of hydrogen and oxygen gases are placed in a container with a pin-hole through which both can escape. What fraction of the oxygen escapes in the time required for one-half of the hydrogen to escape?
- (1) $1/8$
(2) $1/4$
(3) $3/8$
(4) $1/2$
- 69.** Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3 . If a large amount of KHSO_4 is added to the mixture, the rate of nitration will be:
- (1) faster
(2) slower
(3) unchanged
(4) doubled

- 70.** Predict the correct order among the following:
- (1) lone pair – lone pair > lone pair – bond pair > bond pair – bond pair
 - (2) lone pair – lone pair > bond pair – bond pair > lone pair – bond pair
 - (3) bond pair – bond pair > lone pair – bond pair > lone pair – lone pair
 - (4) lone pair – bond pair > bond pair – bond pair > lone pair – lone pair

- 71.** The product obtained as a result of a reaction of nitrogen with CaC_2 is :
- (1) $\text{Ca}(\text{CN})_2$
 - (2) CaCN
 - (3) CaCN_3
 - (4) Ca_2CN

- 72.** Consider the following liquid – vapour equilibrium.
Liquid \rightleftharpoons Vapour
Which of the following relations is correct?

$$(1) \frac{d \ln G}{dT^2} = \frac{\Delta H_v}{RT^2}$$

$$(2) \frac{d \ln P}{dT} = \frac{-\Delta H_v}{RT}$$

$$(3) \frac{d \ln P}{dT^2} = \frac{-\Delta H_v}{T^2}$$

$$(4) \frac{d \ln P}{dT} = \frac{\Delta H_v}{RT^2}$$

- 73.** Match the compounds given in column I with the hybridization and shape given in column II and mark the correct option.

Column I

- | | |
|---------------------|--------------------------|
| (a) XeF_6 | (i) distorted octahedral |
| (b) XeO_3 | (ii) square planar |
| (c) XeOF_4 | (iii) pyramidal |
| (d) XeF_4 | (iv) square pyramidal |

Code:

- | | (a) | (b) | (c) | (d) |
|-----|------|-------|------|-------|
| (1) | (i) | (iii) | (iv) | (ii) |
| (2) | (i) | (ii) | (iv) | (iii) |
| (3) | (iv) | (ii) | (i) | (ii) |
| (4) | (iv) | (i) | (ii) | (iii) |

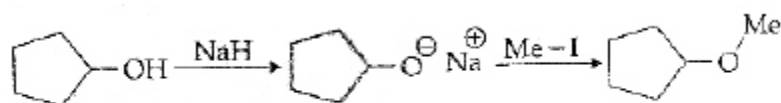
- 74.** Which of the following has longest C – O bond length? (Free C – O bond length in CO is 1.28\AA .)
- (1) $\text{Ni}(\text{CO})_4$
 - (2) $[\text{Co}(\text{CO})_4]^\ominus$
 - (3) $[\text{Fe}(\text{CO})_4]^{2-}$
 - (4) $[\text{Mn}(\text{CO})_6]^+$

- 75.** The pressure of H_2 required to make the potential of H_2 –electrode zero in pure water at 298 K is:
- (1) 10^{-14} atm
 - (2) 10^{-12} atm
 - (3) 10^{-10} atm
 - (4) 10^{-4} atm
- 76.** The addition of a catalyst during a chemical reaction alters which of the following quantities?
- (1) Entropy
 - (2) Internal Energy
 - (3) Enthalpy
 - (4) Activation Energy
- 77.** The ionic radii of A^+ and B^- ions are 0.98×10^{-10} m and 1.81×10^{-10} m. The coordination number of each ion in AB is:
- (1) 6
 - (2) 4
 - (3) 8
 - (4) 2
- 78.** Which is the correct statement for the given acids?
- (1) Phosphinic acid is a diprotic acid while Phosphonic acid is a monoprotic acid.
 - (2) Phosphinic acid is a monoprotic acid while Phosphonic acid is a diprotic acid.
 - (3) Both are triprotic acids.
 - (4) Both are diprotic acids.
- 79.** Fog is colloidal solution of:
- (1) Liquid in gas
 - (2) Gas in liquid
 - (3) Solid in gas
 - (4) Gas in gas
- 80.** Which of the following statements about the composition of the vapour over an ideal 1: 1 molar mixture of benzene and toluene is correct? Assume that the temperature is constant at 25°C. (Given, Vapour Pressure Data at 25°C, benzene = 12.8 kPa, toluene = 3.85 kPa)
- (1) The vapour will contain a higher percentage of benzene.
 - (2) The vapour will contain a higher percentage of toluene.
 - (3) The vapour will contain equal amounts of benzene and toluene.
 - (4) Not enough information is given to make a prediction.

81. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane, is:

- (1) The staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain.
- (2) The eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain.
- (3) The eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain.
- (4) The staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain.

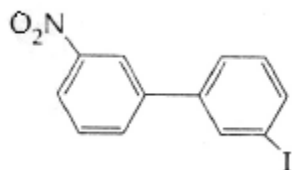
82. The reaction



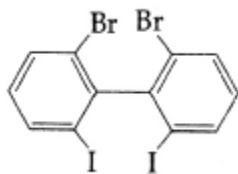
can be classified as:

- (1) Williamson ether synthesis reaction
 - (2) Alcohol formation reaction
 - (3) Dehydration reaction
 - (4) Williamson alcohol synthesis reaction
- 83.** The product formed by the reaction of an aldehyde with a primary amine is:
- (1) Schiff base
 - (2) Ketone
 - (3) Carboxylic acid
 - (4) Aromatic acid
- 84.** Which of the following biphenyl is optically active?

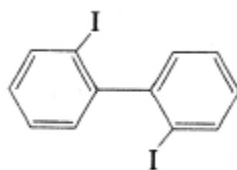
(1)



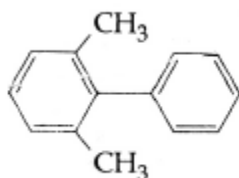
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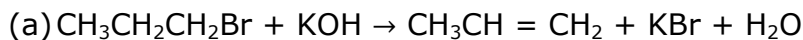
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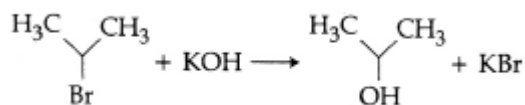
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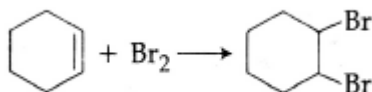
85. For the following reactions:



(b)



(c)



Which of the following statements is correct?

- (1) (a) and (b) are elimination reactions and (c) is addition reaction.
- (2) (a) is elimination, (b) is substitution and (c) is addition reaction.
- (3) (a) is elimination, (b) and (c) are substitution reactions.
- (4) (a) is substitution, (b) and (c) are addition reactions.

86. At 100°C the vapour pressure of a solution of 6.5 g of a solute in 100 g water is 732 mm. If $K_b = 0.52$, the boiling point of this solution will be:

- (1) 101°C
- (2) 100°C
- (3) 102°C
- (4) 103°C

87. The correct statement regarding RNA and DNA, respectively is :

- (1) The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose.
- (2) The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose.
- (3) The sugar component in RNA is arabinose and the sugar component in DNA is ribose.
- (4) The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose.

- 88.** The correct statement regarding the basicity of arylamines is :
- (1) Arylamines are generally less basic than alkylamines because the nitrogen lone-pair electrons are delocalized by interaction with the aromatic ring π electron system.
 - (2) Arylamines are generally more basic than alkylamines because the nitrogen lone-pair electrons are delocalized by interaction with the aromatic ring π electron system.
 - (3) Arylamines are generally more basic than alkylamines because of aryl group.
 - (4) Arylamines are generally more basic than alkylamines, because the nitrogen atom in arylamines is sp -hybridized.
- 89.** Which one given below is a non-reducing sugar?
- (1) Maltose
 - (2) Lactose
 - (3) Glucose
 - (4) Sucrose
- 90.** The pair of electron in the given carbanion, $\text{CH}_3\text{CH} \equiv \text{C}^\ominus$, is present in which of the following orbitals?
- (1) $2p$
 - (2) sp^3
 - (3) sp^2
 - (4) sp
- 91.** Gause's principle of competitive exclusion states that:
- (1) More abundant species will exclude the less abundant species through competition.
 - (2) Competition for the same resources excludes species having different food preferences.
 - (3) No two species can occupy the same niche indefinitely for the same limiting resources.
 - (4) Larger organisms exclude smaller ones through competition.
- 92.** The two polypeptides of human insulin are linked together by:
- (1) Hydrogen bonds
 - (2) Phosphodiester bond
 - (3) Covalent bond
 - (4) Disulphide bridges
- 93.** The coconut water from tender coconut represents:
- (1) Endocarp
 - (2) Fleshy mesocarp
 - (3) Free nuclear proembryo
 - (4) Free nuclear endosperm