

1. In which one of the following reactions, rate constant has the unit $\text{mol L}^{-1}\text{s}^{-1}$?

- (A) $\text{CHCl}_3 + \text{Cl}_2 \rightarrow \text{CCl}_4 + \text{HCl}$
 (B) $2\text{NO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{NO}_2(g)$
 (C) Decomposition of HI on the surface of Gold
 (D) Acid catalysed hydrolysis of $\text{CH}_3\text{COOCH}_3$

Sol: The unit of rate constant is $\text{mol L}^{-1}\text{s}^{-1}$ for zero order reaction.

Decomposition of HI on surface of gold is a zero order reaction.

Ans: (C)

2. For a reaction, the value of rate constant at 300K is $6.0 \times 10^5 \text{s}^{-1}$. The value of Arrhenius factor A at infinitely high temperature is :

- (A) $e^{-Ea/300R}$ (B) $\frac{6 \times 10^{-5}}{300}$ (C) 6×10^5 (D) $6 \times 10^5 \times e^{-Ea/300R}$

Sol: **Question wrong**

The rate constant at 300 K = $6.0 \times 10^5 \text{s}^{-1}$

As temperature increase, k should increase

\therefore value of Arrhenius factor at infinite temperature cannot be determined with the given data.

Ans: (Question wrong)

3. The rate constants k_1 and k_2 for two different reactions are $10^{16} \times e^{-2000/T}$ and $10^{15} \times e^{-1000/T}$ respectively. The temperature at which $k_1 = k_2$ is :

- (A) 2000K (B) $\frac{1000}{2.303}$ K (C) 1000K (D) $\frac{2000}{2.303}$ K

Sol: $K_1 = 10^{16} \times e^{-2000/T}$

$K_2 = 10^{15} \times e^{-1000/T}$

$K_1 = K_2$

$10^{16} \times e^{-2000/T} = 10^{15} \times e^{-1000/T}$

$10 \times e^{-2000/T} = e^{-1000/T}$

$\ln 10 - \frac{2000}{T} = -\frac{1000}{T}$

$\ln 10 = \frac{1}{T} [2000 - 1000]$

$2.303 \times \log 10 = \frac{1}{T} \times 1000$

$T = \frac{1000}{2.303}$ kelvin

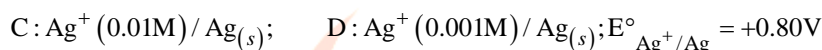
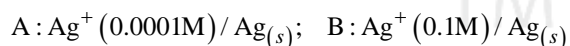
Ans: (B)

4. During the electrolysis of brine, by using inert electrodes,
- (A) H_2 liberates at anode (B) Na deposits on cathode
(C) Cl_2 liberates at anode (D) O_2 liberates at anode

Sol: At anode Cl_2 gas liberation during electrolysis of Brine solution.

Ans: (C)

5. Consider the following 4 electrodes



Then reduction potential in volts of the electrodes in the order

- (A) $C > D > A > B$ (B) $A > D > C > B$ (C) $A > B > C > D$ (D) $B > C > D > A$

Sol: $E = E^\circ + \frac{0.0591}{n} \log[M^{n+}]$

As $[M^{n+}]$ increases E increases

$\therefore B > C > D > A$

Ans: (D)

6. The resistance of 0.1M weak acid HA in a conductivity cell is $2 \times 10^3 \Omega$. The cell constant of the cell is 0.78 cm^{-1} and λ_m° of acid HA is $390 \text{ S cm}^2 \text{ mol}^{-1}$. The pH of the solution is
- (A) 4.2 (B) 5 (C) 3 (D) 3.3

Sol: $R = 2 \times 10^3 \Omega$

Cell constant = $C_K = 0.78 \text{ cm}^{-1}$

$\therefore K = \frac{C_K}{R} = \frac{0.78}{2 \times 10^3} = 3.9 \times 10^{-4} \text{ S cm}^{-1}$

$\lambda = \frac{1000K}{C} = \frac{1000 \times 3.9 \times 10^{-4}}{0.1} = 3.9$

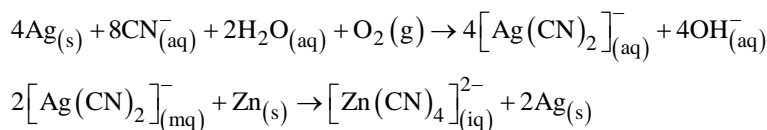
$\alpha = \frac{\lambda_C}{\lambda_{10}^\circ} = \frac{3.9}{390} = 0.01$

$[H^+] = \alpha C = 0.01 \times 0.1 = 10^{-3} \text{ M}$

$p^H = -\log[H^+] = -\log 10^{-3} = 3$

Ans: (C)

7. The reducing agent in the given equations :



- (A) O_2 (B) H_2O (C) CN^{-} (D) Zn

Sol: Zn has oxidized from 0 to +2 and Ag has reduced from +1 to 0.

Ans: (D)

8. For the formation of which compound in Ellingham diagram ΔG° becomes more and more negative with increase in temperature?

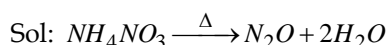
- (A) FeO (B) ZnO (C) Cu_2O (D) CO

Sol: For formation carbon monoxide ΔG will be more negative as temperature increases.

Ans: (D)

9. Which of the following compound does not give dinitrogen on heating?

- (A) NH_4NO_2 (B) NH_4NO_3 (C) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ (D) $\text{Ba}(\text{N}_3)_2$



Ans: (B)

10. Aqueous solution of raw sugar when passed over beds of animal charcoal, it becomes colourless. Pick the correct set of terminologies that can be used for the above example.

	Adsorbent	Adsorbate	Process
(A)	Animal Charcoal	Solution of sugar	Absorption
(B)	Animal Charcoal	Colouring substance	Adsorption
(C)	Colouring Substance	Animal Charcoal	Adsorption
(D)	Solution of Sugar	Animal Charcoal	Sorption

Sol: Colouring matter of sugar solution is adsorbed by charcoal.

Adsorbent – Charcoal

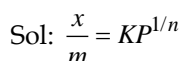
Adsorbate – colouring substance

Process – Adsorption

Ans: (B)

11. For Freundlich adsorption isotherm, a graph of $\log(x/m)$ Vs. $\log(P)$ gives a straight line. The slope of line and its Y-axis intercept respectively are

- (A) $\frac{1}{n}, \log K$ (B) $\log\left(\frac{1}{n}\right), \log K$ (C) $\frac{1}{n} K$ (D) $\log\left(\frac{1}{n}\right), K$



$$\log\left(\frac{x}{m}\right) = \log K + \frac{1}{n} \log P$$

$$\text{Slope} = \frac{1}{n}$$

$$Y\text{-intercept} = \log K$$

Ans: (A)

12. When FeCl_3 is added to excess of hot water gives a sol 'X'. When FeCl_3 is added to $\text{NaOH}_{(\text{aq})}$ solution, gives sol 'Y'.

X and Y formed in the above processes respectively are

- (A) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{H}^+$ and $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Na}^+$
 (B) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Cl}^-$ and $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{OH}^-$
 (C) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Fe}^{3+}$ and $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{OH}^-$
 (D) $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{OH}^-$ and $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O} / \text{Fe}^{3+}$

Sol: The ferric hydroxide sol formed can selectively adsorb either Fe^{3+} or OH^- .

In hot water, Fe^{3+} will be adsorbed and in NaOH it adsorbs OH^- ions.

Ans: (C)

13. In which one of the following pairs, both the elements does not have $(n-1)d^{10}ns^2$ configuration in its elementary state?

- (A) Cd, Hg (B) Hg, Cn (C) Cu, Zn (D) Zn, Cd

Sol: In all option at least 1 atom has $(n-1)d^{10}ns^2$ configuration.

Ans: (No Answer)

14. Which of the following is CORRECT with respect to melting point of a transition element?

- (A) $\text{Cr} > \text{Mn}$ (B) $\text{Mn} > \text{Fe}$ (C) $\text{Ti} > \text{V}$ (D) $\text{V} > \text{Cr}$

Sol: Chromium has higher melting point than Manganese.

Ans: (A)

15. $a\text{MnO}_4^- + b\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \rightarrow x\text{MnO}_2 + y\text{SO}_4^{2-} + z\text{OH}^-$

a and y respectively are

- (A) 8;6 (B) 3;6 (C) 8;8 (D) 8;3

Sol: Balanced equation is $8\text{MnO}_4^- + 3\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \rightarrow 8\text{MnO}_2 + 6\text{SO}_4^{2-} + 2\text{H}^+$

Ans: (A)

16. Which formula and name combination is INCORRECT?

- (A) $[\text{Pt}(\text{NH}_3)_2 \text{Cl}(\text{NO}_2)]$ - Diamminechloridonitrito -N -platinum (II)
 (B) $[\text{CoCl}_2(\text{en})_2] \text{Cl}$ - Dichloridodiethylenediammine cobalt (II) chloride
 (C) $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Cl}]\text{Cl}_2$ - Tetraammineaquachloridocobalt (III) chloride
 (D) $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$ - Potassium trioxalatoaluminate (III)

Sol: $[\text{CoCl}_2(\text{en})_2] \text{Cl}$ - dichlorido-bis-(ethane-1,2, - diamine) cobalt (III) chloride

Ans: (B)

17. Which of the following system in an octahedral complex has maximum unpaired electrons ?

- (A) d^6 (low spin) (B) d^4 (low spin) (C) d^7 (high spin) (D) d^9 (high spin)

Sol: d^6 (low spin) $t_{2g}^6 e_g^0$ – zero unpaired electron.

d^4 (low spin) $t_{2g}^4 e_g^0$ – 2 unpaired electron

d^7 (high spin) $t_{2g}^5 e_g^2$ – 3 unpaired electron

d^9 (high spin) $t_{2g}^6 e_g^3$ – 1 unpaired electron

Ans: (C)

18. The correct decreasing order of basicity of hydrides of Group-15 elements is

- (A) $\text{PH}_3 > \text{As}_3 > \text{SbH}_3 > \text{NH}_3$ (B) $\text{AsH}_3 > \text{SbH}_3 > \text{NH}_3 > \text{PH}_3$
 (C) $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$ (D) $\text{SbH}_3 > \text{AsH}_3 > \text{PH}_3 > \text{NH}_3$

Sol: The basic nature of hydrides of group 15 decreases down the group

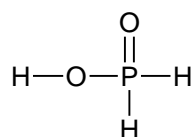
$\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3$

Ans: (C)

19. Which one of the following oxoacids of phosphorus can reduce AgNO_3 to metallic silver?

- (A) $\text{H}_4\text{P}_2\text{O}_7$ (B) $\text{H}_4\text{P}_2\text{O}_6$ (C) H_3PO_4 (D) H_3PO_2

Sol: H_3PO_2 contains P - H bond and it can act as reducing agent



Ans: (D)

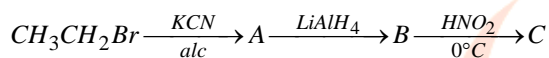
20. In solid state, PCl_5 is a/an

- (A) Ionic solid with $[\text{PCl}_6]^+$ and $[\text{PCl}_4]^-$
 (B) Ionic solid with $[\text{PCl}_4]^+$ and $[\text{PCl}_6]^-$
 (C) Covalent solid present in the form of P_2Cl_{10}
 (D) Octahedral structure

Sol: Solid PCl_5 contains PCl_4^+ and PCl_6^- ions

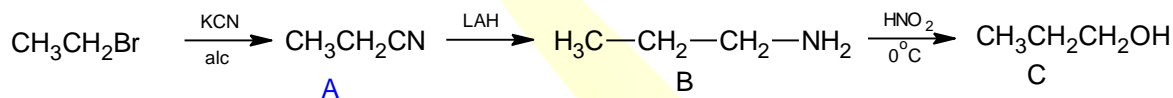
Ans: (B)

21. Identify A, B and C in the sequence:



- (A) $\text{CH}_3\text{CH}_2\text{NC}$, $\text{CH}_3\text{CH}_2\text{OH}$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$
 (B) $\text{CH}_3\text{CH}_2\text{CN}$, $\text{C}_2\text{H}_5\text{OH}$, $\text{C}_2\text{H}_5\text{N}_2\text{Cl}$
 (C) $\text{CH}_3\text{CH}_2\text{CN}$, $\text{CH}_3\text{CH}_2\text{NH}_2$, $\text{C}_2\text{H}_5\text{OH}$
 (D) $\text{CH}_3\text{CH}_2\text{CN}$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$.

Sol:



Ans: (D)

22. $\text{CH}_3-\text{CH}=\text{CH}-\text{CH}_2\text{OH} \xrightarrow{\text{PCC}} \text{CH}_3-\text{CH}=\text{CH}-\text{CHO}$

Hybridisation change involved at C-1 in the above reaction

- (A) sp^3 to sp^2 (B) sp^2 to sp^3 (C) sp to sp^2 (D) sp^3 to sp

Sol: sp^3 to sp^2 conceptual.

Ans: (A)

23. If a didentate ligand ethane-1,2-diamine is progressively added in the molar ratio

en : Ni :: 1:1, 2:1, 3:1 to $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ aq solution, following co-ordination entities are formed.

I. $[\text{Ni}(\text{H}_2\text{O})_4(\text{en})]_{(\text{aq})}^{2+}$ - pale blue II. $[\text{Ni}(\text{H}_2\text{O})_2(\text{en})_2]_{(\text{aq})}^{2+}$ - blue/purple

III. $[\text{Ni}(\text{en})_3]_{(\text{aq})}^{2+}$ - violet

The wavelength in nm of light absorbed in case of I and III are respectively

- (A) 300nm and 475nm (B) 310nm and 500nm (C) 600nm and 535nm (D) 475nm and 310nm

Sol: 475nm and 310nm

Ans: (D)

24. Which of the following is an organometallic compound?

- (A) $\text{CH}_3\text{CH}_2\text{MgBr}$ (B) $(\text{CH}_3\text{COO})_2\text{Ca}$ (C) CH_3ONa (D) CH_3COONa

Sol: Grignard reagents are organometallic compounds

Ans: (A)

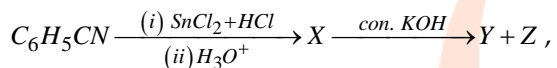
25. A pair of compounds having the same boiling points are

- (A) n-hexane and neo-hexane (B) benzene and naphthalene
 (C) (+) butan -2- ol and (-) butan -2 -ol (D) cis but-2-ene and trans but-2-ene

Sol: (+) butan -2- ol and (-) butan -2 -ol [Enantiomers will have same boiling points]

Ans: (C)

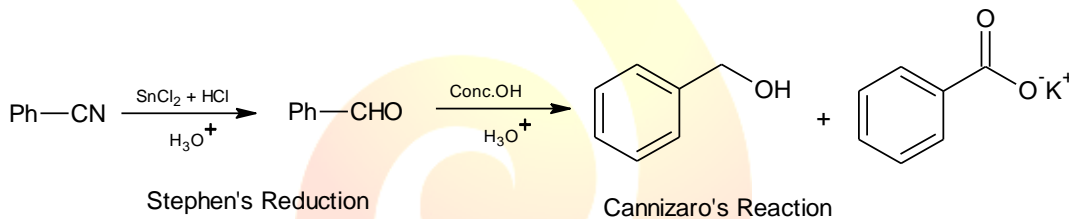
26. In the reaction:



Formation of X, formation of Y and Z are known by

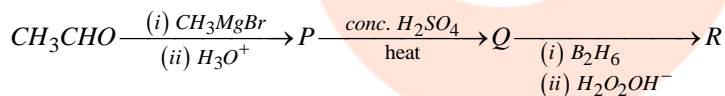
- (A) Clemmensen reduction, Sandmeyer reaction.
 (B) Wolff-Kishner reduction, Wurtz reaction.
 (C) Stephen reaction, Cannizaro reaction.
 (D) Rosenmund reduction, Cannizaro reaction.

Sol:



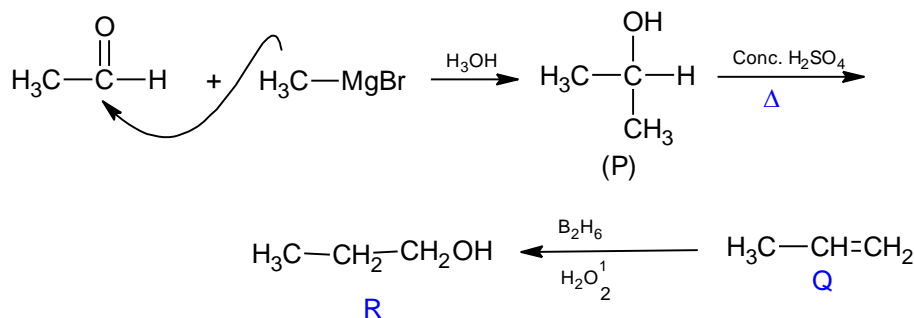
Ans: (C)

27. Compounds P and R in the following reaction are



- (A) Functional isomers (B) Metamers (C) Identical (D) Position isomers

Sol:



P & R are positional isomers

Ans: (D)

28. Aniline does not undergo

(A) Sulphonation

(B) Friedel-Craft reaction

(C) Bromination

(D) Nitration

Sol: Aniline forms adduct with $AlCl_3$ and do not answer Friedel-Craft reaction

Ans: (B)

29. The heating of phenyl methyl ether with HI produces an aromatic compound A which on treatment with con. HNO_3 gives B. A and B respectively are,

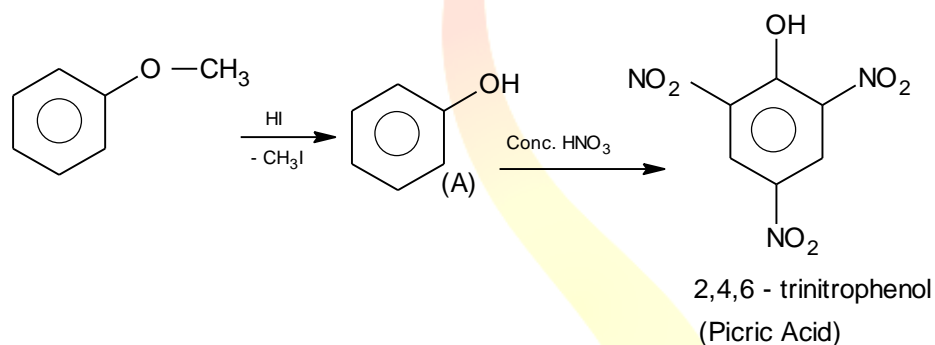
(A) Picric acid, Phenol

(B) Iodobenzene, 1-Iodo-4-nitrobenzene

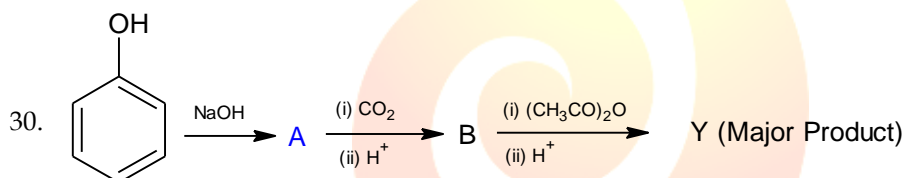
(C) Phenol, Picric acid

(D) Methanol, Ethanoic acid

Sol:



Ans: (C)



Y in the above reaction is

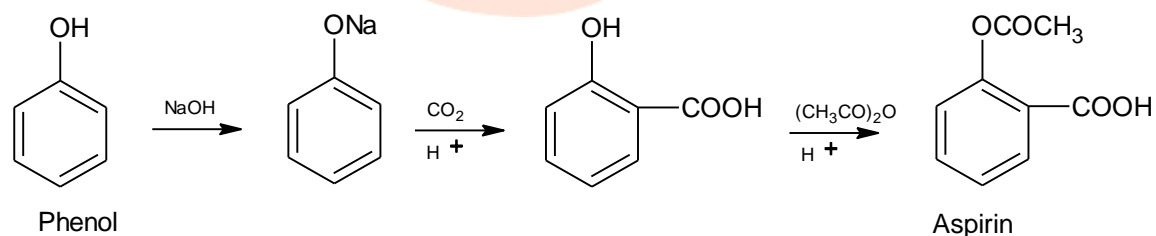
(A) Aspirin

(B) Cumene

(C) Picric acid

(D) Salicylaldehyde

Sol:



Ans: (A)

31. A better reagent to oxidize primary alcohols into aldehyde is :

(A) Alkaline $KMnO_4$

(B) Acidified $K_2Cr_2O_7$

(C) CrO_3

(D) PCC

Sol: PCC

Ans: (D)

32. The correct order of match between column X and column Y is :

	X		Y
I.	Vitamin A	i.	Muscular weakness
II.	Vitamin D	ii.	Increased blood clotting time
III.	Vitamin E	iii.	Night-blindness
IV.	Vitamin K	iv.	Osteomalacia

(A) I- ii, II-i, III - iii, IV - iv

(B) I-iii, II - ii, III-iv, IV-i

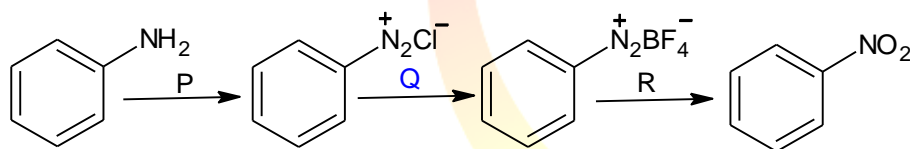
(C) I-iii, II-iv, III-i, IV-ii

(D) I-iv, II - iii, III - ii, IV -i

Sol: Conceptual

Ans: (C)

33. In the reaction:



P, *Q* and *R* respectively are :

(A) $\text{NaNO}_2 + \text{con. HCl, F}_2, \text{Cu} + \text{NaNO}_3$

(B) $\text{NaNO}_2 + \text{dil. HCl, BF}_3, \text{Cu} + \text{NaNO}_2$

(C) $\text{NaNO}_3 + \text{dil. HCl, F}_2, \text{Cu} + \text{NaNO}_3$

(D) $\text{NaNO}_2 + \text{dil. HCl, HBF}_4, \text{Cu} + \text{NaNO}_2$

Sol: Conceptual

Ans: (D)

34. Thyroxine produced in the thyroid gland is an iodinated derivative of

(A) lysine

(B) tyrosine

(C) tryptophan

(D) threonine

Sol: tyrosine

Ans: (B)

35. Sucrose is dextrorotatory but after hydrolysis the mixture show laevorotation, this is because of

(A) Sucrose is a non-reducing sugar

(B) Racemic mixture is formed

(C) Laevorotation of fructose is more than dextrorotation of glucose

(D) Laevorotation of glucose is more than dextrorotation of fructose

Sol: Laevorotation of fructose is more than dextrorotation of glucose

Ans: (C)

36. Receptors are proteins and crucial to body communication process. These receptors are embedded in

(A) Protein

(B) Endocrine gland

(C) Chromosomes

(D) Cell membrane

Sol: Conceptual

Ans: (D)

37. Which of the following monomers form biodegradable polymers

- (A) Caprolactum and 1,3-Butadiene
 (B) Phenol and formaldehyde
 (C) 3-hydroxybutanoic acid and 3-hydroxypentanoic acid
 (D) Ethylene glycol and pthalic acid

Sol: Conceptual

Ans: (C)

38. Match the List-I with List-II in the following:

	List - I		List - II
1	Caprolactum	(a)	$\left(\text{CH}_2 - \underset{\text{CH}_3}{\text{CH}} \right)_n$
2	Vinyl chloride	(b)	$\left(\text{CH}_2 - \underset{\text{C}_6\text{H}_5}{\text{CH}} \right)_n$
3	Styrene	(c)	$\left(\text{CH}_2 - \underset{\text{Cl}}{\text{CH}} \right)_n$
4	Propene	(d)	$\left(\overset{\text{O}}{\parallel} \text{C} - \text{CH}_2 - \underset{\text{H}}{\text{N}} \right)_n$

- (A) 1-a, 2-d, 3-c, 4-b (B) 1-d, 2-c, 3-a, 4-b (C) 1-d, 2-c, 3-b, 4-a (D) 1-c, 2-d, 3-a, 4-b

Sol: Conceptual

Ans: (C)

39. Which one of the following is a non-narcotic analgesic?

- (A) Codeine (B) Aspirin (C) Morphine (D) Heroin

Sol: Conceptual

Ans: (B)

40. Which of the following statement is INCORRECT?

- (A) Bond order of O_2^+ < Bond order of O_2^{2-} (B) Bond length of O_2 < Bond length of O_2^{2-}
 (C) Bond order of O_2 > Bond order of O_2^{2-} (D) Bond length of O_2 > Bond length of O_2^{2+}

Sol: Bond order of O_2^+ < Bond order of O_2^{2-}

OR

Bond order of O_2^+ = 2.5

Bond order of O_2^{2-} = 1

Ans: (A)

41. A gas at a pressure of 2atm is heated from 25°C to 323°C and simultaneously compressed to $\frac{2^{\text{rd}}}{3}$ of its original value. Then the final pressure is

- (A) 6atm (B) 2atm (C) 4atm (D) 1.33atm

Sol: $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$$\frac{2 \times V_1}{273} = \frac{P_2 \times \frac{2}{3}}{596}$$

$$P_2 = 6 \text{ atm}$$

Ans: (A)

42. Lattice enthalpy for NaCl is +788kJmol⁻¹ and $\Delta H_{HYD}^\circ = -784\text{kJmol}^{-1}$. Enthalpy of solution of NaCl is

- (A) +4kJmol⁻¹ (B) -572kJmol⁻¹ (C) -4kJmol⁻¹ (D) +572kJmol⁻¹

Sol: $\Delta H_{\text{sol}} = \text{L.E} + \text{H.E}$

$$= +788 - 784$$

$$= 4\text{kJmol}^{-1}$$

Ans: (A)

43. At 500K, for a reversible reaction $A_{2(g)} + B_{2(g)} \rightleftharpoons 2AB(g)$ in a closed container, $K_C = 2 \times 10^{-5}$. In the presence of catalyst, the equilibrium is attaining 10 times faster. The equilibrium constant K_C in the presence of catalyst at the same temperature is

- (A) 2×10^{-6} (B) 2×10^{-10} (C) 2×10^{-5} (D) 2×10^{-4}

Sol: Catalyst has no effect

Ans: (C)

44. A weak acid with pK_a 5.9 and weak base with pK_b 5.8 are mixed in equal proportions. pH of the resulting solution is

- (A) 7.5 (B) 7 (C) 7.05 (D) 7.005

Sol: $\text{pH} = 7 + \frac{1}{2}(pK_a - pK_b)$

$$= 7 + \frac{1}{2}(5.9 - 5.8)$$

$$= 7 + \frac{1}{2}(0.1) = 7.05$$

Ans: (C)

45. Temperature of 25°C in Fahrenheit and Kelvin scale respectively are

- (A) 17°F and 298.15K (B) 45°F and 260.15K (C) 47°F and 312.15K (D) 77°F and 298.15K

Sol: 77°F and 298.15K

Ans: (D)

46. The number of protons, neutrons and electrons in the ion ${}_{16}^{32}\text{S}^{2-}$ respectively are

- (A) 16,16,18 (B) 18,16,16 (C) 16,16,16 (D) 16,18,16

Sol: No. of protons = 16

No. of electrons = 18

No. of neutrons = 16

Ans: (A)

47. The correct order of first ionisation enthalpy of given elements is

- (A) $\text{Be} < \text{Li} < \text{B} < \text{C}$ (B) $\text{C} < \text{B} < \text{Be} < \text{Li}$ (C) $\text{Li} < \text{Be} < \text{B} < \text{C}$ (D) $\text{Li} < \text{B} < \text{Be} < \text{C}$

Sol: $\text{Li} < \text{B} < \text{Be} < \text{C}$

Ans: (D)

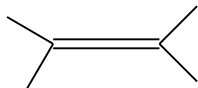
48. The composition of water gas is

- (A) CH_4 (B) $\text{CO}_{(\text{g})} + \text{H}_2\text{O}_{(\text{g})}^-$ (C) $\text{CO}_{(\text{g})} + \text{H}_2_{(\text{g})}$ (D) $\text{CO}_{(\text{g})} + \text{N}_2_{(\text{g})}$

Sol: $\text{CO}_{(\text{g})} + \text{H}_2_{(\text{g})}$

Ans: (C)

49. IUPAC name of the compound is

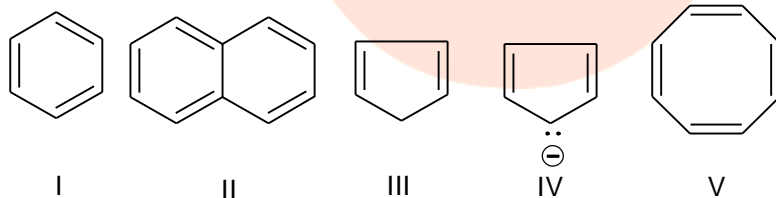


- (A) 2, 3-dimethyl butyne (B) 1,1,2,2-tetra methylethene
(C) 2,3-dimethyl butene (D) 2,3-dimethylbut-2-ene

Sol: 2,3-dimethylbut-2-ene

Ans: (D)

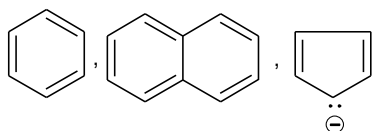
50. Among the following:



I II III IV V The set which represents aromatic species is

- (A) III, IV and V (B) II and III (C) I, II and IV (D) I, II and III

Sol:



Ans: (C)

51. Which one of the following gases converts haemoglobin into carboxy haemoglobin?

- (A) O_2 (B) NO (C) CO_2 (D) CO

Sol: CO

Ans: (D)

52. What is the oxidation number of S in $H_2S_2O_8$?

- (A) +4 (B) +7 (C) +6 (D) +5

Sol: Oxidation number: $H_2S_2O_8$

$$+2 + 2x + 2(-1) + 6(-2) = 0$$

$$x = +6$$

Ans: (C)

53. A 30% solution of hydrogen peroxide is

- (A) '10 volume' hydrogen peroxide (B) '50 volume' hydrogen peroxide
(C) '100 volume' hydrogen peroxide (D) '30 volume' hydrogen peroxide

Sol: 30% solution of H_2O_2 is equivalent 100 volume H_2O_2

Ans: (C)

54. A pair of amphoteric oxides is

- (A) BeO, BO_3 (B) BeO, MgO (C) BeO, ZnO (D) Al_2O_3 , Li_2O .

Sol: BeO, ZnO

Ans: (C)

55. Dimerisation of solute molecules in low dielectric constant solvent is due to :

- (A) Covalent bond (B) Co-ordinate bond (C) Ionic bond (D) Hydrogen bond

Sol: Hydrogen bonding

Ans: (D)

56. The swelling in feet and ankles of an aged person due to sitting continuously for long hours during travel, is reduced by soaking the feet in warm salt water. This is because of:

- (A) Osmosis (B) Edema (C) Diffusion (D) Reverse Osmosis

Sol: Osmosis

Ans: (A)

57. A sample of water is found to contain $5.85\% \left(\frac{w}{w}\right)$ of AB (molecular mass 58.5) and $9.50\% \left(\frac{w}{w}\right)$ XY_2 (molecular mass 95). Assuming 80% ionisation of AB and 60% ionisation of XY_2 , the freezing point of water sample is [Given: K_f for water 1.86K kg mol^{-1} , Freezing point of pure water is 273K and A, B, and Y are monovalent ions]

(A) 265.56K (B) 280.44K (C) 281.75K (D) 264.25K

$$\text{Sol: } \Delta T_f = \frac{k_f (i_1 m_1 + i_2 m_2)}{w_1} \times 1000 = \frac{1.86 [(0.1 \times 1.8) + (0.1 \times 2.2)]}{84.65} \times 1000$$

$$\Delta T = 8.789 \text{ K}$$

$$\text{Freezing point} = 273 \text{ K} - 8.789 \text{ K} = 264.21 \text{ K}$$

Ans: (D)

58. Match the column A (type of crystalline solid) with the column B (example for each type):

	A		B
P	Molecular Solid	i	SiC
Q	Ionic solid	ii	Mg
R	Metallic Solid	iii	H_2O
S	Network Solid	iv	MgO

(A) P-iv, Q-iii, R-ii, S-i (B) P-ii, Q-iv, R-iii, S-i (C) P-iii, Q-iv, R-ii, S-i (D) P-iii, Q-i, R-ii, S-iv

Sol: Molecular solid - H_2O , Ionic solid - MgO, Metallic Solid - Mg, Network Solid - SiC

Ans: (C)

59. A metal crystallises in a body centered cubic lattice with the metallic radius $\sqrt{3} \text{ \AA}$. The volume of the unit cell in m^3 is

(A) 4×10^{-29} (B) 6.4×10^{-29} (C) 4×10^{-10} (D) 64×10^{-29}

Sol: For BCC,

$$4r = \sqrt{3}a$$

$$a = \frac{4r}{\sqrt{3}} = \frac{4}{\sqrt{3}} \times \sqrt{3} \text{ \AA} = 4 \text{ \AA}$$

$$V = a^3 = (4 \times 10^{-10})^3 = 6.4 \times 10^{-29} \text{ m}^3$$

Ans: (B)

60. If 'a' stands for the edge length of the cubic systems - The ratio of radii in simple cubic, body centered cubic and face centered cubic unit cells is

(A) $\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$ (B) $\frac{1}{2}a : \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a$ (C) $\frac{1}{2}a : \sqrt{3}a : \frac{1}{\sqrt{2}}a$ (D) $1a : \sqrt{3}a : \sqrt{2}a$

Sol: $\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$

Ans: (A)

TM



Key Answers:

1. C	2.	3. B	4. C	5. D	6. C	7. D	8. D	9. B	10. B
11. A	12. C	13.	14. A	15. A	16. B	17. C	18. C	19. D	20. B
21. D	22. A	23. D	24. A	25. C	26. C	27. D	28. B	29. C	30. A
31. D	32. C	33. D	34. B	35. C	36. D	37. C	38. C	39. B	40. A
41. A	42. A	43. C	44. C	45. D	46. A	47. D	48. C	49. D	50. C
51. D	52. C	53. C	54. C	55. D	56. A	57. D	58. C	59. B	60. A

