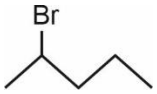
CHEMISTRY

SECTION – A

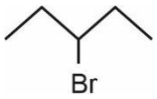
Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

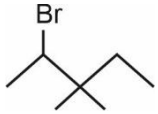
Choose the correct answer :

1. In which molecule, dehydrohalogenation forms maximum number of isomers (excluding rearrangement)

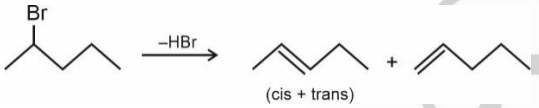
(1) 

(2) 

(3) 

(4) 

Answer (1)

Sol. (1) 

Total 3 isomers are possible

(2) → Only 1 product

(3) → 2 products

(4) → Only 1 product

2. Which of the following complex has zero spin only magnetic moment?

(1) $\left[Fe(F)_6\right]^{3-}$

(2) $\left[CoF_6\right]^{3-}$

(3) $\left[Co(C_2O_4)_3\right]^{3-}$

(4) $\left[Fe(H_2O)_6\right]^{3+}$

Answer (3)

Sol. $\left[Co(C_2O_4)_3\right]^{3-}$ has d^2sp^3 hybridisation and $3d^6$ electronic configuration and it has zero unpaired electrons.

3. Which of the following diseases can be cured by equanil drug?

(1) Pain (2) Stomach ulcer

(3) Depression (4) Hyperacidity

Answer (3)

Sol. Based on fact

4. If Bohr's Radius of H-atom in Ground state is 0.6 A°. Find out Bohr's Radius of 3rd orbit of He^+ Ion.

(1) 2.7 A° (2) 0.9 A°

(3) 5.4 A° (4) 1.8 A°

Answer (1)

Sol. $r \propto \frac{n^2}{z}$

$$\boxed{r = \frac{.6 \times n^2}{z}}$$

$$r = \frac{.6 \times (3)^2}{(2)}$$

$= .3 \times 9$

$= 2.7$ A°

5. Compare the bond order of the following molecules

O_2^{-2}, NO, CO

(1) $O_2^{-2} > NO > CO$ (2) $O_2^{-2} > CO > NO$

(3) $CO > NO > O_2^{-2}$ (4) $NO > CO > O_2^{-2}$

Answer (3)

Sol. The correct bond order :

$O_2^{-2} \rightarrow 1$

$CO \rightarrow 3$

$NO \rightarrow 2.5$

$\therefore$ Correct order is $CO > NO > O_2^{-2}$

6. Which one of the following ores contains sulphide ions?

(1) Malachite (2) Calamine

(3) Sphalerite (4) Siderite

Answer (3)

Sol. The chemical formulae of the given ores are

Malachite : $CuCO_3.Cu(OH)_2$

Calamine : $ZnCO_3$

Sphalerite : ZnS

Siderite : $FeCO_3$

$\therefore$ Sphalerite contains sulphide ions.

7. Statement-I : Ionisation enthalpy difference from B to Al is more than that of Al to Ga.

Statement-II : Ga has completely filled d-orbital.

Then, the correct option is?

(1) Statement-I and Statement-II both are correct.

(2) Statement-I is incorrect and Statement-II is correct.

(3) Statement-I is correct and Statement-II is incorrect.

(4) Statement-I and Statement-II both are incorrect.

Answer (1)

Sol. Ga has similar ionisation enthalpy as Al because of inert pair effect (or completely filled d-orbital in Ga).

8. Which of the following relation is correct?

(1) $\Delta G = \Delta H - T\Delta S$ (at constant T& P)

(2) $\Delta U = \Delta H + nR\Delta T$ (for n moles of ideal gas)

(3) $P\Delta V = (\Delta n)RT$

(4) None of these

Answer (1)

Sol. $\Delta G = \Delta H - T\Delta S \rightarrow$ correct relation at constant T & P

$\Delta H = \Delta U + nR\Delta T$ (for n moles of an ideal gas)

$P\Delta V = (\Delta n)RT$ [is only true for a chemical reaction at constant T & P] (not always true)

So, correct answer is (1)

9. Match the correct column.

(A) Thermosetting	(p) Neoprene
(B) Thermoplastic	(q) Polyester
(C) Elastomer	(r) Polystyrene
(D) Fibre	(s) Urea formaldehyde resin

(1) $A \rightarrow p; B \rightarrow r; C \rightarrow q; D \rightarrow s$

(2) $A \rightarrow s; B \rightarrow r; C \rightarrow p; D \rightarrow q$

(3) $A \rightarrow s; B \rightarrow r; C \rightarrow q; D \rightarrow p$

(4) $A \rightarrow p; B \rightarrow r; C \rightarrow s; D \rightarrow q$

Answer (2)

Sol.
- Urea- formaldehyde resin is Thermosetting
- Polystyrene is Thermoplastic

10. At 300 K the ratio of V_{rms} and V_{avg} of oxygen molecule is $\sqrt{\frac{\alpha\pi}{\alpha+5}}$, the value of α will be

(1) 1 (2) 2

(3) 3 (4) 4

Answer (3)

Sol. $\frac{V_{rms}}{V_{avg}} = \frac{\sqrt{3\pi}}{\sqrt{8}} = \sqrt{\frac{\alpha\pi}{\alpha+5}}$

11. Thermal decomposition products of $LiNO_3$ are

$$LiNO_3 \xrightarrow{\Delta} \text{Products}$$

(1) $LiNO_2$ and O_2

(2) $LiNO_2$, NO_2 and O_2

(3) Li_2O, NO_2 and O_2

(4) Li, NO and O_2

Answer (3)

Sol. Thermal decomposition of $LiNO_3$ gives the following products

$$4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 4NO_2 + O_2$$

12. BOD value of drinking water ranges between

(1) 3-5

(2) 10-13

(3) 14-17

(4) 20-22

Answer (1)

Sol. BOD value of drinking water ranges between 3 and 5

13. Match List-I with List-II.

(A) Electro-osmosis	(P) Solvent moves from low concentration to high concentration of solution
(B) Electrophoresis	(Q) Solvent moves from high concentration to low concentration of solution
(C) RO(Reverse osmosis)	(R) Dispersion medium (DM) moves towards oppositely charged electrode across semi-permeable membrane
(D) Osmosis	(S) Colloidal particles move in the presence of electric field. (DP and DM)

(1) A(R), B(S), C(Q), D(P)

(2) A(Q), B(P), C(R), D(S)

(3) A(P), B(Q), C(R), D(S)

(4) A(P), B(R), C(Q), D(S)

Answer (1)

Sol. All options are definition based.

(A) Electro-osmosis $\rightarrow$ movement of DM across SPM

(B) Electrophoresis $\rightarrow$ movement of DP and DM towards respective electrodes

(C) RO $\rightarrow$ movement of solvent from high concentration to low concentration

(D) Osmosis $\rightarrow$ movement of solvent from low concentration to high concentration

14. The ratio of de-Broglie wavelength of proton to that of α-particle if they are accelerated through same potential

(1) $2\sqrt{2}:1$

(2) $2:1$

(3) $1:2\sqrt{2}$

(4) $\sqrt{2}:1$

Answer (1)

Sol. $\frac{\lambda\rho}{\lambda\alpha}=\sqrt{\frac{m\alpha\cdot kE_\alpha}{m\rho\cdot kE_\rho}}$

$=\sqrt{\frac{4m\rho\cdot 2V}{m\rho\cdot V}}$

$=\sqrt{8}:1$

$=2\sqrt{2}:1$

15. Which of the following is produced when propanamide is treated with Br_2 in presence of KOH?

(1) Ethyl nitrile

(2) Propanamine

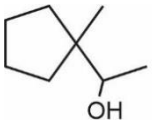
(3) Ethylamine

(4) Propanenitrile

Answer (3)

Sol. $CH_3CH_2-\overset{\overset{O}{\|}}{C}-NH_2 \xrightarrow{Br_2/KOH} CH_3CH_2NH_2$

16. Consider the following reaction:



Major product 'P'

Find the number of α-H in the major product 'P'?

(1) 7

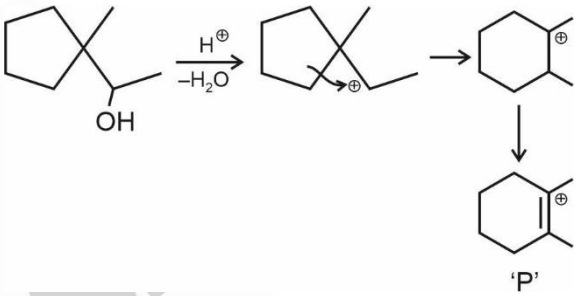
(2) 8

(3) 9

(4) 10

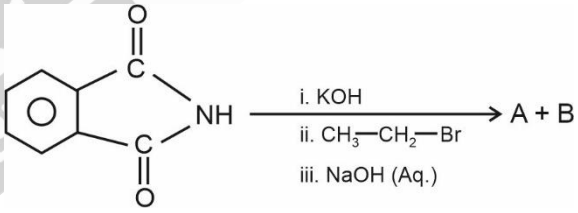
Answer (4)

Sol.

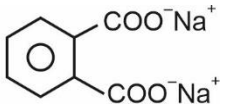


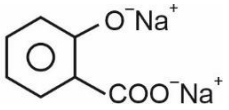
Number of α-H in 'P' = 10

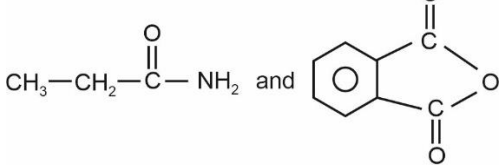
17.

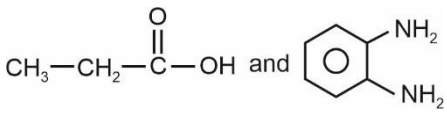


A and B respectively

(1) $CH_3-CH_2-NH_2$ and 

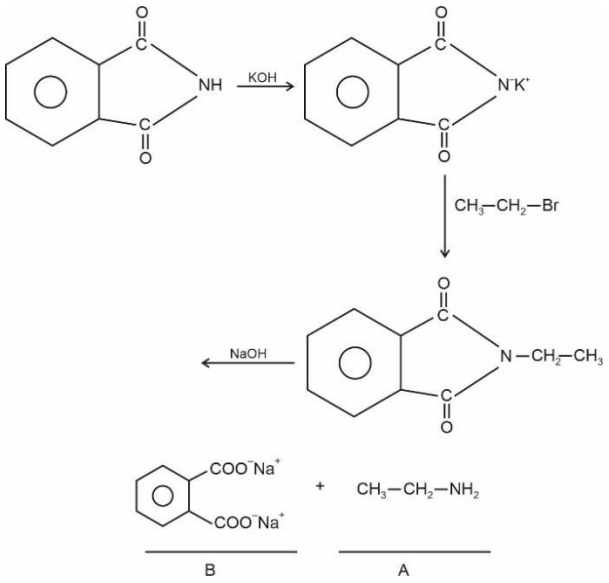
(2) $CH_3-CH_2-NH_2$ and 

(3) 

(4) 

Answer (1)

Sol.



18. The colour of CrO_5 in ether is

(1) Yellow

(2) Green

(3) Blue

(4) Orange

Answer (3)

Sol. CrO_5 is blue in colour

19. The number of voids in 0.02 moles of a solid which forms HCP lattice is _____.

[Given : $N_A = 6 \times 10^{23}$]

(1) 3.6×10^{22}

(2) 3.6×10^{24}

(3) 7.2×10^{20}

(4) 5.4×10^{26}

Answer (1)

Sol. Voids $= \frac{18}{6} \times 6 \times 10^{23} \times 0.02$

$= 3.6 \times 10^{22}$

20.

SECTION - B

Numerical Value Type Questions: This section contains 10 questions. In Section B, attempt any five questions out of 10. The answer to each question is a **NUMERICAL VALUE.** For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g. 06.25, 07.00, –00.33, –00.30, 30.27, –27.30) using the mouse and the on-screen virtual numeric keypad in the place designated to enter the answer.

21. How many oxides are acidic?

$NO, NO_2, N_2O_3, Cl_2O_7, CO, SO_2, SO_3, N_2O$

Answer (5)

Sol. Acidic oxides $\rightarrow NO_2, N_2O_3, Cl_2O_7, SO_2, SO_3$

22. A 1 : 1 (by mole) mixture of A and B is present in a container. Molar mass of A = 16 g and molar mass of B is 32 and the half life of A is 1 day and half life of B is $\frac{1}{2}$ day. Then find the average molar mass of the mixture of A and B remained in the container after 2 days is _____.? [Round off to nearest integer]

Answer (19)

Sol. For A $1 \xrightarrow{2 \text{ days}} \frac{1}{4}$ moles remained

For B $1 \xrightarrow{2 \text{ days}} \frac{1}{16}$ moles remained

$\therefore \quad M_{avg} = \dfrac{\frac{1}{4} \times 16 + \frac{1}{16} \times 32}{\frac{1}{4} + \frac{1}{16}}$

$= 19.2$ g

23.

24.

25.

26.

27.

28.

29.

30.