

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.

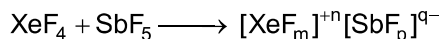
Choose the correct answer:

1. Which of the following elements is most reactive?
 (1) Ca (2) Mg
 (3) Sr (4) K

Answer (4)

Sol. (K) potassium is most reactive out of the given elements.

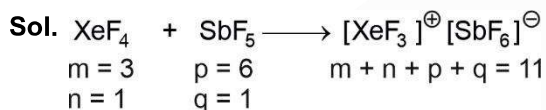
2. Consider the following reaction



The value of $m + n + p + q$ is

- (1) 10 (2) 8
 (3) 6 (4) 11

Answer (4)



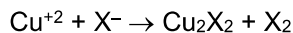
3. The extraction of which one of the following metals involves concentration of the ore by leaching.

- (1) Copper (2) Magnesium
 (3) Aluminium (4) Potassium

Answer (3)

Sol. Bauxite, $(\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O})$, the ore of aluminium is concentrated by leaching by using aq. NaOH solution at high temperature and high pressure.

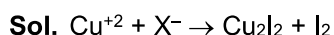
4. Consider the reaction



Final product X_2 will be predominantly.

- (1) Cl_2
 (2) Br_2
 (3) I_2
 (4) All halogens are possible

Answer (3)



X_2 is therefore I_2

5. Read the following two statements

Statement-I : Ionic radius of Li^+ is greater than Mg^{++} .

Statement-II : Lithium and Magnesium can't form superoxide.

- (1) **Statement-I** and **Statement-II** both are correct
 (2) **Statement-I** and **Statement-II** both are incorrect
 (3) **Statement-I** is correct and **Statement-II** is incorrect
 (4) **Statement-I** is incorrect and **Statement-II** is correct

Answer (1)

Sol. Radius of $\text{Li}^+ = 76$ pm and that of Mg^{++} is 72 pm. Both Li and Mg are not able to form peroxide due to their small size.

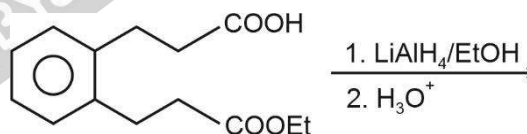
6. Why gypsum is used in cement?

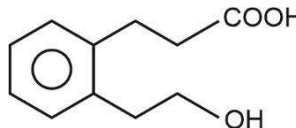
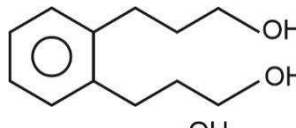
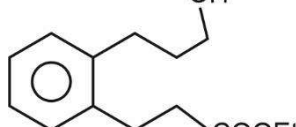
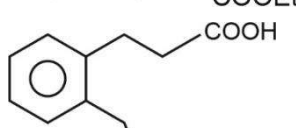
- (1) To increase the hydration of the constituents
 (2) To give a hard mass
 (3) To slow down the process of setting of the cement
 (4) To increase the rate of setting of the cement.

Answer (3)

Sol. Gypsum is added to the cement to slow down the process of setting of the cement.

7. Choose the correct product—

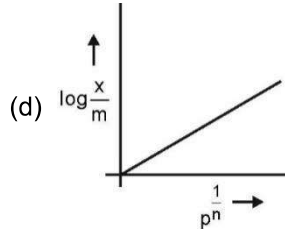
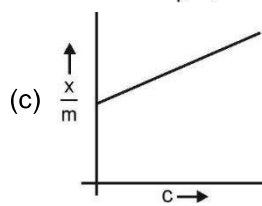
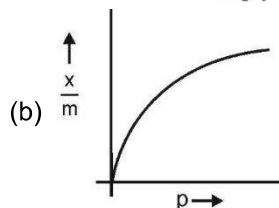
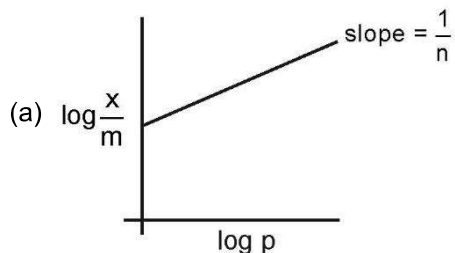


- (1) 
 (2) 
 (3) 
 (4) 

Answer (2)

Sol. LiAlH_4 will reduce both carboxylic acid and ester to Alcohol.

8. Which of the following plots correctly represents Freundlich adsorption isotherm?



(1) a, b

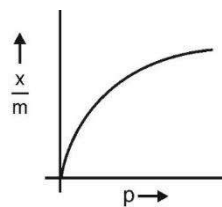
(2) a, b, c

(3) a, b, d

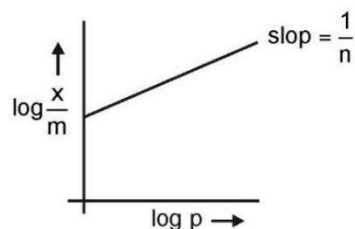
(4) b, d

Answer (1)

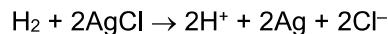
Sol. $\frac{x}{m} = kp^n$



and $\log \frac{x}{m} = \log k + \frac{1}{n} \log p$



9. Which cell representation is correct for the reaction given below



(1) $\text{Pt}|\text{H}_2|\text{HCl}||\text{AgCl}|\text{Ag}$

(2) $\text{Pt}|\text{H}_2|\text{HCl}||\text{AgCl}|\text{Pt}$

(3) $\text{Ag}|\text{AgCl}|\text{HCl}|\text{H}_2|\text{Pt}$

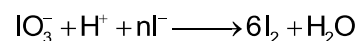
(4) $\text{Pt}|\text{AgCl}|\text{HCl}|\text{H}_2|\text{Pt}$

Answer (1)

Sol. Anode : $\text{H}_2 \rightarrow 2\text{H}^+ + 2\text{e}^-$

Cathode : $\text{e}^- + \text{AgCl} \rightarrow \text{Ag} + \text{Cl}^-$

10. Find the value of 'n' in the following redox reaction



(1) 10

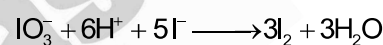
(2) 12

(3) 9

(4) 5

Answer (1)

Sol. n-factor of IO_3^- and I^- in the given redox reaction are 5 and 1 respectively. Therefore, IO_3^- and I^- will always react in the molar ratio 1 : 5 to get I_2



To get 6 molar of I_2 , multiply through out by 2.



$\therefore n = 10$

11. For an electron and proton with same de-Broglie wavelength, the ratio of linear momentum is equal to

(1) 1 : 2

(2) 2 : 1847

(3) 1 : 1

(4) $\sqrt{1847} : 1$

Answer (3)

Sol. $\lambda = \frac{h}{p}$

As λ is same, p is same. \therefore Ratio is 1 : 1

12. Which of the following is most stable, diamagnetic and octahedral shaped?

(1) $\text{K}_3[\text{Co}(\text{CN})_6]$

(2) $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}$

(3) $\text{Na}_3[\text{CoF}_6]$

(4) All have exact equal stability

Answer (1)

Sol. $[\text{Co}(\text{CN})_6]^{3-}$ and $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ are diamagnetic but first one is more stable as Δ_0 is high for first complex.

13. Select the correct order of electronegativity of the elements : B, C, At, S

- (1) $\text{B} > \text{C} > \text{S} > \text{At}$
- (2) $\text{S} > \text{C} > \text{B} > \text{At}$
- (3) $\text{C} > \text{B} > \text{S} > \text{At}$
- (4) $\text{S} > \text{C} > \text{At} > \text{B}$

Answer (4)

Sol. The electronegativity of B (2), C (2.5), At (2.2) & S (2.58). Hence the order will be $\text{S} > \text{C} > \text{At} > \text{B}$

14. Which of the following has same d-electrons as chromium in chromyl chloride?

- (1) Fe(III)
- (2) Ni(III)
- (3) Mn(VII)
- (4) Co(II)

Answer (3)

Sol. Mn^{7+} as d^0 configuration which is same as Cr^{6+} in CrO_2Cl_2 .

15. Syn gas with Cu as catalyst produces :

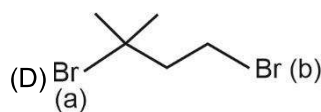
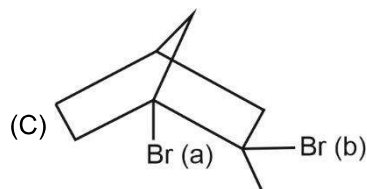
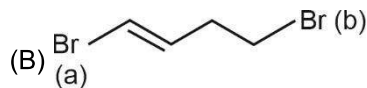
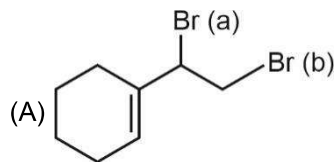
- (1) Ethanol
- (2) Methanal
- (3) Methane
- (4) Methanoic acid

Answer (2)

Sol. $\text{CO} + \text{H}_2 \xrightarrow{\text{Cu}} \text{HCHO}$

Ref: NCERT (Catalysis – Surface chemistry)

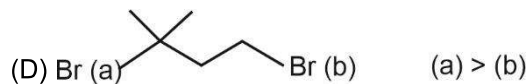
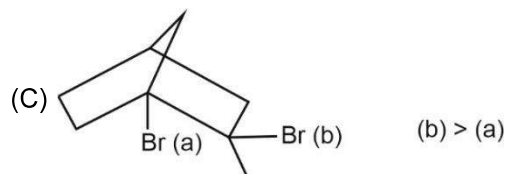
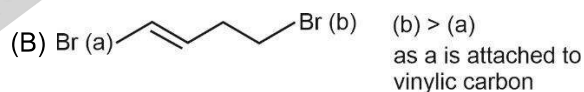
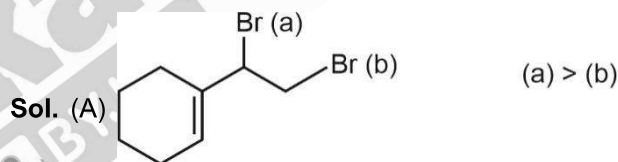
16. Consider the following compounds



Which of the following options represent correctly the Br atoms which are more reactive in $\text{S}_{\text{N}}1$ mechanism?

- (1) (A) Br – (a)
(B) Br – (a)
(C) Br – (a)
(D) Br – (a)
- (2) (A) Br – (a)
(B) Br – (b)
(C) Br – (b)
(D) Br – (a)
- (3) (A) Br – (b)
(B) Br – (b)
(C) Br – (b)
(D) Br – (a)
- (4) (A) Br – (a)
(B) Br – (b)
(C) Br – (b)
(D) Br – (b)

Answer (2)



Hence (2) is correct

17. For the ions: $[\text{MnF}_6]^{4-}$, $[\text{Fe}(\text{CN})_6]^{3-}$ & $[\text{Co}(\text{NH}_3)_6]^{3+}$. The order of the spin magnetic moment is correct in which of the following option

- (1) $[\text{MnF}_6]^{4-} > [\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Fe}(\text{CN})_6]^{3-}$
- (2) $[\text{Fe}(\text{CN})_6]^{3-} > [\text{MnF}_6]^{4-} > [\text{Co}(\text{NH}_3)_6]^{3+}$
- (3) $[\text{MnF}_6]^{4-} > [\text{Fe}(\text{CN})_6]^{3-} > [\text{Co}(\text{NH}_3)_6]^{3+}$
- (4) $[\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Fe}(\text{CN})_6]^{3-} > [\text{MnF}_6]^{4-}$

Answer (3)

Sol. The unpaired electrons present in the given ions are 5 for $[\text{MnF}_6]^{4-}$, 1 for $[\text{Fe}(\text{CN})_6]^{3-}$ & 0 for $[\text{Co}(\text{NH}_3)_6]^{+3}$ hence the option 3 is correct

18. Match the column.

Column-I

(A) Neutral FeCl_3

(B) Iodoform

(C) Carbylamine test

(D) CuSO_4 + Sodium

potassium tartarate
(Rochelle's salt)

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

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

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

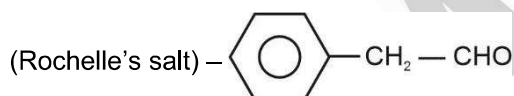
(4) A(Q); B(P); C(S); D(Q)

Answer (3)

Sol. Neutral FeCl_3 – Phenol



CuSO_4 + Sodium Potassium tartrate



19. Match the Column I and II.

	Column I		Column II
A.	Saccharin	1.	Sweetest Sugar
B.	Alitame	2.	Unstable at cooking temperature
C.	Aspartame	3.	Stable at Cooking temperature
D.	Sucralose	4.	First Popular artificial sugar used

(1) A →4; B→1; C→2; D→3

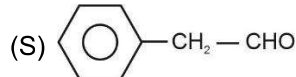
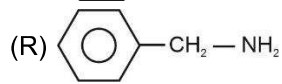
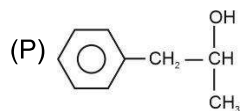
(2) A →1; B→2; C→3; D→4

(3) A →2; B→1; C→4; D→3

(4) A →3; B→2; C→4; D→1

Answer (1)

Column-II



Sol. Option (1) is correct based on the information.

20. Which of the following reagents are used to react with diazonium salt ($\text{Ph-N}_2^+\text{X}^-$) to get the product given against each reagent.

(a) HBF_4 Ph – F

(b) CuCN/KCN Ph – CN

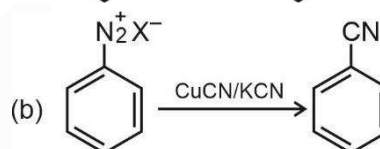
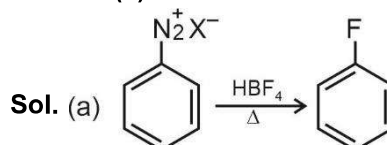
(c) CuCl_2/HCl Ph – Cl

(d) Ph-NH_2 Ph – N = N – Ph

(1) (a) and (b) (2) (a), (b) and (c)

(3) (a), (b), (c) and (d) (4) (a), (b) and (d)

Answer (1)



SECTION - B

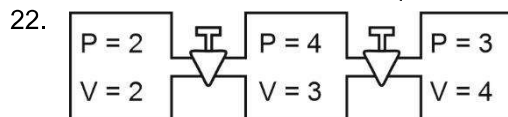
Numerical Value Type Questions: This section contains 10 questions. In Section B, attempt any five questions out of 10. The answer to each question is a **NUMERICAL VALUE**. For each question, enter the correct numerical value (in decimal notation, truncated/rounded-off to the second decimal place; e.g., 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 factors will contribute to major role in covalent character of a compound.

- (A) Polarising power of Cation
- (B) Polarisability of the anion
- (C) Distortion caused by Cation
- (D) Polarisability of cation

Answer (03.00)

Sol. Polarisability of cation doesn't play a major role in covalent character of a compound.



Calculate final pressure once values are released?
(Round off to the nearest integer)

Answer (03)

Sol. $P_1V_1 + P_2V_2 + P_3V_3 = PV$

$$2 \times 2 + 4 \times 3 + 3 \times 4 = P \times 9$$

$$\therefore P = \frac{28}{9} = 3.11 \approx 3$$

23. How many statements are correct:

- (1) If there is no relation between rate constant and temperature, then activation energy is negative.
- (2) If the activation energy is zero, rate constant is temperature independent.
- (3) If rate constant increases with increase of temperature, activation energy is positive
- (4) If rate constant decreases with increase in temperature, activation energy is negative.

Answer (3)

Sol. $k = Ae^{-E_a/RT}$

$$\ln k = \ln A - \frac{E_a}{RT}$$

Clearly, if $E_a = 0$, k is temperature independent

if $E_a > 0$, k increases with increase in temperature

if $E_a < 0$, k decreases with increase in temperature

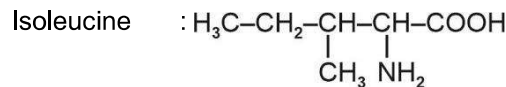
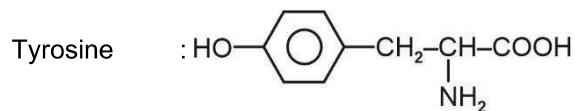
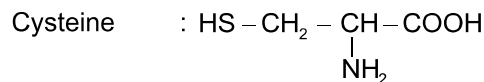
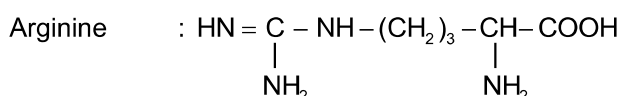
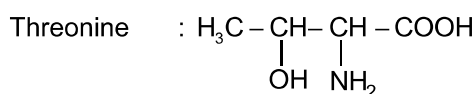
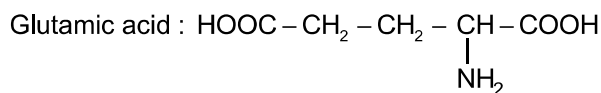
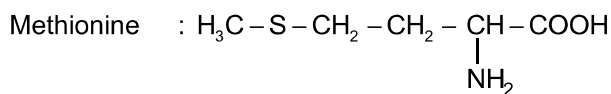
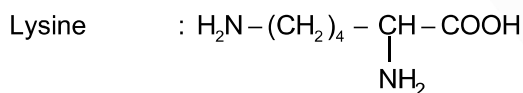
Hence, 2, 3, 4 are correct statements.

24. How many of the following α -amino acids contain sulphur?

Lysine ; Methionine; Glutamic acid; Threonine
Arginine; Cysteine; Tyrosine; Isoleucine

Answer (2)

Sol. The structures of the given α -amino acids are



Methionine and Cysteine contain sulphur

25. 0.5 gm of an organic compound with 60% Carbon will produce _____ gm of CO_2 upon complete combustion

Answer (01.10)

Sol. Moles of Carbon = $\frac{0.5 \times 0.6}{12}$

$$\text{Moles of CO}_2 = \frac{0.5 \times 0.6}{12}$$

$$\text{Mass of CO}_2 = \frac{0.5 \times 0.6}{12} \times 44 = 1.1 \text{ gm}$$

26. How many of the following are not correctly matched?

	Metals or Ions		Maximum prescribed concentration in drinking water (ppm)
A.	Zn	1.	5
B.	F^-	2.	10
C.	NO_3^-	3.	50
D.	SO_4^{2-}	4.	> 500
E.	Mn	5.	0.05

Answer (04.00)

Sol. Maximum prescribed concentration of F^- ion in drinking water is 1 ppm. Rest all are correct matches.

- 27.
- 28.
- 29.
- 30.