

5.

	List-I		List-II
(P)	H ₂ O	(i)	Bent
(Q)	BrF ₅	(ii)	See-Saw
(R)	SF ₄	(iii)	T-shape
(S)	ClF ₃	(iv)	Square pyramidal
		(v)	Linear

Select the correct matching

(1) P-(i), Q-(iv), R-(ii), S-(iii)

(2) P-(iv), Q-(v), R-(iii), S-(i)

(3) P-(v), Q-(i), R-(iii), S-(iv)

(4) P-(i), Q-(v), R-(iv), S-(iii)

Ans. (1)

Sol.

	Molecule	Shape		Molecule	Shape
(1)		Bent	(2)		Square pyramidal
(3)		See-Saw	(4)		T-Shape

6. Which of the following set of ions is diamagnetic?

(1) La⁺³, Ce⁺⁴

(2) Nd⁺³, Ce⁺⁴

(3) Lu⁺³, Eu⁺²

(4) Nd⁺³, Gd⁺³

Ans. (1)

Sol.

⁵⁷La : [Xe] 5d¹ 6s²

⁵⁸Ce : [Xe] 4f¹ 5d¹ 6s²

⁶⁰Nd : [Xe] 4f⁴ 6s²

⁶³Eu : [Xe] 4f⁷ 6s²

⁶⁴Gd : [Xe] 4f⁷ 5d¹ 6s²

⁷¹Lu : [Xe] 4f¹⁴ 5d¹ 6s²

7. **Statement-I** : Reaction of a compound on treatment with dil. H₂SO₄ produces a gas which on passing through lead acetate filter paper turns paper black . It is confirmatory test for S²⁻ acid radical.

Statement-II : Lead sulphite is formed

(1) Statement I and Statement II are correct.

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

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

(4) Statement I and Statement II are incorrect

Ans. (2)

Sol.

Na₂S(aq) + H₂SO₄ (dil) → Na₂SO₄(aq) + H₂S↑

(CH₃COO)₂ Pb + H₂S → PbS↓ + CH₃COOH

(Black)

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8. Aluminium chloride in acidified aqueous solution forms an ion with the shape _____.

- (1) Tetrahedral (2) Octahedral
 (3) Square planar (4) Trigonal bipyramidal

Ans. (2)

Sol. $AlCl_3$ in acidified aqueous solution forms octahedral $[Al(H_2O)_6]^{3+}$ ion.

9. The maximum number of molecular orbitals formed by 2s and 2p atomic orbitals of two atoms are _____.

Ans. (8)

Sol. From 2s & 2p atomic orbitals of two atoms following MO are formed.

ABMO : $\sigma^*2s, \sigma^*2p_z, \pi^*2p_x, \pi^*2p_y$.

BMO : $\sigma2s, \sigma2p_z, \pi2p_x, \pi2p_y$.

10. $aI^- + 2MnO_4^- + bH_2O \longrightarrow xMnO_2 + yI_2 + zOH^-$

Determine value of z.

Ans. (8)

Sol. $6I^- + 2MnO_4^- + 4H_2O \longrightarrow 2MnO_2 + 3I_2 + 8OH^-$

11. For a first order reaction



concentration of A at 10 min. and 20 min is 0.04 M and 0.03 M respectively calculate $t_{1/2}$ in minute.

(Given : $\log 2 = 0.3, \log 3 = 0.48$)

Ans. (24)

Sol. $K = \frac{2.303}{t} \log \frac{[A_0]}{[A_t]}$

$$\frac{0.693}{t_{1/2}} = \frac{2.303}{10} \log \frac{[A_0]}{0.04} \dots\dots\dots (1)$$

$$\frac{0.693}{t_{1/2}} = \frac{2.303}{20} \log \frac{[A_0]}{0.03} \dots\dots\dots (2)$$

on solving

$$\frac{0.693}{t_{1/2}} = \frac{2.303}{10} \log \frac{0.04}{0.03}$$

$$t_{1/2} = 24 \text{ min}$$

12. 250 mL solution of CH_3COONa of molarity 0.35 M is prepared. What is mass of CH_3COONa required in gram (nearest integer) ? [Molar mass of $CH_3COONa = 82.08 \text{ g/mol}$]

Ans. (7)

Sol. Molarity = $\frac{\text{moles of solute}}{\text{Volume (lit) of solution}}$

$$0.35 = \frac{\text{moles}}{250/1000}$$

$$\text{moles} = 0.35 \times \frac{1}{4} = 0.0875$$





$$\text{mass of } CH_3COONa = 0.0875 \times 82.08 = 7.18 \text{ g}$$

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13. The number of atom in silver plate having area 0.05 cm^2 and thickness 0.05 cm is _____ $\times 10^{19}$.
 [Given density of Ag = 7.9 gram/cm^3 and atomic mass of Ag = 108]

Ans. (11)

Sol. Density = $\frac{\text{mass}}{\text{volume}}$

$$\begin{aligned} \text{mass of Ag deposited} &= \text{density} \times \text{volume} \\ &= 7.9 \times [0.05 \times 0.05] \text{ gram} \\ &= 0.01975 \text{ gram} \end{aligned}$$

$$\text{No. of mole of Ag deposited} = \left(\frac{197.5 \times 10^{-4}}{108} \right) = 1.83 \times 10^{-4}$$

$$\begin{aligned} \text{No. of Ag atom} &= [1.83 \times 10^{-4}] \times 6.02 \times 10^{23} \\ &= 11.01 \times 10^{19} \text{ atom} \end{aligned}$$

14. The element with IUPAC name 'unununium' belongs to _____ group of the periodic table.

Ans. (11)

Sol. Unununium—111 (Uuu)

Electronic configuration : $[[\text{Rn}]] 5f^{14}, 6d^{10} 7s^1$

This element belongs to d-block, 7th period and 11th group

15. Given K_{sp} of $\text{Mg}(\text{OH})_2$ is 10^{-11} and $[\text{Mg}^{+2}]$ is 0.1 M, then find pH at which precipitation will start?

Ans. (9)

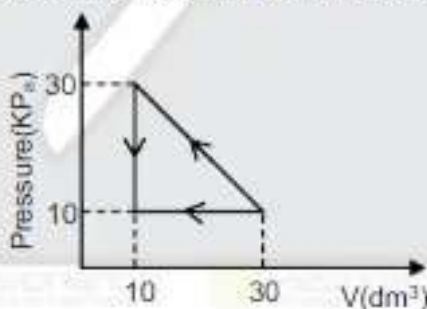
Sol. $K_{sp} = 10^{-11} = [\text{Mg}^{+2}] [\text{OH}^-]^2$

or $10^{-11} = [0.1] [\text{OH}^-]^2$

or $[\text{OH}^-] = 10^{-5}$

or $\text{pOH} = 5$ or $\text{pH} = 9$

16. Find work done in the following cyclic process (in J)



Ans. (200)

Sol. $W = \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 20 \times 10^3 \times 20 \times (10^{-1} \text{ m}^3)$$

$$= 200 \text{ J.}$$

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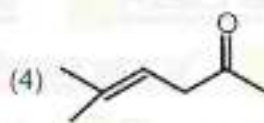
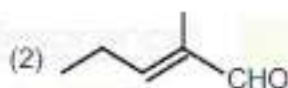
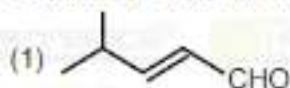
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17. Correct structure of 4-Methyl-pent-2-enal is.



Ans. (1)



18. Which of the following is most stable.



Ans. (2)

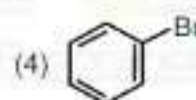
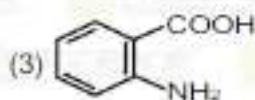
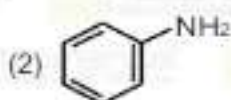
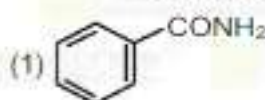
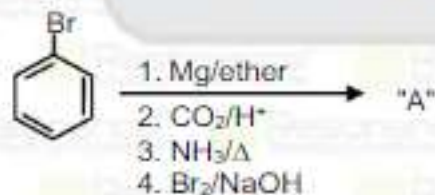


19. Statement-I : Structure of allylic halide is $\text{CH}_2=\text{CH}-\text{CH}_2-\text{X}$.
 Statement-II : In allylic halide, halide atom is attached to sp^2 hybrid carbon
- (1) Both Statement-I & Statement-II are correct.
 (2) Both Statement-I & Statement-II are incorrect.
 (3) Statement-I is correct whereas Statement-II is incorrect.
 (4) Both Statement-I and Statement-II are incorrect.

Ans. (3)

Sol. (3) Statement-I is correct whereas Statement-II is incorrect.

20. The final product "A" formed in the following reaction sequence :



Ans. (2)

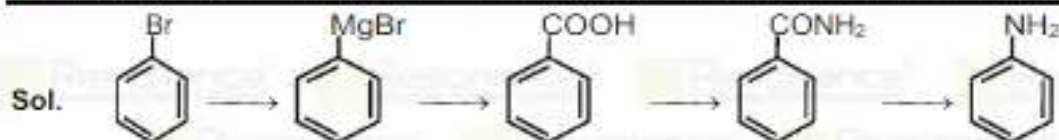
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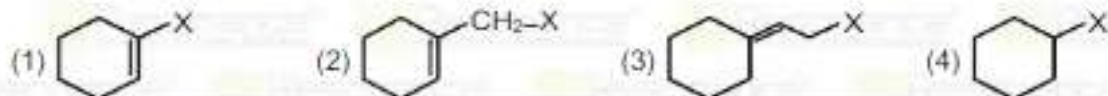
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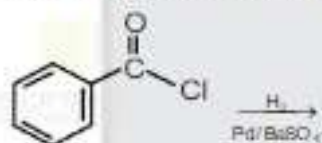


21. Structure of vinylic halide is :



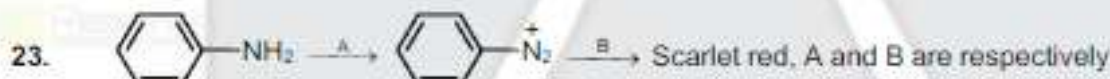
Ans. (1)

22. What is the name of given reaction



- (1) Etard reaction (2) Stephen's reduction
(3) Wolf kishner reduction (4) Rosenmund reaction

Ans. (4)



- (1) A - NaNO_2/HCl ($0-5^\circ\text{C}$) ; B - c1ccc2cc(O)ccc2c1
 (2) A - NaNO_2/HCl ($0-5^\circ\text{C}$) ; B - c1ccc(N)cc1
 (3) A - NaNO_2/HCl ($0-5^\circ\text{C}$) ; B - c1ccc(O)cc1
 (4) A - HNO_3 ; B - c1ccc2cc(O)ccc2c1

Ans. (1)

24. Which sugar does not give reddish brown precipitate with Fehling solution

- (1) Lactose (2) Maltose (3) Sucrose (4) Glucose

Ans. (3)

Sol. Sucrose do not have hemiacetal group, therefore it will not produce aldehyde group in solution, hence no precipitate with Fehling solution.

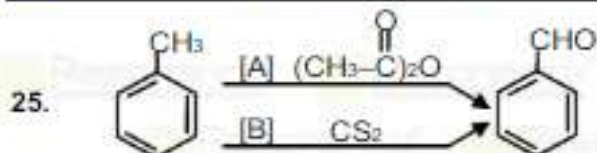
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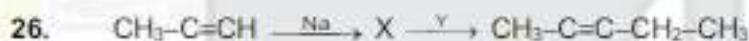
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A and B are

- (1) A = CrO₃ ; B = CrO₂Cl₂
- (2) A = CrO₂Cl₂ ; B = CrO₂Cl₂
- (3) A = CrO₃ ; B = CrO₃
- (4) A = CrO₂Cl₂ ; B = CrO₃

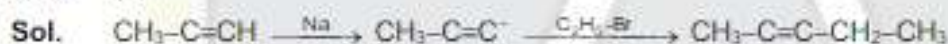
Ans. (1)



Correct set of X and Y is :

- (1) X = 2-Butene ; Y = C₂H₅Br
- (2) X = CH₃-C=C⁻ ; Y = C₂H₅-Br
- (3) X = C₂H₅Br ; Y = CH₃-C=C⁻
- (4) X = CH₃-C=C⁻ ; Y = CH₃-CH₂-CH₂-Br

Ans. (2)



27. Calculate R_f value, if solute travelled by 3.5 cm and solvent travelled by 0.5 cm.

Ans. 7

Sol. R_f i.e. retention factor is the ratio of the distance travelled by the compound as compared to the distance moved by the solvent

$$R_f = \frac{\text{Distance by solute}}{\text{Distance by solvent}} = \frac{3.5}{0.5} = 7$$

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