

No. of e ⁻	10	10	10	10	10
Z	7	8	9	11	12

For isoelectronic specie greater is Z smaller is size of ion.

2. Which of the following lanthanide have half-filled and full filled *f*-orbital respectively.
 (1) Eu²⁺, Tb³⁺ (2) Yb³⁺, Tb²⁺ (3) Gd³⁺, Dy²⁺ (4) Sm²⁺, Dy²⁺

Ans. (3)

Sol. **Ion** **Electronic configuration**

Eu ²⁺	4f ⁷
Tb ²⁺	4f ⁹
Tb ³⁺	4f ⁸
Gd ³⁺	4f ⁷
Dy ²⁺	4f ¹⁰
Sm ²⁺	4f ⁶

3. Statement-I : Fluorine form only one oxoacid.
 Statement-II : Due to high electronegativity and small size.
 (1) Both Statement-I & Statement-II are true (2) Both Statement-I & Statement-II are false
 (3) Statement-I is true & Statement-II is false (4) Statement-I is false & Statement-II is true

Ans. (1)

Sol. Due to small size & high electronegativity F can not act as central atom in higher oxidation state so F form only one oxy acid HOF.

4. Which of the following statement is incorrect regarding PCl₅.
 (1) In PCl₅ axial bonds are longer than equatorial bonds
 (2) It has trigonal by pyramidal structure
 (3) 3Cl atoms are in same plane
 (4) Hybridisation of 'P' is sp³d²

Ans. (4)

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Hybridisation = sp³d

5. Identify correct increasing strength of intermolecular H-bonding.
 (1) HCN < H₂O < NH₃ (2) NH₃ < HCN < H₂O (3) CH₄ < HCN < NH₃ (4) CH₄ < NH₃ < H₂O

Ans. (3)

Sol. Correct order of H-bond strength is :
 CH₄ < HCN < NH₃

6. Identify correct set which represent increasing order of magnetic moment.
 (a) [FeF₆]³⁻ (b) [Fe(CN)₆]³⁻
 (c) [Mn(CN)₆]²⁻ (d) [Mn(Cl)₆]²⁻ (high spin)
 (1) b < c < d < a (2) a < b < c < d (3) a < d < c < b (4) d < c < b < a

Ans. (1)

Sol. **Complex** **Electronic configuration** **No. of unpaired electron**

(a) [FeF ₆] ³⁻	Fe ³⁺ ⇒ 3d ⁵ ⇒ t _{2g} ^{1,1,1} , e _g ^{1,1}	5
---------------------------------------	---	---

- (b) $[\text{Fe}(\text{CN})_6]^{3-}$ $\text{Fe}^{3+} \Rightarrow 3d^5 \Rightarrow t_{2g}^{2,2,1}, e_g^{0,0}$ 1
 (c) $[\text{Mn}(\text{CN})_6]^{2-}$ $\text{Mn}^{2+} \Rightarrow 3d^5 \Rightarrow t_{2g}^{2,1,1}, e_g^{0,0}$ 2
 (d) $[\text{Mn}(\text{Cl})_6]^{2-}$ (high spin) $\text{Mn}^{2+} \Rightarrow 3d^5 \Rightarrow t_{2g}^{1,1,1}, e_g^{1,1}$ 4

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7. Which of the following have high value of reduction potential ($E^\circ_{M^{2+}/M}$)

- (1) Zn (2) Cr (3) Cu (4) Fe

Ans. (3)

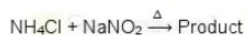
Sol. $E^\circ_{\text{Zn}^{2+}/\text{Zn}} = -0.76 \text{ V}$

$E^\circ_{\text{Cr}^{3+}/\text{Cr}} = -0.91 \text{ V}$

$E^\circ_{\text{Cu}^{2+}/\text{Cu}} = 0.34 \text{ V}$

$E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$

8. Which gas is produced during following reaction :



- (1) NH_3 (2) N_2 (3) Cl_2 (4) N_2O

Ans. (2)

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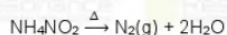
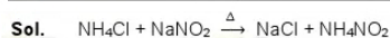
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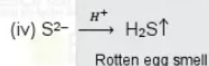
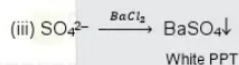
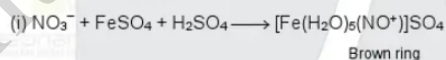
9. Match the acid radicals present in Column I with their characteristic observation in Column II

Column I	Column II
(i) CO_3^{2-}	(P) Brisk effervescence
(ii) NO_3^-	(Q) White PPT
(iii) SO_4^{2-}	(R) Brown Ring
(iv) S^{2-}	(S) Rotten egg smell

(1) (i) - (P); (ii) - (R); (iii) - (Q); (iv) - (S) (2) (i) - (S); (ii) - (R); (iii) - (Q); (iv) - (P)

(3) (i) - (P); (ii) - (R); (iii) - (S); (iv) - (Q) (4) (i) - (P); (ii) - (Q); (iii) - (R); (iv) - (S)

Ans. (1)



10. How many set of quantum numbers are possible.

	n	ℓ	m		n	ℓ	m
(a)	2	2	1	(b)	3	2	-2
(c)	3	2	-1	(d)	2	1	-1

Ans. (3)

Sol. For possible set of quantum number.

$n > \ell$, $m = -\ell$ to $+\ell$ (including zero).

Correct set are b, c, d.

11. Find pH of 0.001 M NaOH solution.

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Ans. (11)



$10^{-3} \text{ M} \quad 10^{-3} \text{ M} \quad 10^{-3} \text{ M}$

$[\text{OH}^-] = 10^{-3} \quad \text{pOH} = 3$

$\text{pH} = 11$

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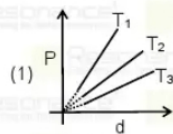
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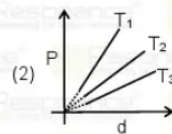
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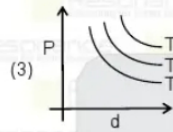
12. Which of the following graph is correct for an ideal gas



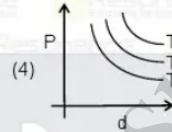
$T_1 > T_2 > T_3$



$T_3 > T_2 > T_1$



$T_3 > T_2 > T_1$



$T_1 > T_2 > T_3$

Ans. (1)

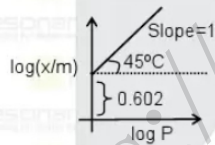
Sol. $PV = nRT$

$P = \left[\frac{w}{V} \right] \frac{RT}{M}$

$P = \frac{dRT}{M}$ so $P \propto d$ Slope = $\frac{RT}{M}$

Greater is slope greater is Temperature.

13. At 1.003 atm pressure value of $\left(\frac{x}{m}\right)$ will be



Report your answer to nearest integer.

Ans. (4)

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

Intercept $\log K = 0.602 = \log 4$

$K = 4$

Slope $\Rightarrow \frac{1}{n} = 1$ so $n = 1$

so $\left(\frac{x}{m}\right) = 4(1.003) = 4.012$

14. 2.5×10^{-3} kg of a non-volatile & non electrolyte solute dissolve in 75×10^{-3} kg of water. If Boiling point of solution is 373.67 K, then molar mass of solute in gram is :

[Given $(T_b^{\circ})_{\text{H}_2\text{O}} = 373.15 \text{ K}$ and $K_b(\text{H}_2\text{O}) = 0.52 \text{ K.Kg/mole}$]

(Report your answer to nearest integer)

Ans. (333)

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Sol. Boiling point of solution (T_b) = 373.67 K

Boiling point of solvent (T_b^0) = 373.15 K

$$\Delta T_b = (T_b - T_b^0)$$

$$\Delta T_b = 0.52$$

$$\Delta T_b = (K_b)m$$

$$0.52 = 0.52 \left[\frac{2.5 \times 1000}{M_{\text{solute}} \times 75} \right]$$

$$M_{\text{solute}} = 333.33 \text{ g/mol}$$

15. 5 mole of an ideal gas change it's volume from 10 L to 20 Lit. reversible isothermally at 300 K then work done by gas is.....KCal. [Given R = 2 Cal]

Ans. (2)

Sol. For isothermal reversible process

$$W = -2.303 nRT \log \left(\frac{V_2}{V_1} \right)$$

$$= -2.303 \times 5 \times 2 \times 300 \log \left(\frac{20}{10} \right)$$

$$= -2072.7 \text{ Cal} = -2.0727 \times 10^3 \text{ Cal} = -2 \text{ K Cal} = |W| = 2 \text{ K Cal}$$

16. 0.25 gram of an organic compound containing chlorine treated with excess of AgNO_3 , which gives 0.4 gram of AgCl as precipitate out in carius method, then % of chlorine in organic compound is [Report your answer to nearest integer]

Ans. (40)



$$\text{Mole of AgCl} = \left(\frac{0.4}{143.5} \right)$$

$$W_{\text{Cl}} = \left(\frac{0.4}{143.5} \right) \times 35.5$$

$$\% \text{ of Cl} = \left[\frac{0.4}{143.5} \times 35.5 \right] \times \frac{100}{0.25} = 39.58 \approx 40$$

17. Statement-I : $\begin{array}{c} n_2 \\ \uparrow \\ n_1 \end{array}$ $h\nu = (E_2 - E_1)$ absorb photon.

Statement-II : $\begin{array}{c} n_2 \\ \downarrow \\ n_1 \end{array}$ $h\nu = E_2 - E_1 =$ emitted photon.

(1) Both **Statement-I** & **Statement-II** are true (2) Both **Statement-I** & **Statement-II** are false

(3) **Statement-I** is true & **Statement-II** is false (4) **Statement-I** is false & **Statement-II** is true

Ans. (1)

Sol. In this process absorbed & emitted photon have equal energy.

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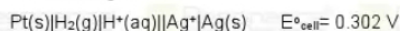
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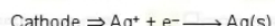
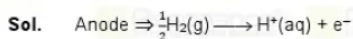
18. For following cell

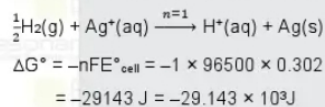


Value of ΔG° is $[-X] \times 10^3 \text{ J}$ then value of X is :

[Report your answer to nearest integer]

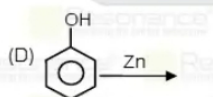
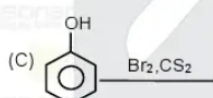
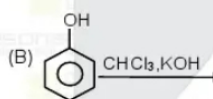
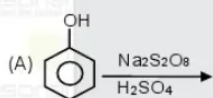
Ans. (29)



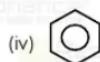
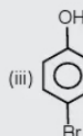
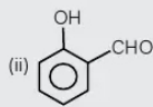
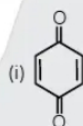


19. The correct match of the product given in Column-II with the reaction in Column-I is.

Column-I



Column-II



(1) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)

(2) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)

(3) (A)-(iv), (B)-(ii), (C)-(iii), (D)-(i)

(4) (A)-(iii), (B)-(i), (C)-(iv), (D)-(ii)

Ans. (1)

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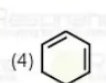
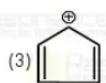
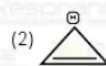
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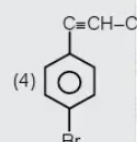
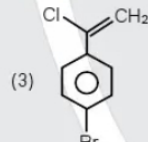
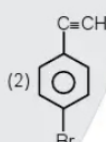
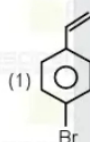
20. Which is most stable.



Ans. (4)

21. major product.

Major product is:



Ans. (1)

22. The correct match of the effects given in Column-II with the drug type given in Column-I.

Column-I	Column-II
(A) Tranquiliser	(1) Pain reliever
(B) Antipyretic	(2) Reduce acidity
(C) Analgesic	(3) Reduce stress
(D) Antacid	(4) Reduce fever
(1) (A)-(3), (B)-(4), (C)-(1), (D)-(2)	(2) (A)-(2), (B)-(3), (C)-(4), (D)-(1)
(3) (A)-(3), (B)-(1), (C)-(1), (D)-(1)	(4) (A)-(1), (B)-(3), (C)-(2), (D)-(4)

Ans. (1)

23. Which of the following is incorrect about Buna-N?

- (1) N stands for acrylonitrile (2) Buna-N is formed by butadiene & styrene
 (3) Buna-N is a addition polymer (4) Buna-N is a copolymer

Ans. (1)

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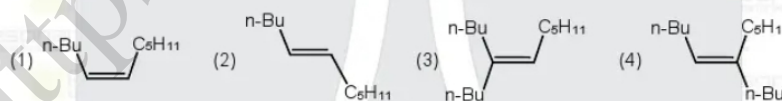
24. **Statement-I** : Maltose is formed by C₁-C₄ glycosidic linkage between two αD(+) glucose units that are reducing sugar.

Statement-II : Maltose is formed by C₁-C₆ glycosidic linkage between two αD(+) glucose & βD(+) glucose.

- (1) Statement-I is true & Statement-II is false (2) Statement-I & Statement-II both are true
 (3) Statement-I & II both are false (4) Statement-I is false & Statement is true

Ans. (1)

25. $n\text{Bu}-\text{C}\equiv\text{CH} \xrightarrow[3. \text{H}_2-\text{Pd, BaSO}_4]{1. n\text{BuLi}, 2. n\text{C}_5\text{H}_{11}\text{Cl}}$ Major product

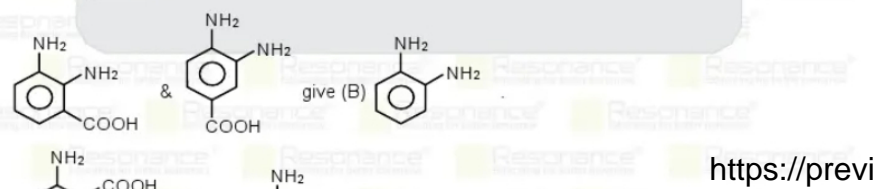
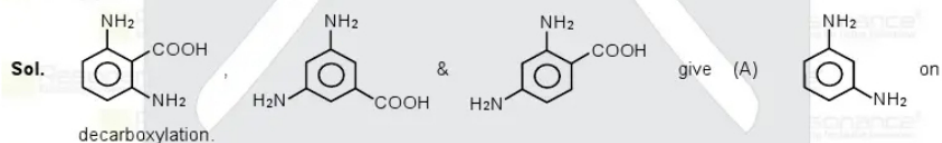


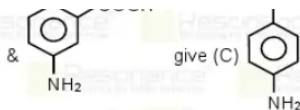
Ans. (1)

26. A compound has molecular formula C₆H₃(NH₂)₂COOH has six structural isomers, on decarboxylation out of six, three compounds give same product (A), another two isomers give same product (B) & remaining isomer give one product (C). Find melting point of (C).

- (1) 143°C (2) 104°C (3) 73°C (4) 47°C

Ans. (1)





(C) has highest melting point.






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