

PART : CHEMISTRY

1. Consider the following reaction



Find the value of (X+Y+Z)

Ans. (27)

Sol. Balance reaction is :



$$X = 14 \qquad Y = 6 \qquad Z = 7$$

Hence (X+Y+Z) = 14+6+7 = 27

2. Ba^{+2} ion cannot be precipitate as :

- (1) BaCO_3
- (2) BaSO_4
- (3) Barium oxalate
- (4) $\text{Ba}(\text{OH})_2$

Ans. (4)

Sol. $\text{Ba}(\text{OH})_2$ is soluble and rest are insoluble in water

3. The orbit angular momentum of $3s$ e^- is $\frac{x\hbar}{2\pi}$ then find value of x .

Ans. (3)

Sol. Orbit angular momentum = $\frac{n\hbar}{2\pi}$ for an orbit

For $3s$ orbital $n = 3$. $x = 3$.

4. In a BCC lattice edge length is 4Å then find radius of sphere in unit cell (in Å)
 (Report your answer to nearest integer)

Ans. (2)

Sol. The relation between edge length and radius in bcc lattice is $4R = \sqrt{3}a$
 given $a = 4\text{Å}$

$$4R = \sqrt{3} \times 4$$

$$R = 1.732\text{Å}$$

5. **Assertion:** The bond angle of $\text{SO}_2 > \text{H}_2\text{O}$.

Reason: Both SO_2 & H_2O have V-shape

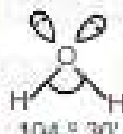
- (1) Both Assertion and Reason are correct but Reason is not correct explanation.
- (2) Both Assertion and Reason are correct Reason is correct explanation.
- (3) Assertion is correct and Reason is not correct.
- (4) Reason is correct and Assertion is not correct.

Ans. (1)

Sol.



Hybridisation = sp^2
 no of lone pair = 1



Hybridisation = sp^3
 no of lone pair = 2

6. What is the covalency and oxidation number of boron in $[\text{BF}_3]^-$ respectively ?

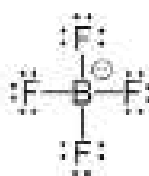
- (1) 3, 4 (2) 3, 5
(3) 4, 3 (4) 4, 5

Ans. (3)

Sol. covalency = 4

For oxidation number $x + 4(-1) = -1$

$\therefore x = 3$



7. Which is the best method for preparation of BeF_2 ?

(1) Thermal decomposition of $(\text{NH}_4)_2\text{BeF}_4$



Ans. (1)

Sol. Thermal decomposition of $(\text{NH}_4)_2\text{BeF}_4$ is the best route for the preparation of BeF_2



8. If the formula of borax is $\text{Na}_2\text{B}_4\text{O}_x(\text{OH})_y \cdot z\text{H}_2\text{O}$. Find the value of $X + Y + Z$?

Ans. (17)

Sol. Formula of borax is $\text{Na}_2\text{B}_4\text{O}_7(\text{OH})_4 \cdot 8\text{H}_2\text{O}$

$X + Y + Z = 5 + 4 + 8 = 17$

9. The correct increasing order of the magnitude enthalpies of formation for group I halides is:

- (1) $\text{NaI} > \text{NaF} > \text{NaBr} > \text{NaCl}$
(2) $\text{NaF} > \text{NaCl} > \text{NaBr} > \text{NaI}$
(3) $\text{NaCl} > \text{NaF} > \text{NaBr} > \text{NaI}$
(4) $\text{NaI} > \text{NaBr} > \text{NaF} > \text{NaCl}$

Ans. (2)

Compound	ΔH_f (KJ/mol)
NaF	-569
NaCl	-400
NaBr	-360
NaI	-288

10. For A 1st order reaction: $A_{(g)} \rightarrow 2B_{(g)} + C_{(g)}$

Initial pressure of reaction mixture 800 mm of Hg, if only A is taken initially.

After 10 min total pressure of reaction mixture is become 1600 mm of Hg.

Find total pressure of reaction mixture after 30 min. (in mm of Hg.)

Ans. (2200)

	$A_{(g)}$	\times	$2B_{(g)}$	$+$	$C_{(g)}$
$t = 0$	800		-		-
$t = (10 \text{ min})$	$800 - P$		$2P$		P
$P_T = 800 - P + 2P + P$					
	$= 800 + 2P = 1600$				
So $P = 400 \text{ mm}$					
So $t_{\frac{1}{2}} = 10 \text{ min}$					
$\frac{1}{2}$					
Given time 30 min					

So for 1st order Reaction $C_1 = \frac{C_0}{(2)^n}$

$$n = \frac{t}{t_{1/2}} = \frac{30}{10} = 3; n = \text{number of half life}$$

$$C_t = \frac{800}{(2)^3} = 100 \text{ mm of Hg}$$

So after 30 min $P = 700$ mm

$$P_A = 800 - 700 = 100, \quad P_B = 1400, \quad P_C = 700$$

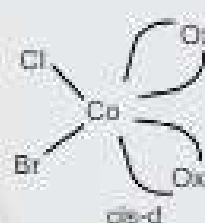
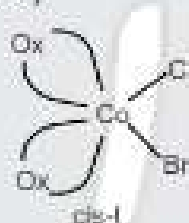
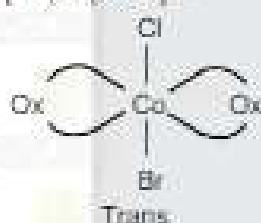
$$P_T \text{ of reaction mixture} = 100 + 1400 + 700 = 2200 \text{ mm of Hg}$$

11. Total number of stereoisomers of complex $[\text{Co}(\text{Ox})_2\text{ClBr}]^{-2}$ are

Ans. (3)

Sol. $[\text{Co}(\text{Ox})_2\text{ClBr}]^{-2}$

$[\text{M}(\text{AA})_2\text{ab}]$



12. Regarding tyndall effect-

Statement-I : The diameter of the dispersed particles is not much smaller than the wavelength of light used.

Statement-II : The refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.

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

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

(3) Both statement-I and statement-II are correct.

(4) Both statement-I and statement-II are incorrect.

Ans. (3)

13. Which of the following complex is more affected in presence of external magnetic field.

(1) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$

(2) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$

(3) $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$

(4) $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$

Ans. (2)

Sol.

Complex	Electronic configuration	No. of unpaired electrons
$[\text{Co}(\text{H}_2\text{O})_6]^{2+}$	$\text{Co}^{2+}: 3d^7 \Rightarrow t_{2g}^{5.2.2}, e_g^{2.0}$	3
$[\text{Co}(\text{H}_2\text{O})_6]^{3+}$	$\text{Co}^{3+}: 3d^6 \Rightarrow t_{2g}^{4.2.2}, e_g^{0.0}$	0
$[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$	$\text{Ni}^{2+}: 3d^8 \Rightarrow t_{2g}^{6.2.2}, e_g^{0.0}$	2
$[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$	$\text{Zn}^{2+}: 3d^{10} \Rightarrow t_{2g}^{6.4.4}, e_g^{2.2}$	0

Greater the number of unpaired electrons greater is the interaction in magnetic field.

17. When 1 g of M_2CO_3 react with HCl. It gives 0.01 mole of CO_2 gas. Find molar mass of M_2CO_3

Ans. (100)



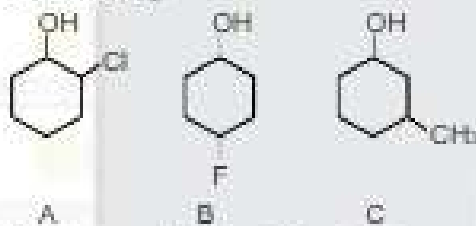
POAC on C-atom

Mole of $M_2CO_3 \times 1 = \text{Mole of } CO_2 \times 1$

$\frac{1}{(MM)} \times 1 = (0.01) \times 1$

molar mass of $M_2CO_3 = 100 \text{ g/mol}$

18. Statement-I



Acidic strength order is $A > B > C$.

Statement-II - Fluorine is more electron withdrawing group than chloro

- (1) Both 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) Both statement-I and statement-II are incorrect.

Ans. (1)

Sol. Chlorine at α carbon is more electron withdrawing -I than F at α carbon, where CH_3 is +I group.

19. 1-Bromopropane react with

A	Alc. KOH	i	Nitrile
B	KCN	ii	Ester
C	$AgNO_2$	iii	Alkene
D	CH_3COOAg	iv	Nitro alkane

- (1) A \rightarrow (i), B \rightarrow (ii), C \rightarrow (iv), D \rightarrow (iii)
- (2) A \rightarrow (iii), B \rightarrow (i), C \rightarrow (iv), D \rightarrow (ii)
- (3) A \rightarrow (iv), B \rightarrow (i), C \rightarrow (iii), D \rightarrow (ii)
- (4) A \rightarrow (ii), B \rightarrow (iv), C \rightarrow (i), D \rightarrow (iii)

Ans. (2)



Sol.





In above sequential reaction, reactant 'A' is

- Ans. (1) Salicylic acid (2) Aniline (3) Phenol (4) Benzene



21. Which of the following are green-house gases.

- (a) Water vapour (b) Ozone
(c) CO_2 (d) Molecular hydrogen
(1) a and b only (2) b and d only
(3) b and c only (4) a and d only

Ans. (1)

Sol. CH_4 , Water vapour, Nitrous oxide, CFCs, Ozone and CO_2 are green house gases.

22. Match the following :

- (a) High density polythene (i) Hexamethylenediamine + adipic acid
(b) Highly branched polymer (ii) $TiCl_4 + Al(Et)_3$
(c) Weak intermolecular force (iii) 2-Chloro-1, 3-butadiene
(d) H-Bonding (iv) Phenol and formaldehyde

- | | a | b | c | d |
|-----|-------|------|-------|------|
| (1) | (ii) | (iv) | (iii) | (i) |
| (2) | (iii) | (iv) | (ii) | (i) |
| (3) | (i) | (i) | (iii) | (iv) |
| (4) | (i) | (iv) | (iii) | (ii) |

Ans. (1)

Sol. (i) Formation of high density polythene uses Ziegler-Natta catalyst.
(ii) Phenol formaldehyde resin is highly branched.
(iii) Nylon-6,6 is formed by Hexamethylenediamine and adipic acid and it has inter molecular H-bonding due to amide group.

23. Naturally occurring amino acid which has only one basic functional group is :

- (1) Lysine (2) Arginine (3) Histidine (4) Asparagine

Ans. (4)

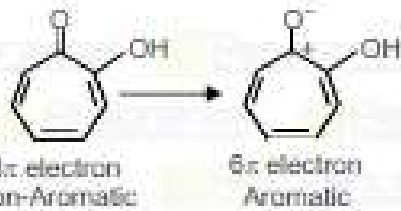
Sol. Lysine, Arginine and Histidine are basic amino acids with one extra basic functional group, whereas Asparagine has additional-amide group, which is not classified as basic functional group.

24. **Statement-I** : Tropolone has 8π electron and it is aromatic.

Statement-II : π electrons of CO are involved in aromaticity of tropolone.

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

Ans. (4)



Sol.

25. The product(P) formed from given reaction



Ans. (3)

Sol.

