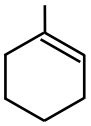
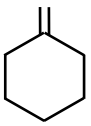
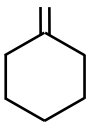
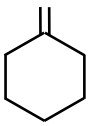
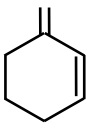
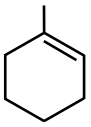
CHEMISTRY

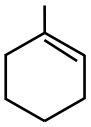
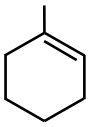
1. 

A and B are respectively

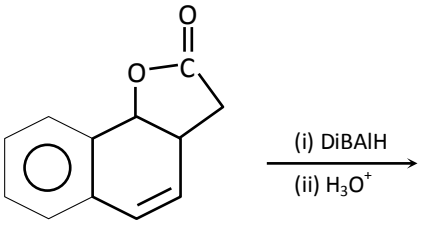
(1) A =  B = 

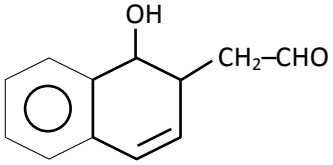
(2) A =  B = 

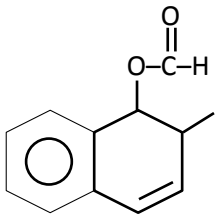
(3) A =  B = 

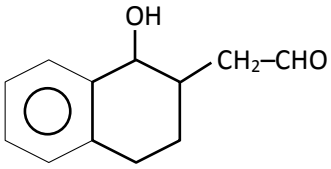
(4) A =  B = 

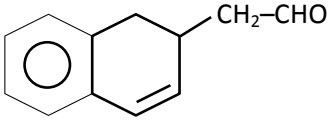
Ans. (1)

2. 

(1) 

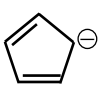
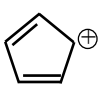
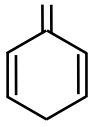
(2) 

(3) 

(4) 

Ans. (1)

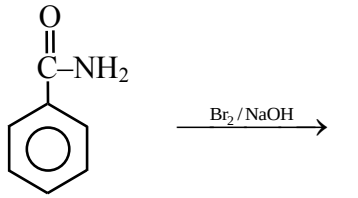
3. Which of the following will whose aromaticity

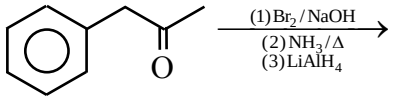
(a)  (b)  (c)  (d) 

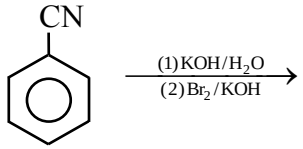
(1) a, b and c (2) a, and b (3) a and b (4) c and d

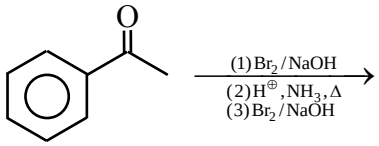
Ans. (2)

4. In which of the following hoffman's bromamide reaction does not take place?

(1) 

(2) 

(3) 

(4) 

Ans. (2)

5. **Assertion :** Acetone exists in enolic form < (0.15%) but acetyl acetone predominantly exist enolic form (>15%)

Reason : H-bonding in enolic form in acetyl acetone favour it while it is absent in acetone.

(1) Assertion is correct but reason is wrong

(2) Both assertion and reason are correct and reason is correct explanation of assertion

(3) Both assertion and reason are correct but reason is not correct explanation of assertion

(4) Assertion is wrong but reason is correct.

Ans. (2)

6. Antihistamines are

(1) Antacid and Anti allergic (2) Antacid and analgesic

(3) Anti allergic and analgesic (4) Antipyretic and disinfectants.

Ans. (1)

7. Which vitamin are stored in body for longer time?

(1) Thiamine and A (2) Vitamin D & A

(3) Ascorbic acid and thiamine (4) Ascorbic acid and D

Ans. (2)

8. In presence of O_3, which of the following pollution happens in day time?

(1) Global warming (2) Reducing smog (3) Oxidizing smog (4) Acid Rain

Ans. (3)

9. Chromatography is not affected by which of the following

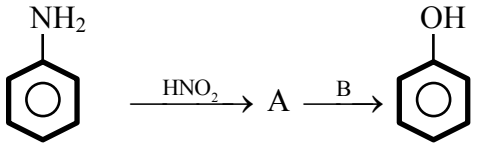
(1) Solubility of compound (2) Mobility of solvent

(3) Length of column (4) State of pure compound

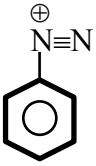
Ans. (4)

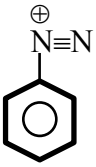
10. Lindlar catalyst is
(1) Partially deactivated palladised characoal
(2) Partially activated palladised characoal
(3) $HCl + ZnCl_2$
(4) $FeSO_4 + H_2O_2$

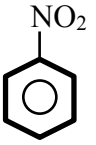
Ans. (1)

11. 

(A) and (B) is:

(1) A →  ; B → $NaOH + H_2O/\Delta$

(2) A →  ; B → H_2O/Δ

(3) A →  ; B → H_2O/Δ

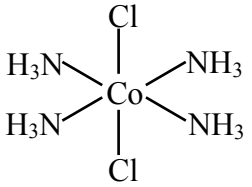
(4) A →  ; B → C_2H_5OH/Δ

Ans. (2)

12. Determine number of equivalents of ethylene diamine which are required to replace neutral ligands in trans $CoCl_3.4NH_3$

Ans. 2

Sol. trans, $CoCl_3.4NH_3$
trans $[Co(NH_3)_4Cl_2]Cl$



$2NH_3$ molecule will be replaced by 1 molecule of ethylene diamine.
$\therefore$ total 2 molecule of ethylene diamine are required to remove 4 molecule of NH_3

13. $H^+ + MnO_4^{2-} + C_2O_4^{2-} \longrightarrow Mn^{2+} + CO_2$

Determine coefficient of H^+ in balanced chemical equation

Ans. 16

Sol. $16H^+ + 2MnO_4^{2-} + 5C_2O_4^{2-} \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

14. 16 g of O_2, 28 g N_2 and 44 g of CO_2 is taken in a container of volume V at temperature T, Determine the total pressure

(1) $\frac{5}{2}\frac{RT}{V}$ (2) $\frac{3RT}{V}$ (3) $\frac{2RT}{V}$ (4) $\frac{RT}{V}$

Ans. (1)

Sol. $n_{O_2} = \frac{16}{32} = 0.5$

$n_{N_2} = \frac{28}{28} = 1$

$n_{CO_2} = \frac{44}{44} = 1$

Total moles = 2.5

$\Rightarrow P = \frac{nRT}{V} = \frac{(2.5)(R)T}{V} = \frac{5RT}{2V}$

15. Sulphur can be removed from ores by

(1) Roasting (2) Leaching (3) Smelting (4) Refining

Ans. (1)

Sol. Roasting: Ore is heated in the presence of air, sulphur present in the get oxidise into $SO_2(g)$.

$S + O_2 \longrightarrow SO_2\uparrow$

16. Determine molarity of 6.5 molal KOH solution having density 1.89 g/ml.

Ans. (9)

Sol. $m = \frac{1000 \times M}{1000d - M \times M_{Solute}}$

$6.5 = \frac{1000 \times M}{1890 - M \times 56}$

$M \approx 9$

17. S-1: Size of Bk^{3+} is smaller than that of Np^{3+}.

S-2 : This is the effect of lanthanide contraction.

(1) Both S1 and S2 are correct and S2 is a correct explanation of S1.

(2) Both S1 and S2 are correct but S2 is not correct explanation of S1.

(3) S1 is correct and S2 is incorrect.

(4) S1 is incorrect and S2 is correct.

Ans. (3)

Sol. Size of Actinide ions decreases continuously along the series due to Actinide contraction.

18. S-1 : H_2O_2 can act both as oxidising and reducing agent in basic medium.

S-2 : In hydrogen economy, energy is stored in the form of di-hydrogen.

(1) Only S-1 is true

(2) Only S-2 is true

(3) S-1 and S-2 both are true

(4) S-1 is true and S-2 is incorrect

Ans. (3)

19.

Column-I	**Column-II**
(A) Hypophosphorous acid	(P) +1
(B) Orthophosphophoric acid	(Q) +2
(C) Hypophosphoric acid	(R) +3
(D) Phosphorous acid	(S) +4
	(T) +5

(1) (A–P); (B–T) ; (C–S) ; (D–R)

(2) (A–T); (B–P) ; (C–S) ; (D–R)

(3) (A–R); (B–P) ; (C–S) ; (D–T)

(4) (A–P); (B–S) ; (C–T) ; (D–R)

Ans. (1)

Sol.

H_3PO_2	Oxidation number of P = +1
H_3PO_4	Oxidation number of P = +5
$H_4P_2O_6$	Oxidation number of P = +4
H_3PO_3	Oxidation number of P = +3

20. Determine boiling point (in ºC) of 10 molal solution of a salt AB_2 which is 10% dissociated in solution. [Given : $K_b = 0.5$]

Ans. (106ºC)

Sol. $\Delta T_b = i\, K_b\, m$

$i = 1 + 0.1\,(3 - 1)$

$i = 1.2$

$\Delta T_b = 1.2 \times 0.5 \times 10$

$\Delta T_b = 6$

$(T_b)_{solution} = 106ºC$

21. Two salts AX_2 & BX are having same $K_{sp} = 4 \times 10^{-12}$. Determine $\frac{S_{AX_2}}{S_{BX}}$ (where S represent solubility in pure water)

Ans. (50)

Sol. $AX_2(s) \rightleftharpoons A^{+2}(aq) + 2X^{-}(aq)$

Solubility : (x) mol/L x 2x

$\Rightarrow K_{sp} = 4 \times 10^{-12} = [A^{+2}][X^{-}]^2 = 4x^3$

$\Rightarrow x = 10^{-4} = S_{AX_2}$

$BX(s) \rightleftharpoons B^{+}(aq) + X^{-}(aq)$

Solubility : (y) mol/L y y

$K_{sp} = 4 \times 10^{-12} = [B^{+}][X^{-}] = y^2$

$y = 2 \times 10^{-6} = S_{BX}$

$\Rightarrow \frac{S_{AX_2}}{S_{BX}} = \frac{10^{-4}}{2 \times 10^{-6}} = 50$

22. A particular element crystallises in both BCC & simple cubic lattice. Determine edge length of cubic close packing unit cell if edge length of BCC unit cell is 27 Å.

Ans. (33)

Sol. for BCC unit cell, $\sqrt{3}\,a = 4r$

$\Rightarrow a = \frac{4r}{\sqrt{3}} = 27$

$r = \frac{27\sqrt{3}}{4}$

For CCP unit cell,

$a = 2\sqrt{2}r = \left(2\sqrt{2}\right)\left(\frac{27\sqrt{3}}{4}\right)$

$= 27\sqrt{\frac{3}{2}}$ Å.

$= 33.06$Å

23. S-1 : $E^{\circ}_{Ce^{+4}/Ce^{+3}} = 1.74$ Volt

S-2 : Ce^{+4} is more stable than Ce^{+3+}.

(1) Both S1 and S2 are correct and S2 is a correct explanation of S1.

(2) Both S1 and S2 are correct but S2 is not correct explanation of S1.

(3) S1 is correct and S2 is incorrect.

(4) S1 is incorrect and S2 is correct.

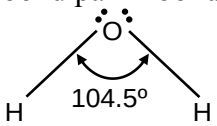
Ans. (3)

Sol. S-1 is correct but S-2 is incorrect since Ce^{+4} is strong oxidising agent.

24. **Statement-1 :** Bond angle of H_2O molecule 104.5º.
Statement-2 : Lone pair-lone pair repulsion is more than bond pair-bond pair repulsion.
(1) Both S1 and S2 are correct and S2 is a correct explanation of S1.
(2) Both S1 and S2 are correct but S2 is not correct explanation of S1.
(3) S1 is correct and S2 is incorrect.
(4) S1 is incorrect and S2 is correct.

Ans. (1)

Sol. Bond angle decreases since repulsion between lone pair-lone pair repulsion is more than bond pair – bond pair repulsion.



25. Determine ratio of wavelength of first line & third line of Balmer series in H-Spectrum.

Ans. (2)

Sol. Transition for 1st line of Balmer series $3 \rightarrow 2$

$$\frac{1}{\lambda} = R\left(\frac{1}{2^2} - \frac{1}{3^2}\right) = R\left(\frac{1}{4} - \frac{1}{9}\right) = \frac{5R}{36}$$

$$\lambda = \frac{36}{5R}$$

Transition for 3rd line of Balmer series $5 \rightarrow 2$

$$\frac{1}{\lambda} = R\left(\frac{1}{2^2} - \frac{1}{5^2}\right) = R\left(\frac{1}{4} - \frac{1}{25}\right) = \frac{21R}{100}$$

$$\lambda = \frac{100}{21R}$$

Ratio of wavelength is $\frac{\frac{36}{5R}}{\frac{100}{21R}} = 1.512$

26.

Processes	Substance produced
(A) Haber's process	(P) HNO_3
(B) Ostwald process	(Q) H_2SO_4
(C) Contact process	(R) Al
(D) Hall Heroult process	(S) NH_3

(1) $A \rightarrow S; B \rightarrow P; C \rightarrow Q; D \rightarrow R$ (2) $A \rightarrow P; B \rightarrow S; C \rightarrow Q; D \rightarrow R$
(3) $A \rightarrow P; B \rightarrow S; C \rightarrow R; D \rightarrow Q$ (4) $A \rightarrow S; B \rightarrow P; C \rightarrow R; D \rightarrow Q$

Ans. (1)