

1. 4 gram mixture of NaOH and Na₂CO₃ is equimolar, if it contain X gram of NaOH and Y gram of Na₂CO₃, then value of 'X' is

Ans. (1)

Sol. Given (i) $X + Y = 4$

$$(ii) \frac{X}{40} = \frac{Y}{106} \text{ [Equimolar]}$$

$$Y = \left[\frac{106}{40} \right] X$$

So $X + \frac{106}{40} X = 4$

$$X + 2.65X = 4$$

$$3.65X = 4$$

$$X = 1.096 \text{ gram.}$$

2. What is the correct relation between degree of freedom and γ

(1) $\left(1 + \frac{2}{F}\right)$

(2) $1 + \frac{F}{2}$

(3) $\frac{F}{2}$

(4) $\frac{1}{F}$

Ans. (1)

Sol. $\frac{C_p}{C_v} = \gamma$

$$\frac{\left(\frac{F}{2} + 1\right)R}{\left(\frac{F}{2}\right)R} = \gamma$$

$$\left(\frac{F}{2} + 1\right) = \gamma \left[\frac{F}{2}\right]$$

$$R = 1 + \frac{2}{F}$$

3. In an octahedral complex of Fe²⁺ in high spin state what is the Magnetic moment (Spin only)

(1) 4.89 BM

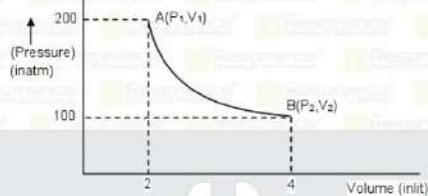
(2) 1.73 BM

(3) 0 BM

(4) 3.87 BM

Ans. (1)

4. An ideal gas change state from A to state B. Find work done by gas (in KJ) using following P-V diagram



Ans. (2.8)

Sol. As $P_1 V_1 = P_2 V_2$ So reversible isothermal process

$$W = -nRT \ln \left(\frac{V_2}{V_1} \right) = -P_1 V_1 \ln \left(\frac{V_2}{V_1} \right) = -200 \times 2 \ln \left(\frac{4}{2} \right)$$

$$= -2.303 \times 400 \log 2 = -2.303 \times 400 \times 0.3$$

$$= -276.36 \text{ atm} \times \text{lit} = -28002 \text{ J} = -2.8 \text{ KJ}$$

Work done by gas = 2.8 KJ

5. An ideal solution is prepared by mixing of A ($P_A^0 = 90$ torr) and B ($P_B^0 = 15$ torr) in which mole fraction of A in liquid phase is 0.6, Then mole fraction of B in vapour phase is $[X] \times 10^{-1}$. Then Volume of X is

Ans. (1)

Sol. $X_A + X_B = 1$ $\begin{cases} X_A = 0.6 \\ X_B = 0.4 \end{cases}$

$$P_{\text{Total}} = P_A^0 X_A + P_B^0 X_B$$

$$= [90] 0.6 + [15] 0.4 = 54 + 6 = 60 \text{ torr}$$

$$P_B = P_B^0 X_B = [P_{\text{Total}}] Y_B$$

$$Y_B = \frac{15 \times 0.4}{60} = 0.1$$

Ans. 1×10^{-1}

difference in unpaired electron = 2

7. What is the major use of dihydrogen (H₂)
- (1) In formation of HNO₃
 - (2) In synthesis of ammonia (NH₃)
 - (3) In fuel cell for generating electrical energy
 - (4) To reduce heavy metal oxides to metal

Ans. (2)

Sol. The largest single of dihydrogen in the synthesis of ammonia [NCERT page 287]

8. Cu²⁺ salt on reaction with KI forms
- (1) CuI
 - (2) Cu₂I₂
 - (3) CuI₂
 - (4) Does not react

Ans. (1)

Sol. $2\text{Cu}^{2+} + 4\text{KI} \longrightarrow 2\text{CuI(s)} + \text{I}_2 + 4\text{K}^+$

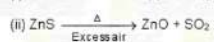
9. Which of the following species does not have magnetic moment (spin only) 1.73 BM

- (1) O₂⁻
- (2) O₂[⊖]
- (3) CuI
- (4) [Cu(NH₃)₄]Cl₂

Ans. (3)

Sol. $\mu = 1.73 \text{ BM}$ It means number of unpaired electron = 1

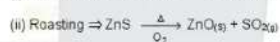
Species	Unpaired electron
O ₂ ⁻	1
O ₂ [⊖]	1
Cu ⁺	0
Cu ²⁺	1



Identify the calcination and roasting reaction from above

- (1) Both reaction are roasting
- (2) Both reaction are calcination
- (3) 1st reaction is calcination and 2nd reaction is roasting
- (4) 1st reaction is roasting and 2nd reaction is calcination.

Ans. (3)



11. For a reaction $\Delta G^\circ = -51.4 \text{ KJ/mol}$ and $\Delta H^\circ = 49.4 \text{ KJ/mol}$ at 300K, then value of ΔS° in J/K is

Ans (336)

Sol. $\Delta G^\circ = \Delta H^\circ - T \Delta S^\circ$

$-51.4 = 49.4 - T \Delta S^\circ$

$\Delta S^\circ = \left[\frac{49.4 + 51.4}{300} \right]$

$= 0.336 \text{ KJ/K} = 336 \text{ J/K}$

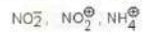
12. In 13th group from the element with electronic configuration $4s^2 4p^1$ if we move diagonally then the electronic configuration of 5th period element is:

- (1) $5s^2 5p^2$
- (2) $4s^2 4p^1$
- (3) $4s^2 4p^2$
- (4) $5s^2 5p^2$

Ans (4)

Sol. 13th 14th 15th

13. Identify the correct hybridisation of



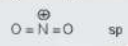
- (1) sp^2 , sp , sp^3 (2) sp , sp^2 , sp^3 (3) sp^3 , sp^2 , sp (4) sp^2 , sp^3 , sp

Ans (1)

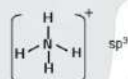
Sol. NO_2^-



NO_2^+



NH_4^+



14. Which of the following statement is incorrect about Enzymes

- (1) Enzymes are non-specific (2) Enzymes are temperature and pH specific
 (3) Almost all enzymes are proteins (4) Enzymes act as catalyst

Ans. (1)

Sol. Enzymes are highly specific in nature

15. A metal crystallize in FCC lattice in addition to 50% occupancy of tetrahedral voids, find the effective number of atoms of metal per unit cell.

Ans (8)

Sol. Metal crystallize in fcc unit cell
 Effective No. of Atoms = 4 [FCC] + 8 [TV]1/2
 Ans = 8

16. PCl_5 decompose according to 1st order reaction as $\text{PCl}_5(\text{g}) \longrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$.

Initially we take 50 moles of PCl_5 and after 120 minutes final moles of PCl_5 is 10 then the value of rate constant of reaction is $k \times 10^{-4}$ minutes. then value of 'k' is

number of atoms of metal per unit cell

Ans (8)

Sol. Metal crystallize in fcc unit cell
Effective No. of Atoms = 4 [FCC] + 8 [TV]1/2
Ans = 8

16. PCl_5 decompose according to 1st order reaction as $\text{PCl}_5(\text{g}) \longrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$
Initially we take 50 moles of PCl_5 and after 120 minutes final moles of PCl_5 is 10 then the value of rate constant of reaction is $x \times 10^{-4}$ minutes, then value of 'x' is

Ans (133)

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Sol. $\text{PCl}_5(\text{g}) \longrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$



$t = 0$ 50 moles

$t = 120$ minutes 10 mole

$$K = \frac{1}{t} \ln \left(\frac{a}{a-x} \right)$$

$$= \frac{2.303}{120} \log \left(\frac{50}{10} \right)$$

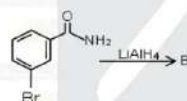
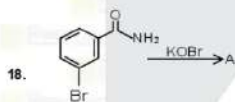
$$= \frac{2.303 \times 0.693}{120} = 0.0133 \text{ minutes}$$

$$= 133 \times 10^{-4} \text{ minutes}$$

17. Among H_2SO_4 and HNO_3 , which act as acid and base respectively during nitration ?

- (1) H_2SO_4 , HNO_3 (2) HNO_3 , H_2SO_4 (3) HNO_3 , HNO_3 (4) H_2SO_4 , H_2SO_4

Ans. (1)



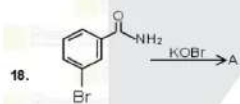
A and B are respectively



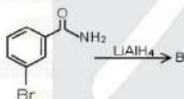
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- (1) H_2SO_4 , HNO_3 (2) HNO_3 , H_2SO_4 (3) HNO_3 , HNO_3 (4) H_2SO_4 , H_2SO_4

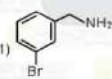
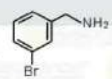
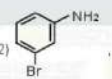
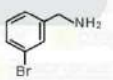
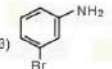
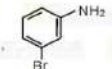
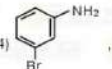
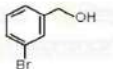
Ans. (1)



18.



A and B are respectively:

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

Ans. (2)

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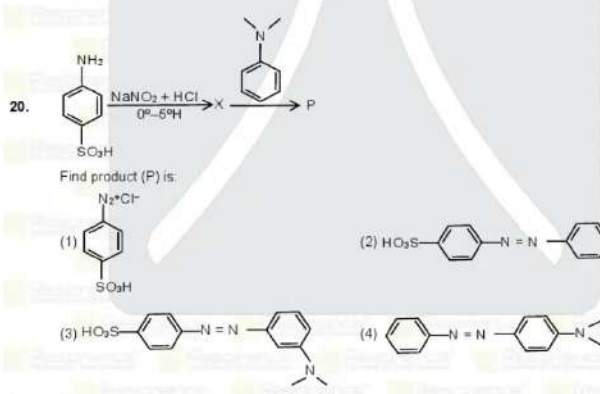
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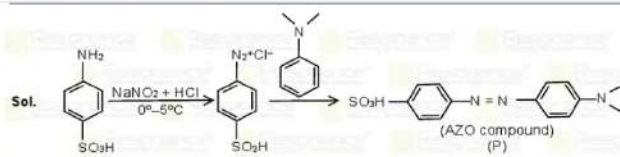
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19. Which gas retards photosynthesis?
 (1) CO (2) CFC (3) CO₂ (4) NO₂
Ans. (4)
Sol. Reason: NO₂ damage the leaves of plants and retard the photosynthesis.



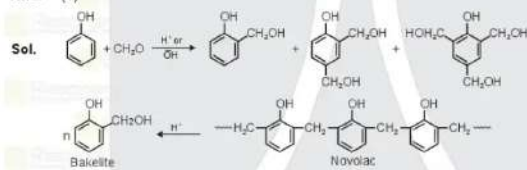
Ans. (2)



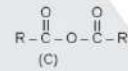
Diazotisation reaction

21. Which one is form as intermediate during the formation of Bakelite.
 (1) Novolac (2) Buna-S (3) Buna-N (4) Adipic acid

Ans. (1)



22. Rate of hydrolysis of given compounds ester, acid chloride, acid anhydride is:

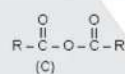


- (1) B > A > C (2) B > C > A (3) A > B > C (4) C > A > B

Ans. (2)

Sol. Rate of hydrolysis is directly proportional to δ positive charged present on carbon of C=O group.
 Rate of hydrolysis – Acid chloride > Acid anhydride > ester

23. Which of following compounds are metamers?



(1) B > A > C

(2) B > C > A

(3) A > B > C

(4) C > A > B

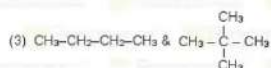
Ans. (2)

Sol. Rate of hydrolysis is directly proportional to δ positive charged present on carbon of C=O group.
Rate of hydrolysis – Acid chloride > Acid anhydride > ester

23. Which of following compounds are metamers?



(2) $\text{CH}_3-\text{CH}_2-\text{OH}$ & $\text{CH}_3-\text{O}-\text{CH}_2-\text{CH}_3$



Ans. (1)

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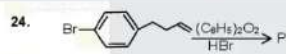
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Sol. Metamers are compounds which have different alkyl groups present along both side of polyvalent



Product (P) is



Ans. (2)





Sol. Here addition of HBr in presence of peroxide takes place according to antimarkovnikov rule.

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