

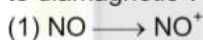
PART : CHEMISTRY

1. The ClF_5 at room temperature
 (1) Colourless liquid, Square pyramidal
 (2) Colourless gas, Bent T-shaped
 (3) Colourless gas, Pentagonal bipyramidal
 (4) Yellow green liquid, Bent T-shaped

Ans. (1)

Sol. ClF_5 colourless liquid Square pyramidal

2. In which of the following process, the bond order has increased and paramagnetic character has changed to diamagnetic ?



Ans. (1)

Sol.

Molecule / Ion	Electronic configuration	Bond order	Magnetic behaviour
N_2	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\sigma 2p_z)^2$	$1/2(10 - 4) = 3$	Diamagnetic
N_2^+	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\sigma 2p_z)^1$	$1/2(9 - 4) = 2.5$	Paramagnetic
O_2	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\sigma 2p_z)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\pi^* 2p_x^1 = \pi^* 2p_y^1)$	$1/2(10 - 6) = 2$	Paramagnetic
O_2^+	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\sigma 2p_z)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\pi^* 2p_x^1 = \pi^* 2p_y^0)$	$1/2(10 - 5) = 2.5$	Paramagnetic
O_2^{2-}	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\sigma 2p_z)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\pi^* 2p_x^2 = \pi^* 2p_y^2)$	$1/2(10 - 8) = 1.0$	Diamagnetic
NO	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\sigma 2p_z)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\pi^* 2p_x^1 = \pi^* 2p_y^0)$	$1/2(10 - 5) = 2.5$	Paramagnetic
NO^+	$(\sigma 1s)^2 (\sigma^* 1s)^2 (\sigma 2s)^2 (\sigma^* 2s)^2 (\pi 2p_x^2 = \pi 2p_y^2) (\sigma 2p_z)^2$	$1/2(10 - 4) = 3$	Diamagnetic

3. What happens when lyophilic sol is added to lyophobic sol ?

(1) Coagulation

(2) Lyophilic sol surrounded by lyophobic sol

(3) Dispersion of Lyophilic sol

(4) Lyophobic sol surrounded by Lyophilic sol

Ans. (4)

Sol. Lyophilic colloids have a unique property of protecting lyophobic colloids. When a lyophilic sol is added to the lyophobic sol, the lyophilic particles form a layer around lyophobic particles and thus protect the latter from electrolytes.

4. In a first order reaction the ratio of $T_{87.5\%}$ to $T_{50\%}$ is :

Ans. (3)

Sol. $T_{87.5\%} = 3 \times T_{50\%}$

5. Which is incorrect about borazine

(1) It is cyclic

(2) It has banana bond

(3) Delocalisation possible

(4) It reacts with water

Ans. (2)

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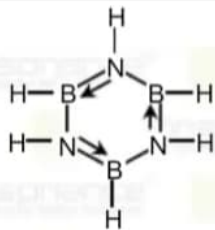
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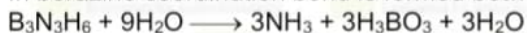
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Sol.



In borazine coordination bond is formed between B & N.



6. 12 g of compound is dissolved in 1000 mL solution has same osmotic pressure as that of 0.05 M glucose. The compound has empirical formula as CH_2O and if molecular formula is $(CH_2O)_n$. Find n :

Ans. (8)

Sol. $\pi_1 = \pi_2$

$$C_1 = C_2$$

$$\frac{12}{M} \times \frac{1000}{1000} = 0.05$$

$$M = \frac{12}{0.05} = 240$$

Molar mass of compound = 240

Empirical formula mass = 30

$$n = \frac{240}{30} = 8$$

7. Radius of 2nd orbit of He^+ is r_0 radius of 4th orbit of Be^{+3} is xr_0 find x :

Ans. (2)

Sol. $r \propto \frac{n^2}{Z}$

$$\frac{r_{He^+}}{r_{Be^{+3}}} = \frac{n_1^2 / Z_1}{n_2^2 / Z_2} = \frac{2^2 / 2}{4^2 / 4} = \frac{2}{4}$$

$$r_{Be^{+3}} = 2r_{He^+} = 2r_0$$

$$x = 2$$

8. Which Lanthanide element has more value of 3rd ionisation energy

(1) Lu & Yb

(2) Eu & Gd

(3) Eu & Yb

(4) Dy & Yb

Ans. (3)

Sol.

Element	Electronic configuration
Europium (Eu)	[Xe] 4f ⁷ 6s ²
Gadolinium (Gd)	[Xe] 4f ⁷ 5d ¹ 6s ²
Dysprosium (Dy)	[Xe] 4f ¹⁰ 6s ²
Ytterbium (Yb)	[Xe] 4f ¹⁴ 6s ²
Lutetium (Lu)	[Xe] 4f ¹⁴ 5d ¹ 6s ²

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9. An organic compound is burnt in excess of air then CO_2 obtained is 0.220 g & water obtained is 0.126 g if mass percentage of carbon is 24%, find percentage of hydrogen ?

Ans. (6)

Sol. $n\text{CO}_2 \Rightarrow \frac{0.220}{44} = 0.005 \longrightarrow n\text{C} = 0.005$

$n\text{H}_2\text{O} \Rightarrow \frac{0.126}{18} = 0.007 \longrightarrow n\text{H} = 0.014$

$m\text{C} = 0.06 \quad \frac{m\text{C}}{m\text{H}} = \frac{0.06}{0.014} = \frac{24}{x\%}$

$x\% = 5.6\%$

percentage of hydrogen = 5.6 % \approx 6 %

10. If in acidic medium 2 molecule of KMnO_4 is titrated with hexahydrated ferrous ammonium sulphate then how many water molecules will be required ?

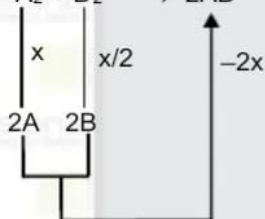
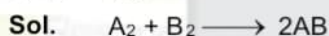
Ans. (8)



11. $\text{A}_2 + \text{B}_2 \longrightarrow 2\text{AB}; \Delta\text{H} = -200 \text{ J}$

A_2, B_2 & AB has bond enthalpy in the ratio as 1 : $\frac{1}{2}$: 1. Find Bond enthalpy of A_2

Ans. 400



$\Delta\text{H} = x + x/2 - 2x = -200$
 $= -x/2 = -200$
 $x = 400 \text{ J}$

12. Statement-I : Permutit method is better than synthetic resin method.

Statement-II : In Synthetic resin method Na^+ is soluble.

- (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. (2)

Sol. Theory Based.

13. Which is mismatched about purification ?

- (1) Ni - Mond process
 (2) Zn - Liquefaction
 (3) Ti - Van Arkel process
 (4) Cu - Electrolysis

Ans. (2)

Sol. Zn is refined mainly by distillation.

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14. Select incorrect match :
 (1) Wilkinson catalyst : $[\text{Rh}(\text{Ph}_3\text{P})_3 \text{Cl}]$ (2) Chlorophyll : Co
 (3) Photography : $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{3-}$ (4) Vitamin B₁₂ : Co

Ans. (2)

Sol. Chlorophyll is complex of Mg

15. When $\text{Be}(\text{OH})_2$ is added in $\text{Sr}(\text{OH})_2$ then select incorrect statement :
 (1) They will exhibit acid base reaction.
 (2) In the complex formed both Be & Sr are present.
 (3) Be is present in cationic part of complex.
 (4) Sr is present in cationic part of complex.

Ans. (3)

Sol. $\text{Sr}(\text{OH})_2 + \text{Be}(\text{OH})_2 \longrightarrow \text{Sr}[\text{Be}(\text{OH})_4] \text{ or } \text{SrBeO}_2$
base acid (amphoteric in nature)

16. Equal volume of 0.1M BaCl_2 & 0.2M NaF are mixed.
 find value of $[\text{Ba}^{+2}][\text{F}^-]^2/K_{\text{SP}}$?
 (K_{SP} of $\text{BaF}_2 = 10^{-6}$)

Ans. 1

Sol. If equal volume are mixed concentration becomes half
 $[\text{BaCl}_2] = 0.05\text{M} = [\text{Ba}^{+2}]$
 $[\text{NaF}] = 0.1\text{M} = [\text{F}^-]$
 $Q = [\text{Ba}^{+2}][\text{F}^-]^2 \Rightarrow 5 \times 10^{-3} > K_{\text{SP}}$
 so precipitation takes place & remaining solution is in equilibrium.

$$\frac{[\text{Ba}^{+2}][\text{F}^-]^2}{K_{\text{SP}}} = 1$$

17. Select incorrect statement :
 (1) Ionisation enthalpy decreases down the group.
 (2) NO & Al_2O_3 are amphoteric oxide.
 (3) Magnitude of electron gain enthalpy of Cl is more than F.
 (4) Electronegativity depends on how atom is bonded with it.

Ans. (2)

Sol. NO is neutral oxide.

18. Which of the following free Radical helps in depletion of ozone layer ?

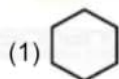
(1) NO^\bullet (2) Cl^\bullet (3) OH^\bullet (4) CH_3^\bullet

Ans. (2)

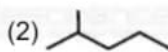
Sol. $\text{CF}_2\text{Cl}_2 \xrightarrow{\text{UV}} \dot{\text{C}}\text{Cl}(\text{g}) + \dot{\text{C}}\text{IF}_2\text{Cl}_2(\text{g})$

The chlorine radicals are continuously Regenerated and cause of breakdown of ozone layer.

19. $\text{CH}_3(\text{CH}_2)_4\text{CH}_3 \xrightarrow[\text{HCl}]{\text{Anhydrous AlCl}_3} \text{Major product.}$



(3) $\text{CH}_3-(\text{CH}_2)_4-\text{CH}_2-\text{Cl}$



(4) $\text{CH}_2(\text{Cl})-(\text{CH}_2)_4-\text{CH}_2(\text{Cl})$

Ans. (2)






Sol. This is Isomerisation reaction of alkane.

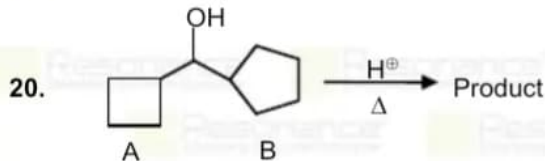
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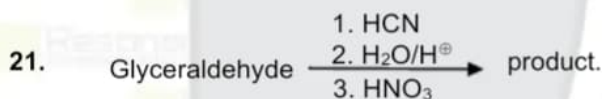
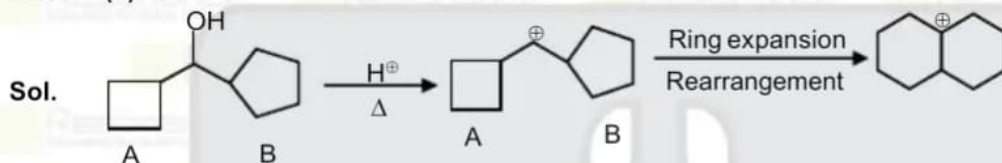
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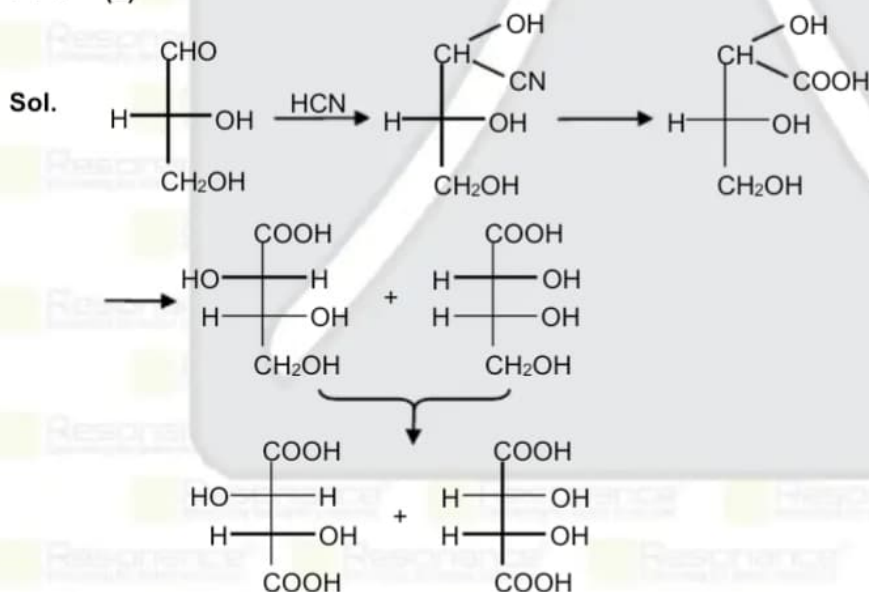
- (1) A and B both are 6-membered ring.
 (2) A and B both are 5-membered ring.
 (3) Only A is 5-membered ring.
 (4) One ring is 7-membered ring.

Ans. (1)



- (1) One product optically inactive and one product meso.
 (2) One product optically active and one product meso.
 (3) Both product are optically active.
 (4) Both product are optically inactive.

Ans. (2)



22. The correct match of the polymer and their code.

	List-I		List-II
(A)	Nylon-6	(i)	Natural rubber
(B)	Cis-1-4-poly isoprene	(ii)	Caprolactams
(C)	Vulcanised Rubber	(iii)	Cross linkage
(D)	Polychloroprene	(iv)	Neoprene.

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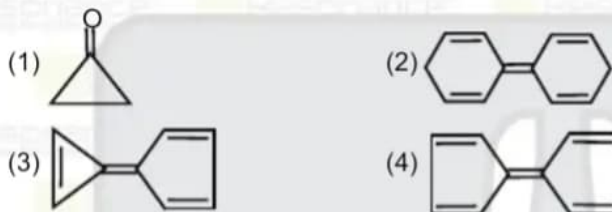
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- (1) (A) – (i) ; (B) – (iii) ; (C) – (ii) ; (D) – (iv)
 (2) (A) – (ii) ; (B) – (i) ; (C) – (iii) ; (D) – (iv)
 (3) (A) – (iii) ; (B) – (i) ; (C) – (iv) ; (D) – (i)
 (4) (A) – (i) ; (B) – (iv) ; (C) – (ii) ; (D) – (iii)

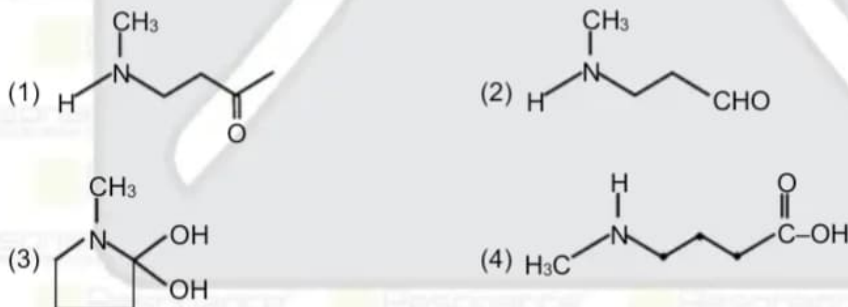
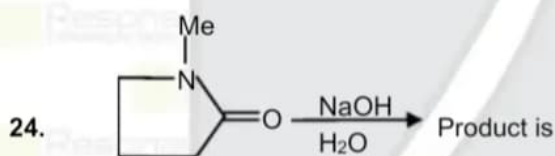
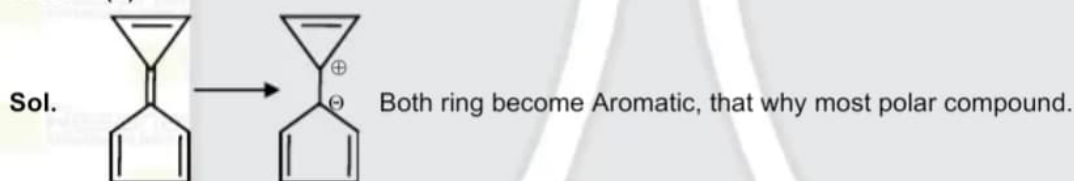
Ans. (2)

Sol. NCERT based

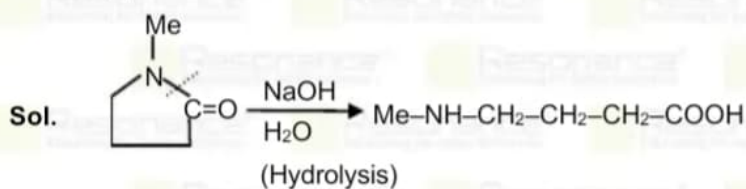
23. Which compound has maximum dipole moment?



Ans. (3)



Ans. (4)







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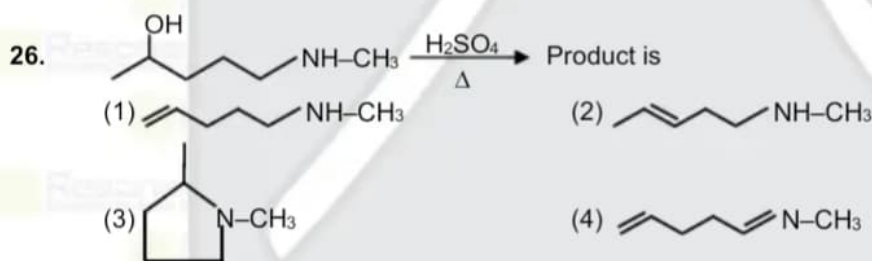
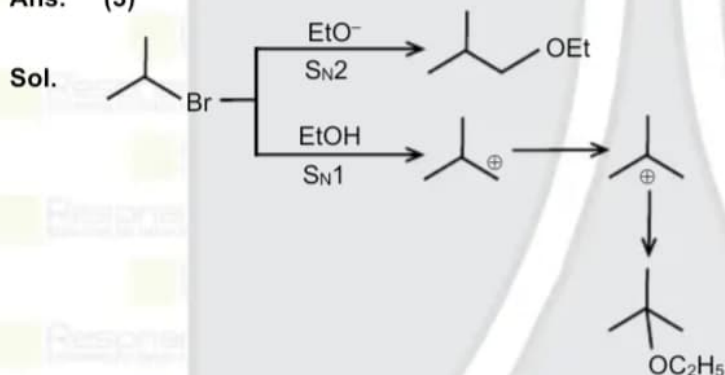
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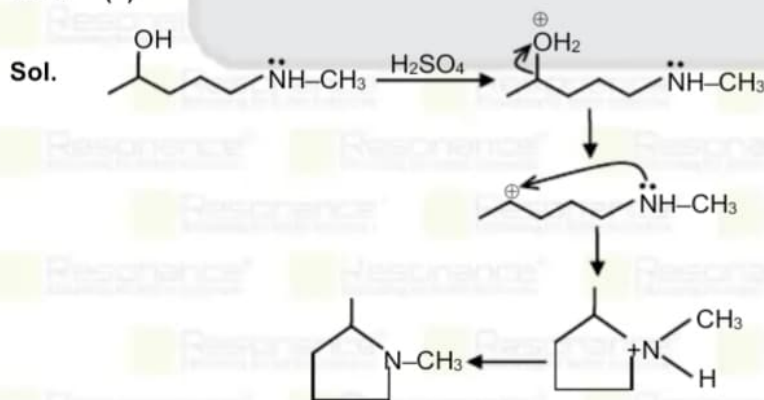
Correct option for product A and B

- (1) A – Isobutyl ethyl ether–S_N1
 B – Ethyl ter. Butyl ether–S_N1
 (2) A – Isobutyl ethyl ether–S_N2
 B – Ethyl ter. Butyl ether–S_N2
 (3) A – Isobutyl ethyl ether–S_N2
 B – Ethyl ter. Butyl ether–S_N1
 (4) A – Isobutyl ethyl ether–S_N1
 B – Ethyl ter. Butyl ether–S_N2

Ans. (3)



Ans. (2)







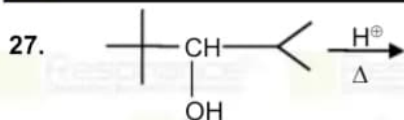
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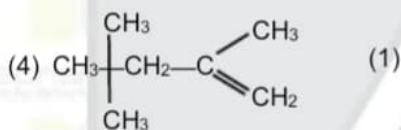
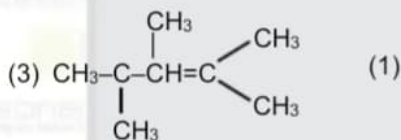
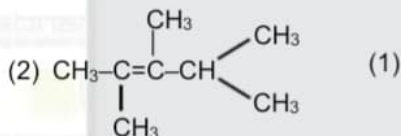
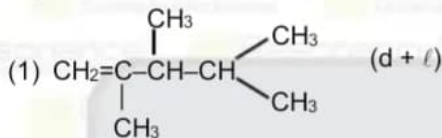
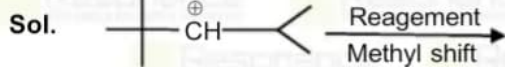
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How many products will form by 3° carbocation?

Ans. (5)



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