

PART : CHEMISTRY

1. Which of the following has sp^3 hybridisation ?

- (1) ClO_3^- (2) NO_2 (3) ClO_2 (4) BF_3

Ans. (1)

Sol.

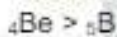
(1)	(2)	(3)	(4) $BF_3(sp^2)$
SN = 4 sp^3	SN = 3 sp^2 Odd electron gets delocalised in 3d	SN = 3 sp^2 no 2d subshell so odd electron does not get delocalised	

2. Which of the following is the correct order of first ionization enthalpy ?

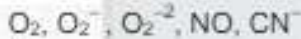
- (1) $Be < B < O < F < N$ (2) $B < Be < O < N < F$
(3) $B < Be < N < F < O$ (4) $Be < B < N < F < O$

Ans. (2)

Sol. Exception of IE

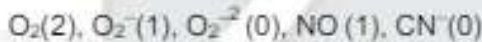


3. Amongst the following how many of the following have one unpaired electron ?



Ans. (2)

Sol. According to MOT



4. Determine molarity of a NaCl solution in which 5.85 gram of it is present in 500 ml solution.

- (1) 0.2 M (2) 2 M (3) 0.3 M (4) 3 M

Ans. (1)

Sol.

$$[NaCl] = \frac{5.85 / 58.5 \text{ mol}}{500 / 1000L}$$

$$= 0.2 \text{ M}$$

5. Amongst the following which shows only one type of oxidation state ?

- (1) Ti (2) Sc (3) Co (4) Ni

Ans. (2)

Sol. Sc show only +3 oxidation state having Ar noble gas configuration.

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6. De-Broglie wave length of e^- in fourth Bohr's orbit of H-atom is _____ πa_0 .

Fill in the blank. (Here a_0 is radius of first Bohr's orbit in H-atom)

Ans. (8)

Sol. $mvr = \frac{nh}{2\pi}$

or $2\pi r = \frac{nh}{mv}$ or $n\lambda = 2\pi r$

or $4\lambda = 2\pi r_4$ or $4\lambda = 2\pi \cdot 4^2 a_0$

or $\lambda = 8\pi a_0$

7. Amongs the following which has maximum dipole moment ?

- (1) NH_3 (2) PCl_5 (3) NF_3 (4) XeF_2

Ans. (1)

Sol. $\mu : \text{NH}_3 > \text{NF}_3$

As lone pair exerts dipole moment outwards from molecule

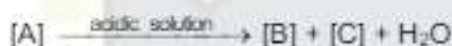
For PCl_5 & XeF_2 $\mu = 0$

8. In the precipitation of the iron group III of qualitative analysis ammonium chloride is added before adding ammonium hydroxide to -

- (1) Prevent interference by phosphate ions
 (2) Increase conc. of Cl^- ions
 (3) Decrease conc. of OH^- ions
 (4) Increase conc. of NH_4^+ ions

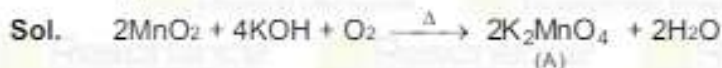
Ans. (3)

Sol. By common ion effect, concentration of OH^- ions decreases so that higher group metal hydroxide does not ppt.



Determine sum of spin only magnetic moment of [B] & [C] ? Give your answer to nearest integer.

Ans. (4)








In KMnO_4 & MnO_2 number of unpaired electrons is 0 & $3(\sqrt{15} \text{ BM})$

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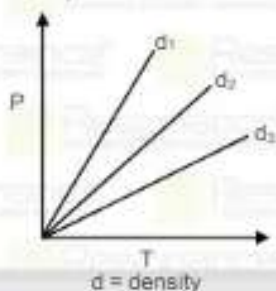
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10. Following graph between P and T are given -

Choose the correct option :



(1) $d_1 > d_2 > d_3$

(2) $d_1 < d_2 < d_3$

(3) $d_1 = d_2 = d_3$

(4) $d_2 > d_1 > d_3$

Ans. (1)

Sol. $PV = nRT$

$$PV = \frac{W}{M} RT$$

$$P = \frac{W}{V} \frac{RT}{M}$$

$$P = \frac{dR}{M} T$$

$$y = mx$$

$$\text{slope} = \frac{dR}{M}$$

$$d_1 > d_2 > d_3$$

11. If EMF of hydrogen electrode at 25°C is zero in pure water then pressure of H₂ in bar:

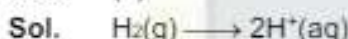
(1) 10^{-14}

(2) 10^{-7}

(3) 1

(4) 0.5

Ans. (1)



$$E = E^\circ - \frac{0.059}{n} \log Q$$

$$E = \frac{0.0591}{2} \log \frac{P_{H_2}}{[H^+]^2}$$

$$0 = \frac{0.0591}{2} \log \frac{P_{H_2}}{[H^+]^2}$$

$$\log \frac{P_{H_2}}{[H^+]^2} = 0 \Rightarrow \log \frac{P_{H_2}}{[H^+]^2} = \log 1$$

$$\frac{P_{H_2}}{[H^+]^2} = 1$$

$$\Rightarrow P_{H_2} = [H^+]^2$$

for pure water $[H] = 10^{-7} M$

$$P_{H_2} = 10^{-14} \text{ bar}$$

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12. How many of the following have even number of unpaired electrons ?

- (1) $[V(H_2O)_6]^{+3}$ (2) $[Cr(H_2O)_6]^{+3}$ (3) $[Ni(H_2O)_6]^{+2}$ (4) $[Fe(H_2O)_6]^{+3}$

Ans. (1)

Sol. As H_2O is weak field ligand, so number of unpaired electrons will be same as central metal ion in the complex



13. Amongst the following which is correct order of field strength of ligands as per spectrochemical series ?

- (1) $CO > NH_3 > H_2O > I^-$ (2) $C_2O_4^{2-} > CN^- > I^- > NH_3$
(3) $Cl^- > en > CO > CN^-$ (4) $OH^- > C_2O_4^{2-} > NH_3 > en$

Ans. (1)

Sol. Theory based

14. For the reaction $C_2H_6 \rightarrow C_2H_4 + H_2$ the reaction enthalpy $\Delta_r H$ $kJ\ mol^{-1}$

[Round off to the nearest integer]

Given bond enthalpies in $kJ\ mol^{-1}$

C-C : 347, C=C : 611, C-H : 414, H-H : 436

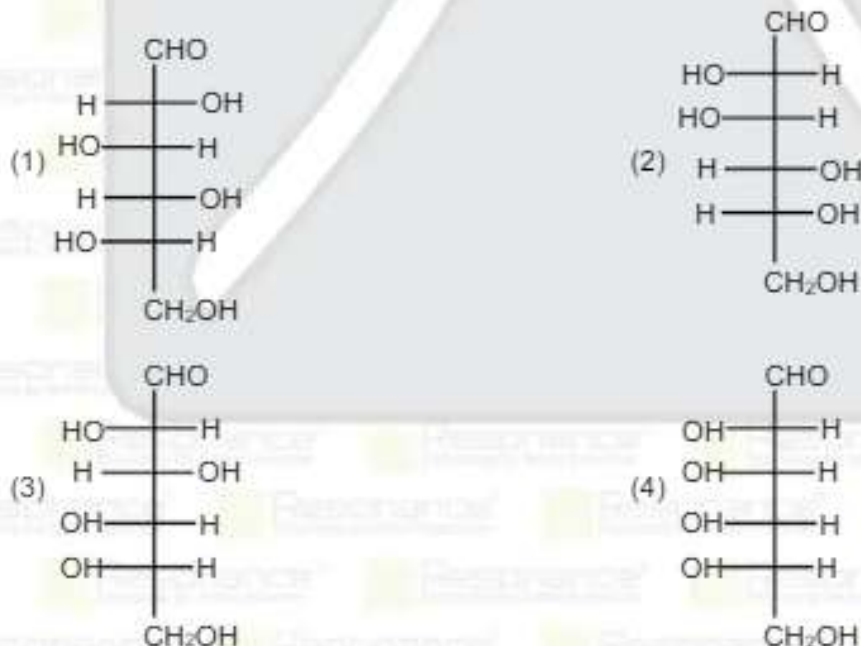
Ans. (128)

Sol. $\Delta_r H = \text{sum of bond diss E} - \text{sum of bond formation E}$

$$\Delta_r H = 347 + 6 \times 414 - (611 + 4 \times 414 + 436)$$

$$= 128\ kJ\ mol^{-1}$$

15. Which of the following correct structure of L-Glucose.



Ans. (1)

Sol.

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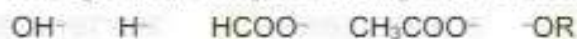
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16. Among the following decreasing order of basic strength will be-



(I) (II) (III) (IV) (V)

(1) II > V > III > I > IV

(2) II > V > I > IV > III

(3) III > IV > I > V > II

(4) V > I > IV > II > III

Ans. (2)

Sol. Maximum strongest base = H^-

RO^- is stronger base than OH^-

$\text{V} > \text{I}$

ROH ever weaker acid

∴

Conjugate base strong.

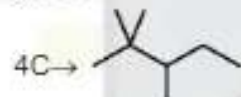
17. The number of different structural isomers of molecular formula C_7H_{16}

Ans. (9)

Sol. $\text{DU} = n + 1 \left[\frac{\text{H} + \text{X} - \text{N}}{2} \right]$

$\text{DU} = 8 - 8 = 0$

i.e. Saturated compound.



18. **Statement-1** : Aldol condensation is proceed due to acidity of alpha hydrogen.

Statement-2 : PhCHO and ethanal will not give cross Aldol product.

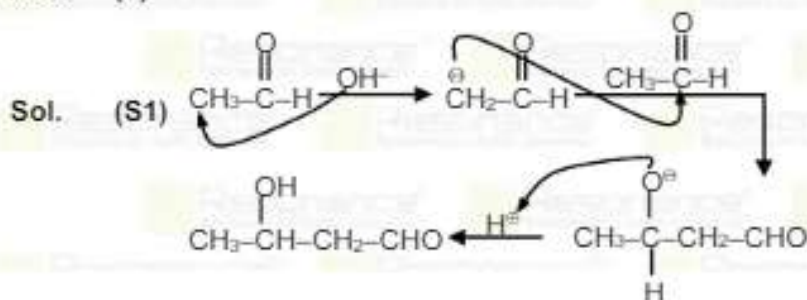
(1) Both **Statement-1** & **Statement-2** are correct.

(2) Both **Statement-1** & **Statement-2** are incorrect.

(3) **Statement-1** is correct whereas **Statement-2** is incorrect.

(4) Both **Statement-1** and **Statement-2** are incorrect.

Ans. (2)



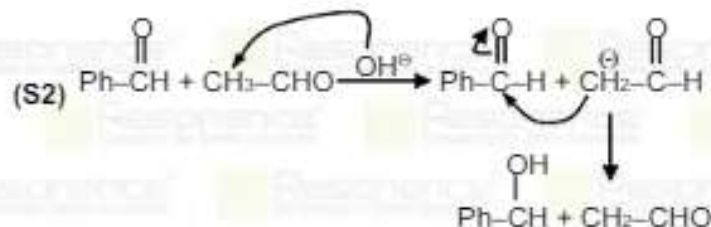
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Cross Aldol condensation occur in this reaction

19. Which of the following nitrogen ion containing compound to not give lassaigan's test?

- (1) Hydrazine (2) Phenyl hydrazine
 (3) Glycene (4) Urea

Ans. (1)

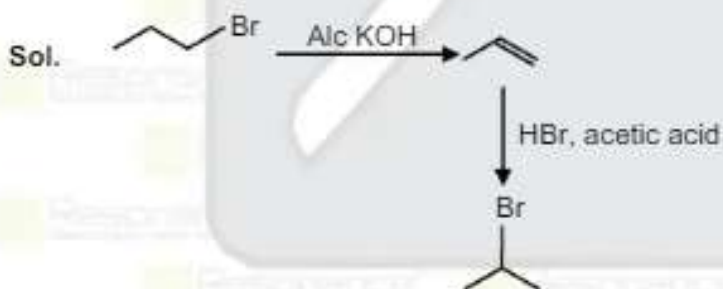
Sol. Hydrazine NH_2-NH_2 is a inorganic compound (carbon absent then how to make NaCN) then this test is not possible.



Find the relation between (P) and (B)

- (1) Diastereomer (2) Enantiomer
 (3) Positional isomer (4) Mesomer

Ans. (3)








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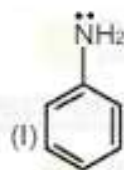
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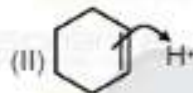
21. Match the following:

List-I

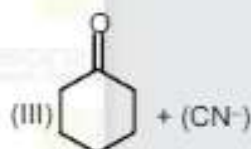
List-II



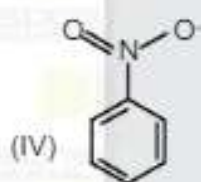
(P) + R



(Q) - E



(R) + E



(S) - R

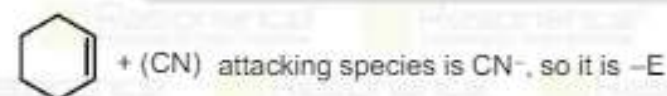
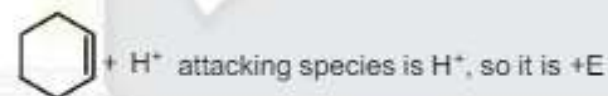
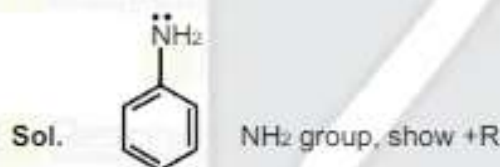
(1) (I) - (P), (II) - (R), (III) - (Q), (IV) - (S)

(2) (I) - (R), (II) - (P), (III) - (Q), (IV) - (S)

(3) (I) - (R), (II) - (P), (III) - (S), (IV) - (Q)

(4) (I) - (P), (II) - (R), (III) - (S), (IV) - (Q)

Ans. (1)








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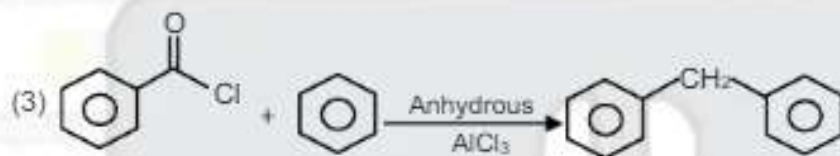
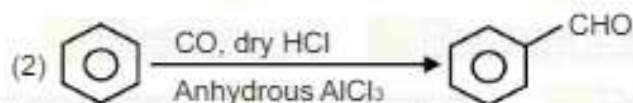
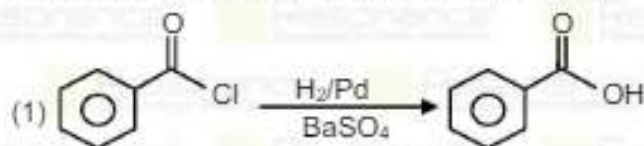
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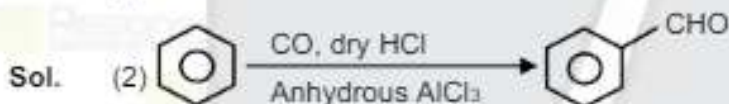
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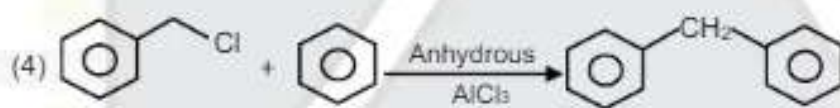
22. How many of the following reaction are correct?



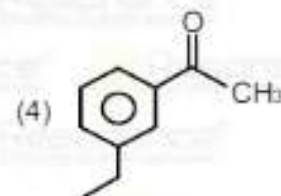
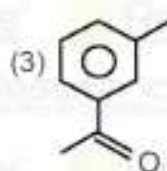
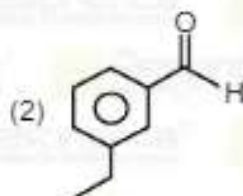
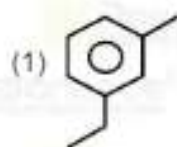
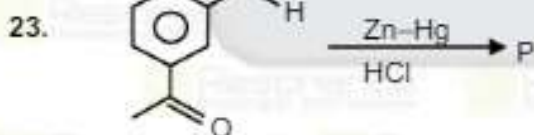
Ans. (2)



Gatterman koch reaction



Friedel-Crafts reaction








Ans. (1)

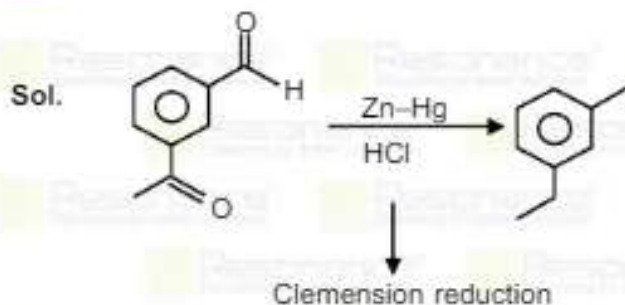
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Now, (1) is correct option.

24. The correct formula sodium Nitroprusside.

(1) $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$

(2) $\text{Na}_2[\text{Fe}(\text{CN})_3\text{NO}]$

(3) $\text{Na}_2[\text{Fe}(\text{CN})_4\text{NO}]$

(4) $\text{Na}_2[\text{Fe}(\text{CN})_2\text{NO}]$

Ans. (1)

Sol. The correct formula sodium Nitroprusside is $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}]$.

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