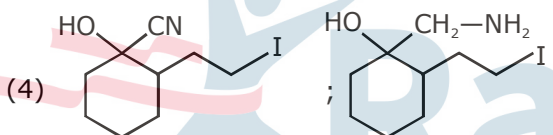
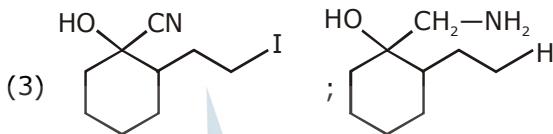
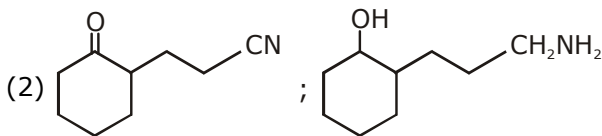
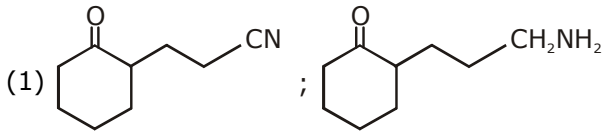
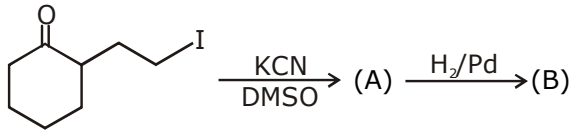


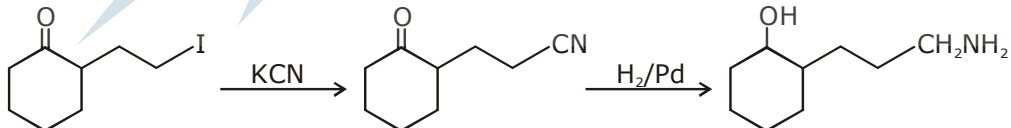
CHEMISTRY
JEE-MAIN (April-Attempt) 9
April (Shift-2) Paper

SECTION - A

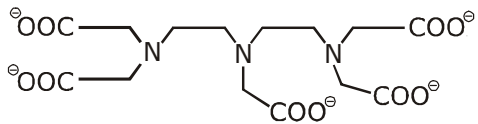
1. The major products A and B for the following reactions are, respectively :



Sol. 2



2. The maximum possible denticities of a ligand given below towards a common transition and inner-transition metal ion, respectively, are :



- (1) 8 and 8 (2) 6 and 6 (3) 6 and 8 (4) 8 and 6

Sol. 3

3. HF has highest boiling point among hydrogen halides, because it has :
 (1) lowest dissociation enthalpy (2) strongest van der Waal's interactions
 (3) lowest ionic character (4) strongest hydrogen bonding

Sol. 4

HF has highest boiling point among HX due to H-bonding

4. 10 mL of 1 mM surfactant solution forms a monolayer covering 0.24 cm² on a polar substrate. If the polar head is approximated as a cube, what is its edge length ?
 (1) 0.1 nm (2) 2.0 pm (3) 2.0 nm (4) 1.0 pm

Sol. 2

$$M = \frac{n}{V}$$

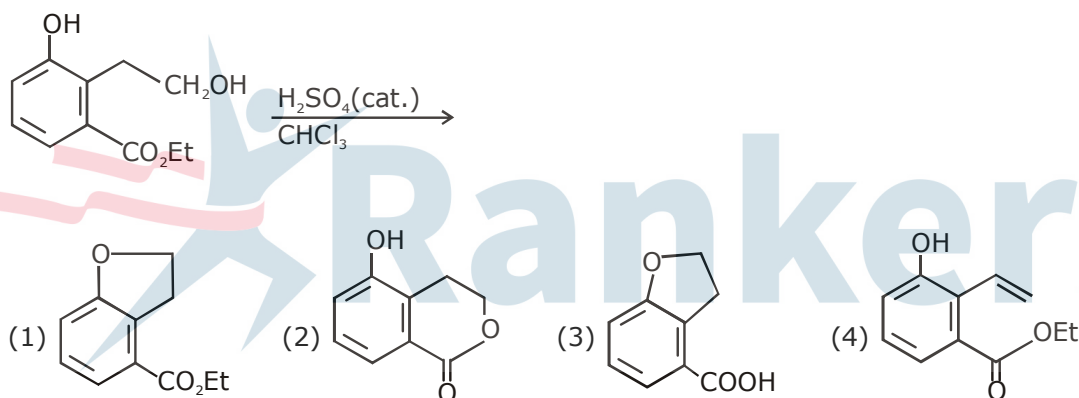
$$n = M \times V = 10^{-3} \times \frac{10}{100} = 10^{-5}$$

$$\therefore 1 \text{ mole occupies } 0.24 \times 10^{-4} \times 10^5 \text{ m}^2$$

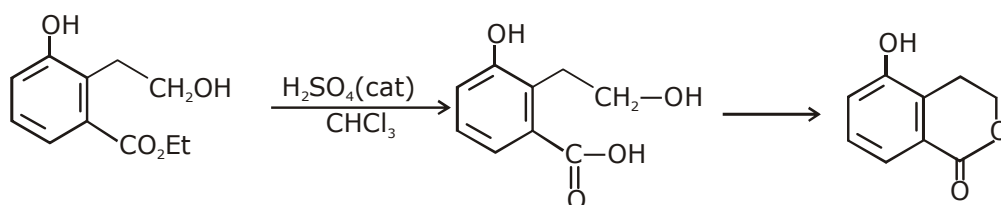
$$1 \text{ molecule occupies } \frac{2.4}{6 \times 10^{23}} = 0.4 \times 10^{-23} \text{ m}^2$$

$$\therefore \text{edge length} = \sqrt[3]{0.4 \times 10^{-23}} = 2 \times 10^{-12} \text{ m} = 2.0 \text{ pm}$$

5. The major product of the following reaction is :



Sol. 2



6. What would be the molality of 20% (mass/mass) aqueous solution of KI ?
 (molar mass of KI = 166 g mol⁻¹)
 (1) 1.48 (2) 1.51 (3) 1.08 (4) 1.35

Sol. 2

20 gm of solute — 100 gm solution
 20 gm of solute — 80 gm of solvent

$$\therefore m = \frac{20/166}{80} \times 1000 = 1.506$$

7. Noradrenaline is a / an :
(1) Antacid (2) Antidepressant
(3) Neurotransmitter (4) Antihistamine

Sol. 2
Noradrenaline is a antidepressant

8. The amorphous form of silica is :
(1) Cristobalite (2) tridymite (3) kieselguhr (4) quartz

Sol. 3

9. Among the following species, the diamagnetic molecule is :
(1) CO (2) O₂ (3) NO (4) B₂

Sol. 1
Follow MOT

10. The correct statements among I to III regarding group 13 element oxides are,
(I) Boron trioxide is acidic
(II) Oxides of aluminium and gallium are amphoteric
(III) Oxides of indium and thallium are basic
(1) (II) and (III) only (2) (I) and (III) only
(3) (I) and (II) only (4) (I), (II) and (III)

Sol. 4
fact

11. **Assertion :**
For the extraction of iron, haematite ore is used

Reason :

Haematite is a carbonate ore of iron.

- (1) Only the assertion is correct.
(2) both are assertion and reason are correct and the reason is the correct explanation for the assertion.
(3) Both the assertion and reason are correct, but the reason is not the correct explanation for the assertion.
(4) Only the reason is correct.

Sol. 1
fact

Fe₃O₄ haematite

12. In the following reaction

Carbonyl compound + MeOH $\xrightleftharpoons{\text{HCl}}$ acetal, rate of the reaction is the highest for :

- (1) Acetone as substrate and methanol in stoichiometric amount
(2) Acetone as substrate and methanol in excess
(3) Propanal as substrate and methanol in excess
(4) Propanal as substrate and methanol in stoichiometric amount

Sol. 3

Carbonyl compound + CH₃-OH $\xrightleftharpoons{\text{HCl}_3}$ Acetal
Propanal as substrate & methanol is in excess

13. A solution of $\text{Ni}(\text{NO}_3)_2$ is electrolysed between platinum electrodes using 0.1 Faraday electricity. How many mole of Ni will be deposited at the cathode ?

- (1) 0.05 (2) 0.20 (3) 0.10 (4) 0.15

Sol. 1

Equivalent of Ni^{2+} = No. of faradays

$$\Rightarrow n \times nf = 0.1$$

$$\Rightarrow n = \frac{0.1}{2} = 0.05$$

14. The one that is not a carbonate ore is :

- (1) bauxite (2) siderite (3) calamine (4) malachite

Sol. 1

Bauxite is oxide ore, rest all are carbonate ore

15. Which one of the following about an electron occupying the 1s orbital in a hydrogen atom is incorrect ? (The Bohr radius is represented by a_0).

- (1) The total energy of the electron is maximum when it is at a distance a_0 from the nucleus.
(2) The electron can be found at a distance $2a_0$ from the nucleus.
(3) The probability density of finding the electron is maximum at the nucleus.
(4) The magnitude of the potential energy is double that of its kinetic energy on an average.

Sol. 1

Maximum e^- density that is energy is maximum at the nucleus

16. At a given temperature T, gases Ne, Ar, Xe and Kr are found to deviate from ideal gas behaviour.

Their equation of state is given as $p = \frac{RT}{V-b}$ at T.

Here, b is the van der Waals constant. Which gas will exhibit steepest increase in the plot of Z (compression factor) vs p ?

- (1) Ar (2) Kr (3) Ne (4) Xe

Sol. 4

$p(V - b) = RT$ For a real gas

$$\Rightarrow PV - Pb = RT$$

$$\Rightarrow PV = Pb + RT$$

$$\Rightarrow \frac{PV}{RT} = \frac{Pb}{RT} + \frac{RT}{RT}$$

$$\Rightarrow Z = 1 + \frac{Pb}{RT}$$

$$\text{Slope} = \frac{b}{RT}$$

\therefore Xe

larger is the size larger is the value of b.

17. Hinsberg's reagent is :

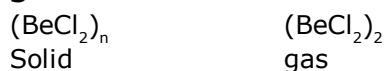
- (1) SOCl_2 (2) $\text{C}_6\text{H}_5\text{COCl}$ (3) $(\text{COCl})_2$ (4) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$

Sol. 4

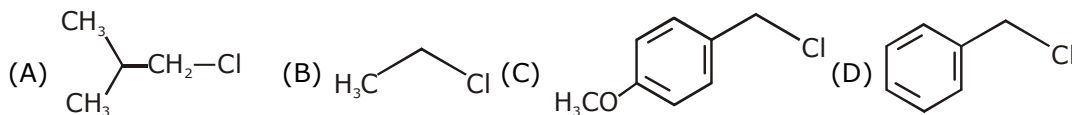
$\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ is a hinsberg's reagent

18. The structures of beryllium chloride in the solid state and vapour phase, respectively, are :
 (1) dimeric and chain (2) dimeric and dimeric
 (3) chain and dimeric (4) chain and chain

Sol. 3



19. Increasing order of reactivity of the following compounds for $\text{S}_{\text{N}}1$ substitution is :

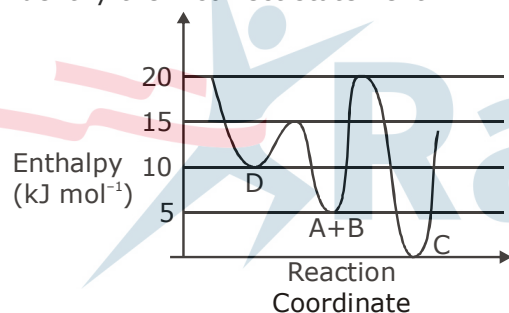


- (1) (B) < (C) < (D) < (A) (2) (B) < (C) < (A) < (D)
 (3) (A) < (B) < (D) < (C) (4) (B) < (A) < (D) < (C)

Sol. 4

Rate of $\text{S}_{\text{N}}1 \propto$ stability of carbocation
 $\text{B} < \text{A} < \text{D} < \text{C}$

20. Consider the given plot of enthalpy of the following reaction between A and B.
 $\text{A} + \text{B} \rightarrow \text{C} + \text{D}$
 Identify the incorrect statement.



- (1) D is kinetically stable product
 (2) Activation enthalpy to form C is 5 kJ mol^{-1} less than that to form D.
 (3) C is the thermodynamically stable product.
 (4) Formation of A and B from C has highest enthalpy of activation.

Sol. 2

From graph

21. During compression of a spring the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. The change in internal energy, ΔU (in kJ) is :

- (1) -8 (2) 12 (3) -12 (4) 8

Sol. 4

$$\Delta E = q + w$$

$$= -2 + 10 = 8 \text{ kJ}$$

22. The maximum number of possible oxidation states of actinoides are shown by :

- (1) neptunium (Np) and plutonium (Pu) (2) nobelium (No) and lawrencium (Lr)
 (3) actinium (Ac) and thorium (Th) (4) berkelium (Bk) and californium (Cf)

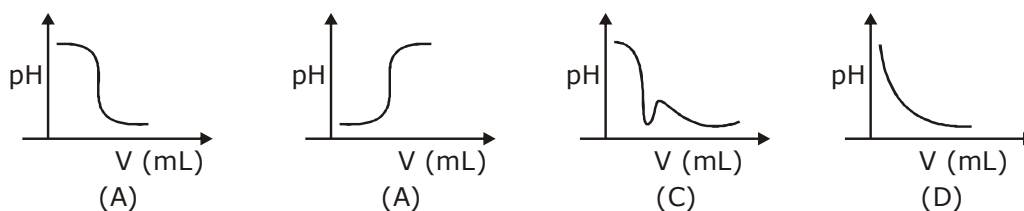
Sol. 1

$\text{Np} \Rightarrow$ (upto 7)

23. The layer of atmosphere between 10 km to 50 km above the sea level is called as :
 (1) stratosphere (2) mesosphere (3) thermosphere (4) troposphere

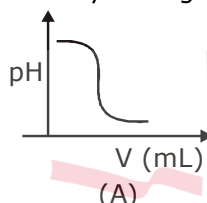
Sol. 1
 10 to 50 km is called as stratosphere

24. In an acid-base titration, 0.1 M HCl solution was added to the NaOH solution of unknown strength. Which of the following correctly shows the change of pH of the titration mixture in this experiment ?



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

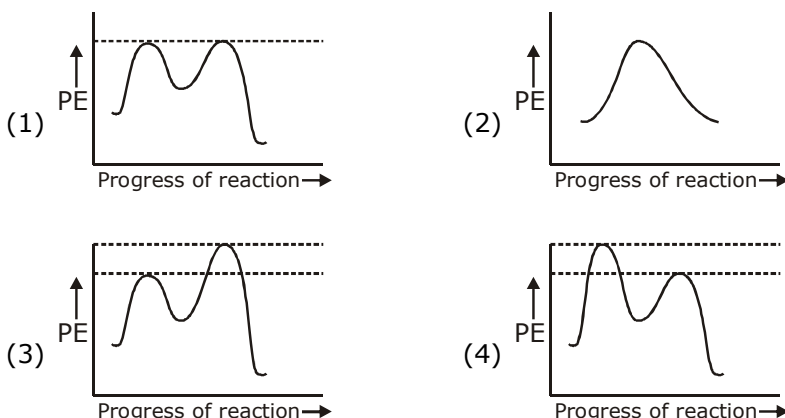
Sol. 4
 Initially strong base is given in which strong acid is added causing sharp decrease in pH



25. Molal depression constant for a solvent is $4.0 \text{ K kg mol}^{-1}$. The depression in the freezing point of the solvent for 0.03 mol kg^{-1} solution of K_2SO_4 is :
 (Assume complete dissociation of the electrolyte)
 (1) 0.18 K (2) 0.24 K (3) 0.36 K (4) 0.12 K

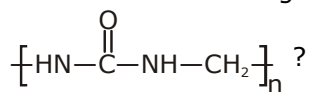
Sol. 3
 $\Delta T_f = i k_f m = 3 \times 4 \times 0.03 = 0.36 \text{ K}$

26. Which of the following potential energy (PE) diagrams represents the $\text{S}_{\text{N}}1$ reaction ?



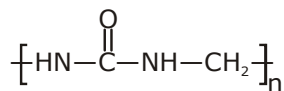
Sol. 4
 In $\text{S}_{\text{N}}1$ reaction, first step is the RDS. Hence

27. Which of the following compounds is a constituent of the polymer ?



- (1) Formaldehyde (2) N-Methyl urea (3) Ammonia (4) Methylamine

Sol. 2



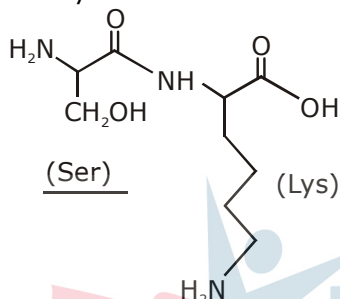
N-methyl urea

28. The peptide that gives positive ceric ammonium nitrate and carbylamine tests is :

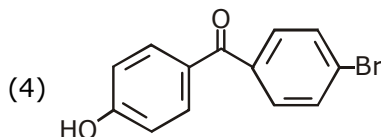
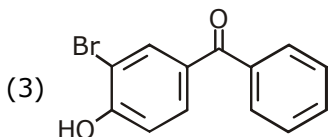
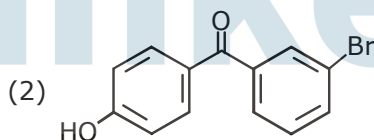
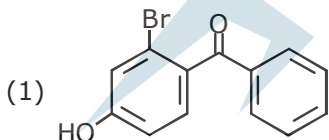
- (1) Lys-Asp (2) Gln-Asp (3) Ser-Lys (4) Asp-Gln

Sol. 3

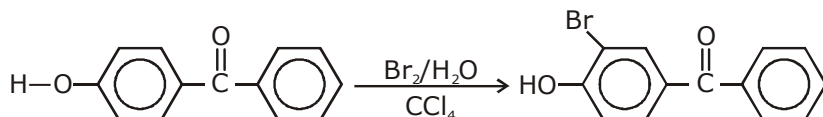
Ser-Lys



29. p-Hydroxybenzophenone upon reaction with bromine in carbon tetrachloride gives :



Sol. 3



P-hydroxy benzophenone

30. The correct statements among I to III are :

- (I) Valence bond theory cannot explain the colour exhibited by transition metal complexes.
 (II) Valence bond theory can predict quantitatively the magnetic properties of transition metal complexes.
 (III) Valence bond theory cannot distinguish ligands as weak and strong field ones.
- (1) (I) and (II) only (2) (I), (II) and (III)
 (3) (II) and (III) only (4) (I) and (III) only

Sol. 4