

**Chemistry : Section-A (Q. No. 51 to 85)**

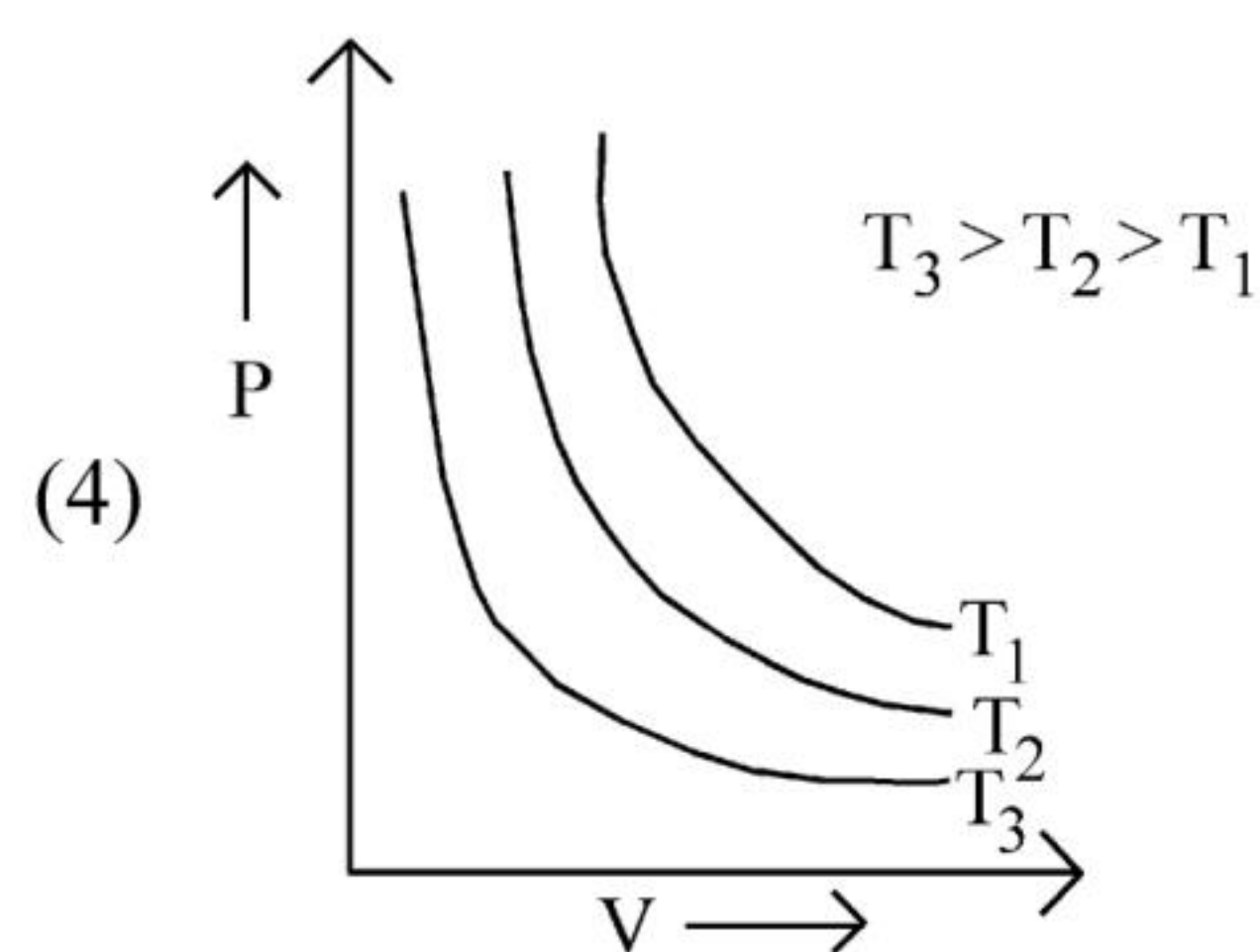
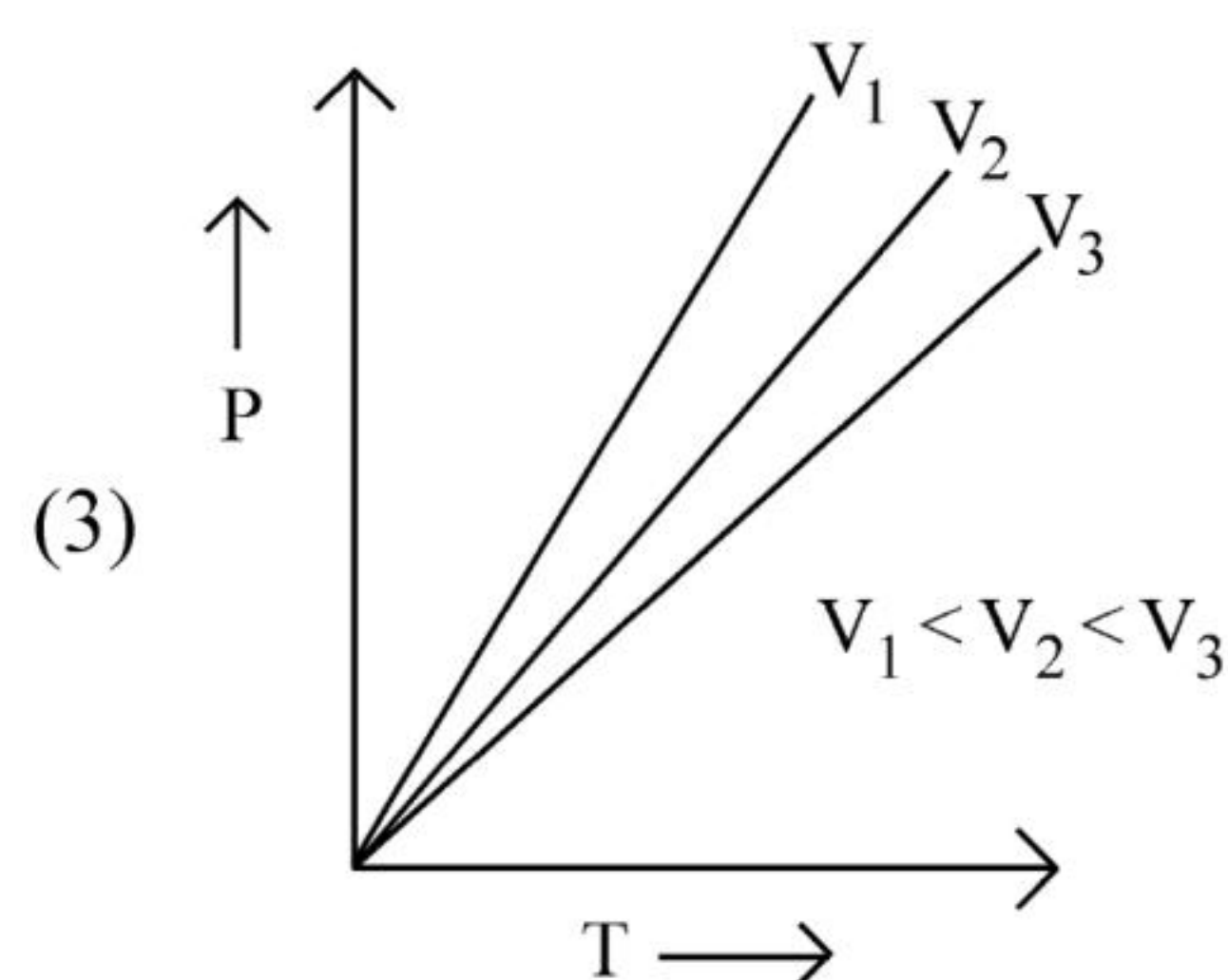
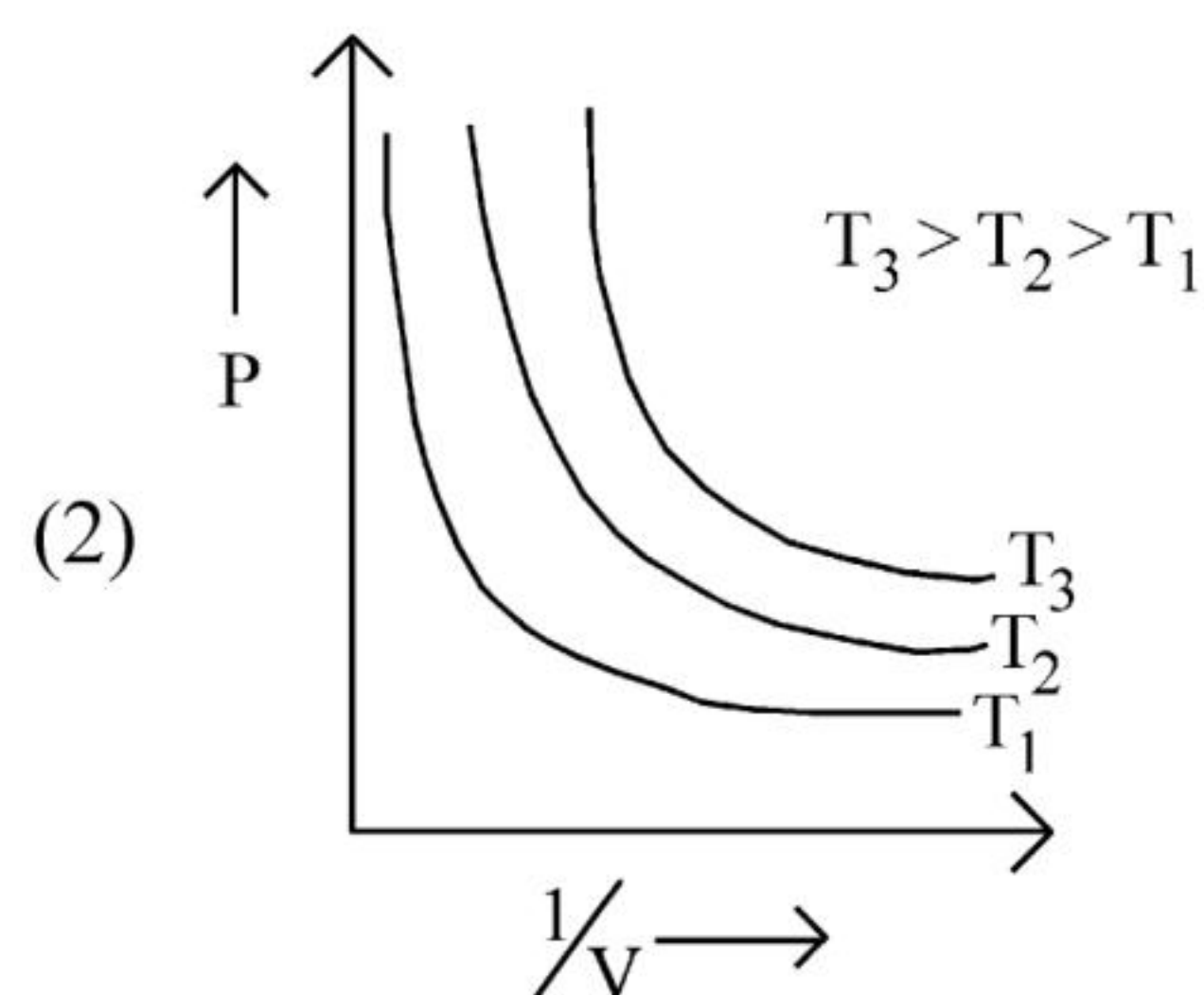
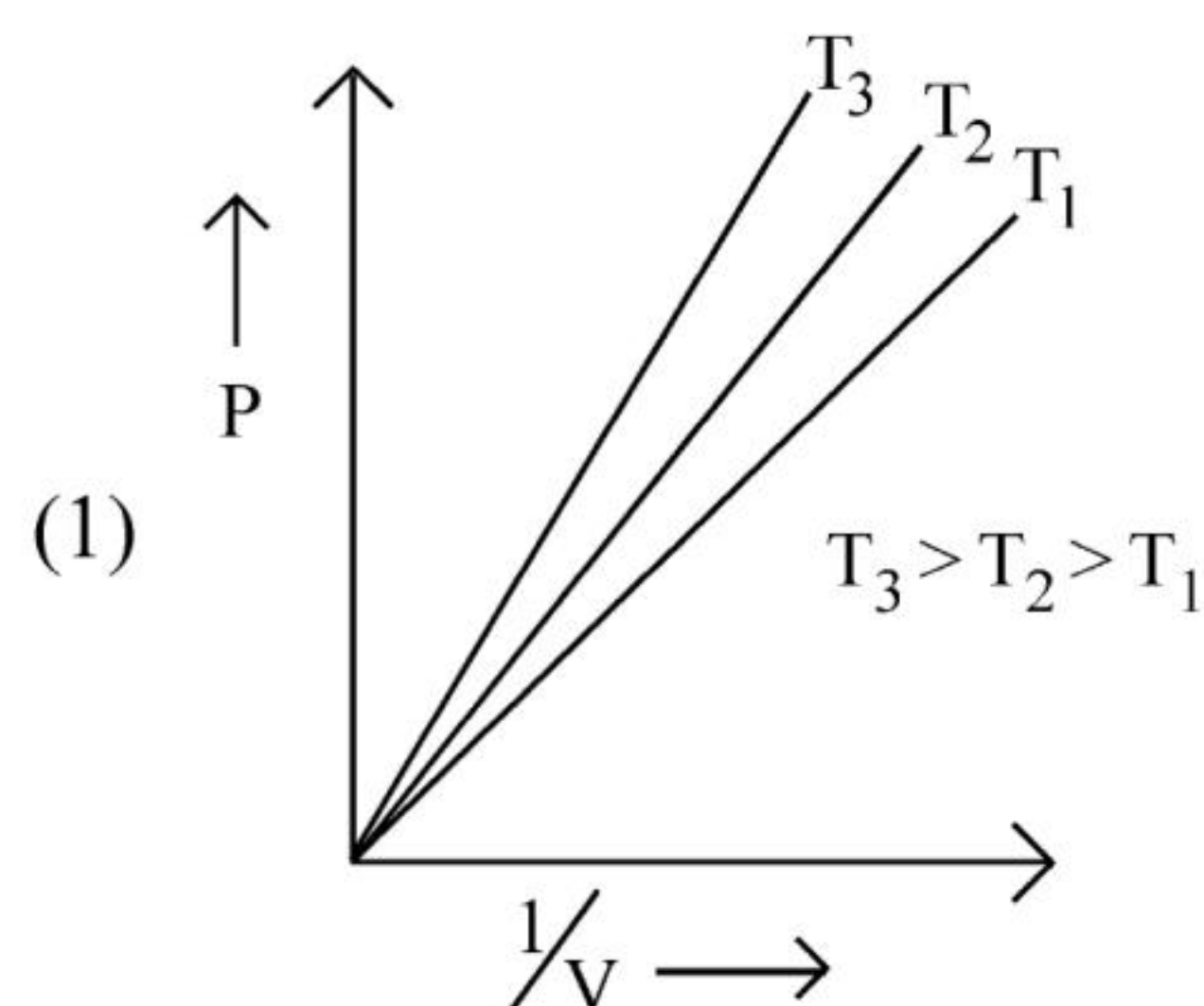
**51** The stability of  $\text{Cu}^{2+}$  is more than  $\text{Cu}^+$  salts in aqueous solution due to -

- (1) enthalpy of atomization.
- (2) hydration energy.
- (3) second ionisation enthalpy.
- (4) first ionisation enthalpy.

**52** Which one is an example of heterogenous catalysis?

- (1) Hydrolysis of sugar catalysed by  $\text{H}^+$  ions.
- (2) Decomposition of ozone in presence of nitrogen monoxide.
- (3) Combination between dinitrogen and dihydrogen to form ammonia in the presence of finely divided iron.
- (4) Oxidation of sulphur dioxide into sulphur trioxide in the presence of oxides of nitrogen.

**53** Which amongst the following options is **correct** graphical representation of Boyle's Law?





- 54 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

**Assertion A** : A reaction can have zero activation energy.

**Reasons R** : The minimum extra amount of energy absorbed by reactant molecules so that their energy becomes equal to threshold value, is called activation energy.

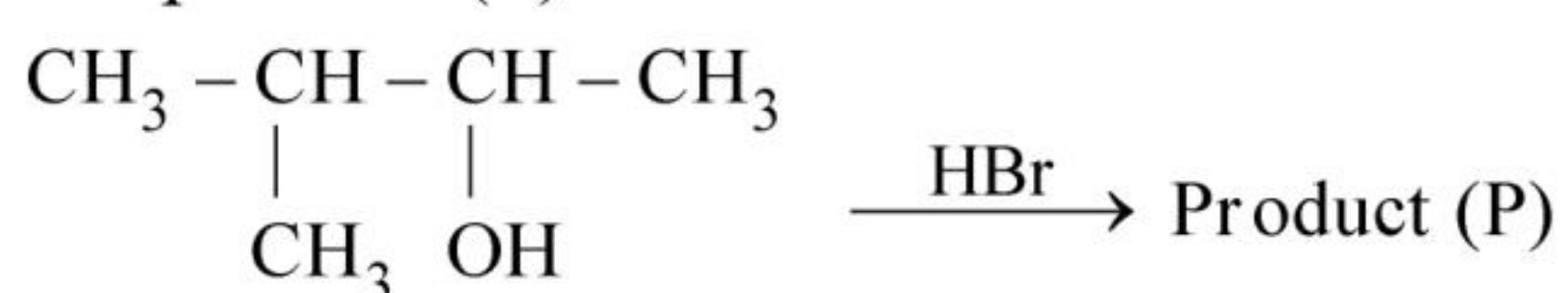
In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.
- (2) **A** is true but **R** is false.
- (3) **A** is false but **R** is true.
- (4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

- 55 In Lassaigne's extract of an organic compound, both nitrogen and sulphur are present, which gives blood red colour with  $\text{Fe}^{3+}$  due to the formation of -

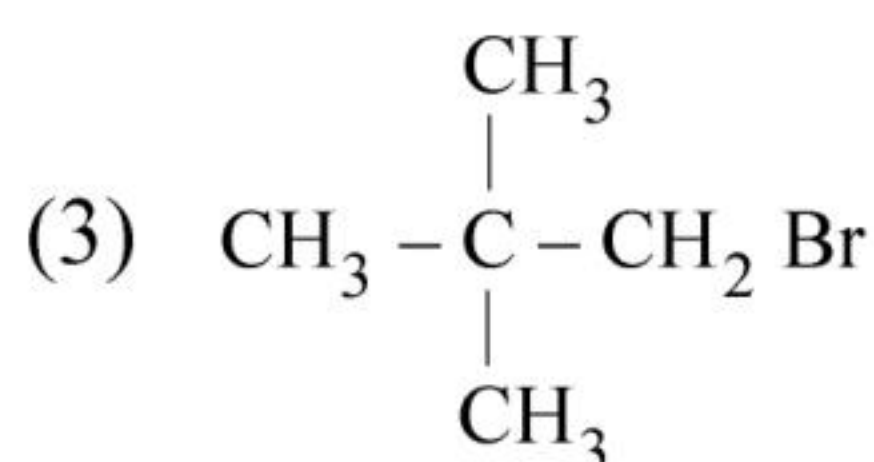
- (1)  $\text{NaSCN}$
- (2)  $[\text{Fe}(\text{CN})_5\text{NOS}]^{4-}$
- (3)  $[\text{Fe}(\text{SCN})]^{2+}$
- (4)  $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3 \cdot x\text{H}_2\text{O}$

- 56 Consider the following reaction and identify the product (P).



3 - Methylbutan-2 - ol

- (1)  $\text{CH}_3\text{CH}=\text{CH}-\text{CH}_3$
- (2)  $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH} - \text{CH}_3 \\ | \quad | \\ \text{CH}_3 \quad \text{Br} \end{array}$



- (3)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2\text{Br} \\ | \\ \text{Br} \end{array}$
- (4)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{CH}_3 \end{array}$

- 57 For a certain reaction, the rate =  $k[\text{A}]^2[\text{B}]$ , when the initial concentration of A is tripled keeping concentration of B constant, the initial rate would

- (1) increase by a factor of six.
- (2) increase by a factor of nine.
- (3) increase by a factor of three.
- (4) decrease by a factor of nine.

- 58 Match **List - I** with **List - II** :

<b>List - I</b>	<b>List - II</b>
A. Coke	I. Carbon atoms are $\text{sp}^3$ hybridised.
B. Diamond	II. Used as a dry lubricant
C. Fullerene	III. Used as a reducing agent
D. Graphite	IV. Cage like molecules

Choose the **correct** answer from the options given below :

- (1) A-IV, B-I, C-II, D-III
- (2) A-III, B-I, C-IV, D-II
- (3) A-III, B-IV, C-I, D-II
- (4) A-II, B-IV, C-I, D-III

- 59 Which one of the following statements is **correct**?

- (1) All enzymes that utilise ATP in phosphate transfer require Ca as the cofactor.
- (2) The bone in human body is an inert and unchanging substance.
- (3) Mg plays roles in neuromuscular function and interneuronal transmission.
- (4) The daily requirement of Mg and Ca in the human body is estimated to be 0.2 - 0.3 g.



**60** A compound is formed by two elements A and B. The element B forms cubic close packed structure and atoms of A occupy  $\frac{1}{3}$  of tetrahedral voids. If the formula of the compound is  $A_xB_y$ , then the value of  $x + y$  is in option

- (1) 4                      (2) 3  
(3) 2                      (4) 5

**61** Homoleptic complex from the following complexes is :

- (1) Diamminechloridonitrito - N - platinum (II)  
(2) Pentaamminecarbonatocobalt (III) chloride  
(3) Triamminetriaquachromium (III) chloride  
(4) Potassium trioxalatoaluminate (III)

**62** The **correct** order of energies of molecular orbitals of  $N_2$  molecule, is :

- (1)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$   
(2)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < \sigma 2p_z < \sigma^* 2p_z < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y)$   
(3)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < (\pi^* 2p_x = \pi^* 2p_y) < \sigma 2p_z < \sigma^* 2p_z$   
(4)  $\sigma 1s < \sigma^* 1s < \sigma 2s < \sigma^* 2s < (\pi 2p_x = \pi 2p_y) < \sigma 2p_z < (\pi^* 2p_x = \pi^* 2p_y) < \sigma^* 2p_z$

**63** Taking stability as the factor, which one of the following represents **correct** relationship?

- (1)  $InI_3 > InI$                       (2)  $AlCl > AlCl_3$   
(3)  $TlI > TlI_3$                       (4)  $TlCl_3 > TlCl$

**64** Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :

**Assertion A** : Helium is used to dilute oxygen in diving apparatus.

**Reasons R** : Helium has high solubility in  $O_2$ .

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both **A** and **R** are true and **R** is **NOT** the correct explanation of **A**.  
(2) **A** is true but **R** is false.  
(3) **A** is false but **R** is true.  
(4) Both **A** and **R** are true and **R** is the correct explanation of **A**.

**65** Select the **correct** statements from the following :

- A. Atoms of all elements are composed of two fundamental particles.  
B. The mass of the electron is  $9.10939 \times 10^{-31}$  kg.  
C. All the isotopes of a given element show same chemical properties.  
D. Protons and electrons are collectively known as nucleons.  
E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below :

- (1) C, D and E only  
(2) A and E only  
(3) B, C and E only  
(4) A, B and C only



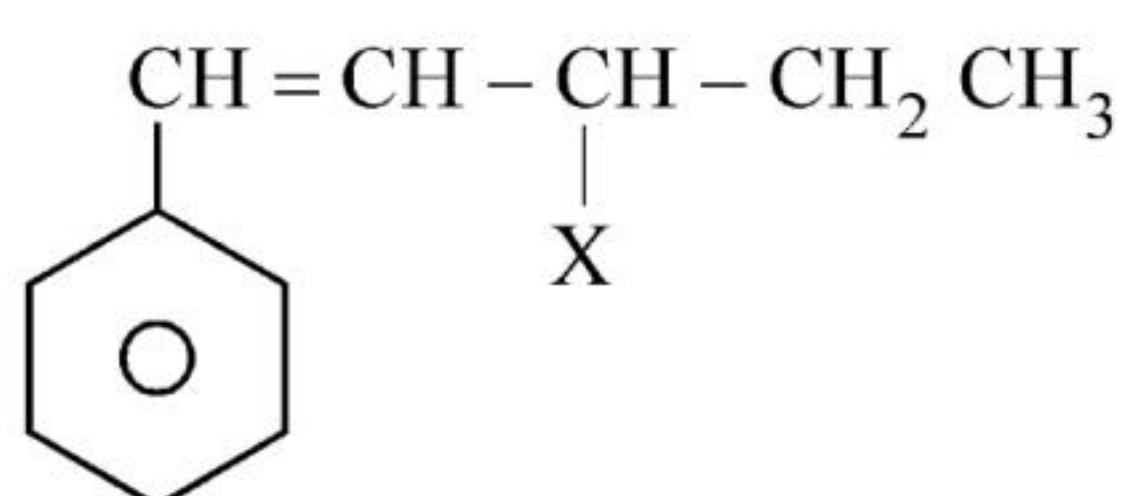
66 Which of the following statements are **NOT** correct?

- A. Hydrogen is used to reduce heavy metal oxides to metals.
- B. Heavy water is used to study reaction mechanism.
- C. Hydrogen is used to make saturated fats from oils.
- D. The H-H bond dissociation enthalpy is lowest as compared to a single bond between two atoms of any element.
- E. Hydrogen reduces oxides of metals that are more active than iron.

Choose the **most appropriate** answer from the options given below :

- (1) B, D only
- (2) D, E only
- (3) A, B, C only
- (4) B, C, D, E only

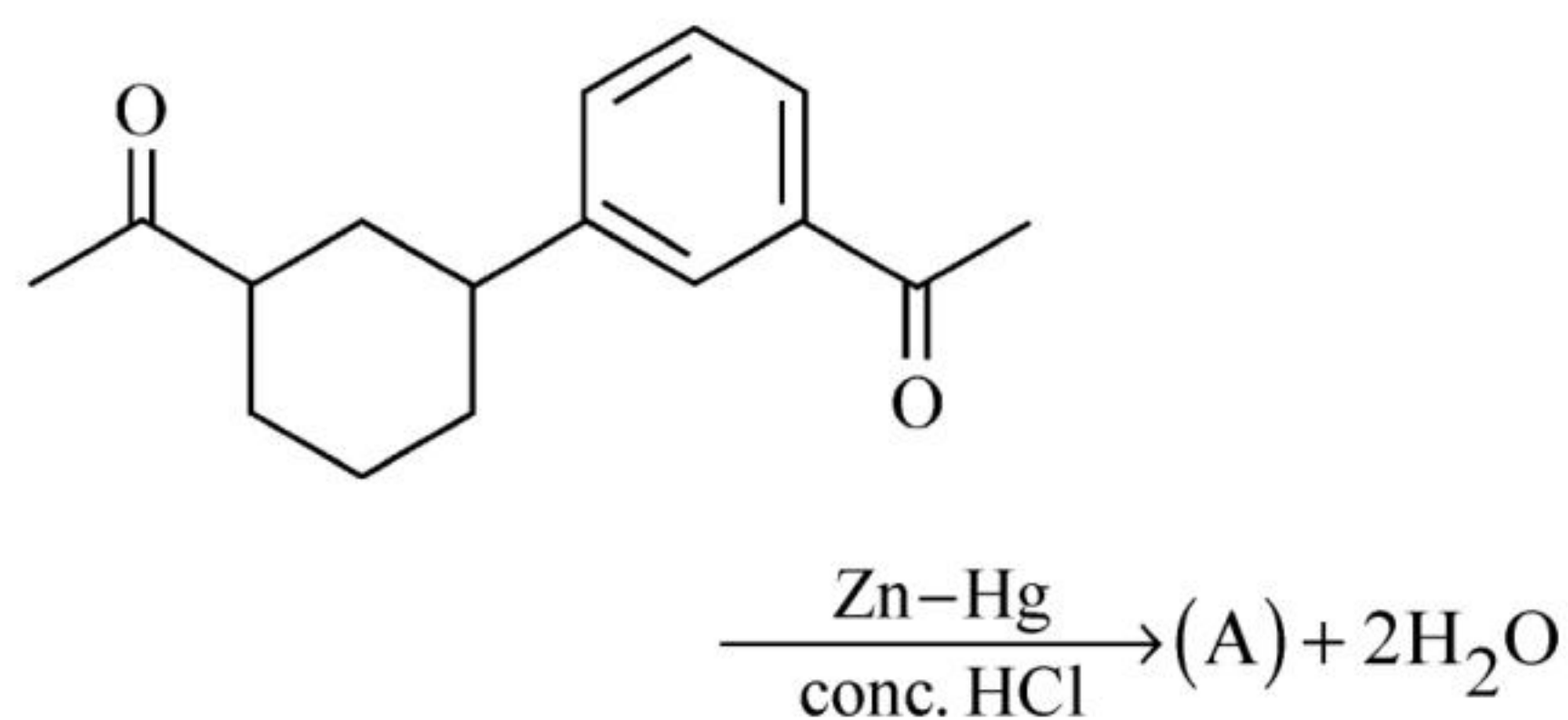
67 The given compound



is an example of \_\_\_\_\_.

- (1) aryl halide
- (2) allylic halide
- (3) vinylic halide
- (4) benzylic halide

68 Identify product (A) in the following reaction:



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

69 The conductivity of centimolar solution of KCl at 25°C is 0.0210 ohm<sup>-1</sup> cm<sup>-1</sup> and the resistance of the cell containing the solution at 25°C is 60 ohm. The value of cell constant is -

- (1) 3.28 cm<sup>-1</sup>
- (2) 1.26 cm<sup>-1</sup>
- (3) 3.34 cm<sup>-1</sup>
- (4) 1.34 cm<sup>-1</sup>

70 Amongst the given options which of the following molecules / ion acts as a Lewis acid?

- (1) H<sub>2</sub>O
- (2) BF<sub>3</sub>
- (3) OH<sup>-</sup>
- (4) NH<sub>3</sub>

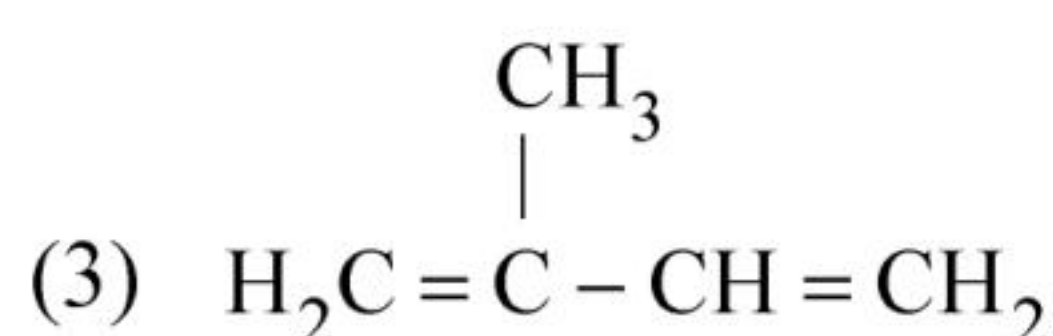
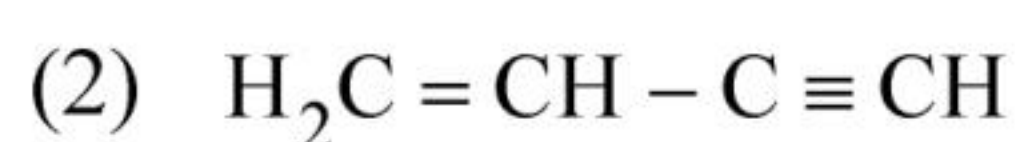
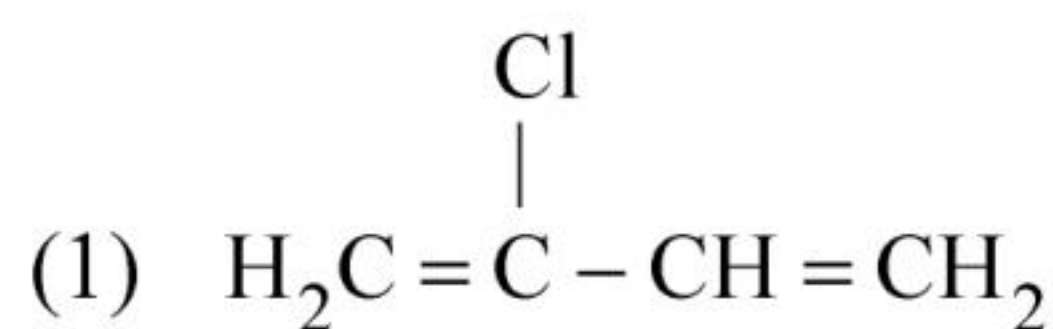


- 71 Given below are two statements :  
**Statement I** : A unit formed by the attachment of a base to 1' position of sugar is known as nucleoside  
**Statement II** : When nucleoside is linked to phosphorous acid at 5'-position of sugar moiety, we get nucleotide.  
 In the light of the above statements, choose the **correct** answer from the options given below :
- (1) Both Statement I and Statement II are false.
  - (2) Statement I is true but Statement II is false.
  - (3) Statement I is false but Statement II is true.
  - (4) Both Statement I and Statement II are true.
- 72 The relation between  $n_m$ , ( $n_m$  = the number of permissible values of magnetic quantum number ( $m$ )) for a given value of azimuthal quantum number ( $l$ ), is
- (1)  $l = 2n_m + 1$
  - (2)  $n_m = 2l^2 + 1$
  - (3)  $n_m = l + 2$
  - (4)  $l = \frac{n_m - 1}{2}$
- 73 Amongst the following, the total number of species NOT having eight electrons around central atom in its outer most shell, is  
 $\text{NH}_3, \text{AlCl}_3, \text{BeCl}_2, \text{CCl}_4, \text{PCl}_5$  :
- (1) 2
  - (2) 4
  - (3) 1
  - (4) 3
- 74 Intermolecular forces are forces of attraction and repulsion between interacting particles that will include :
- A. dipole - dipole forces.
  - B. dipole - induced dipole forces.
  - C. hydrogen bonding.
  - D. covalent bonding.
  - E. dispersion forces.
- Choose the **most appropriate** answer from the options given below :
- (1) A, B, C, D are correct.
  - (2) A, B, C, E are correct.
  - (3) A, C, D, E are correct.
  - (4) B, C, D, E are correct.

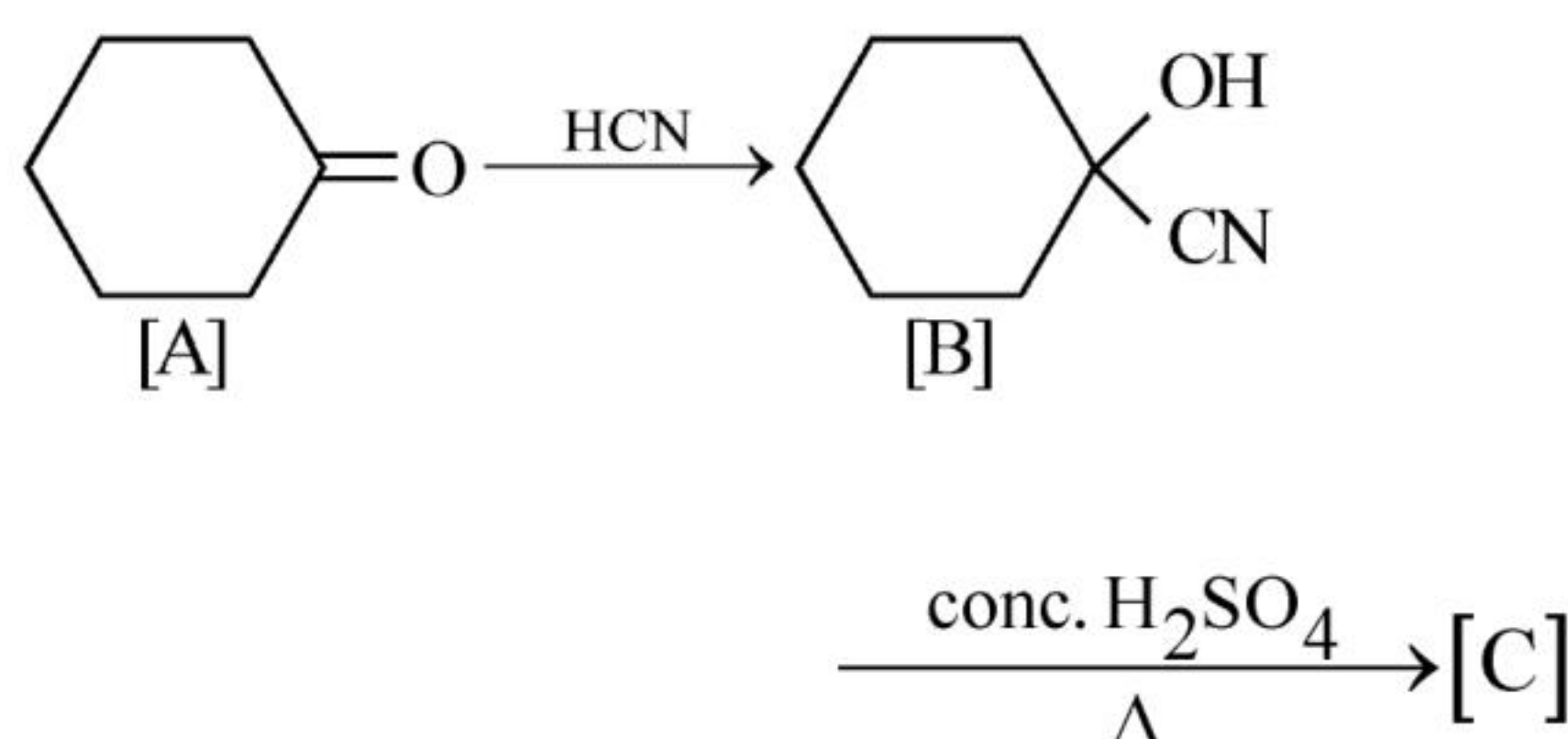
- 75 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :
- Assertion A** : Metallic sodium dissolves in liquid ammonia giving a deep blue solution, which is paramagnetic.  
**Reasons R** : The deep blue solution is due to the formation of amide.  
 In the light of the above statements, choose the **correct** answer from the options given below :
- (1) Both A and R are true but R is NOT the correct explanation of A.
  - (2) A is true but R is false.
  - (3) A is false but R is true.
  - (4) Both A and R are true and R is the correct explanation of A.
- 76 The element expected to form largest ion to achieve the nearest noble gas configuration is :
- (1) F
  - (2) N
  - (3) Na
  - (4) O
- 77 Some tranquilizers are listed below. Which one from the following belongs to barbiturates?
- (1) Meproamate
  - (2) Valium
  - (3) Veronal
  - (4) Chlordiazepoxide
- 78 Given below are two statements : one is labelled as **Assertion A** and the other is labelled as **Reason R** :
- Assertion A** : In equation  $\Delta_r G = -nFE_{\text{cell}}$ , value of  $\Delta_r G$  depends on  $n$ .  
**Reasons R** :  $E_{\text{cell}}$  is an intensive property and  $\Delta_r G$  is an extensive property.  
 In the light of the above statements, choose the **correct** answer from the options given below :
- (1) Both A and R are true and R is NOT the correct explanation of A.
  - (2) A is true but R is false.
  - (3) A is false but R is true.
  - (4) Both A and R are true and R is the correct explanation of A.



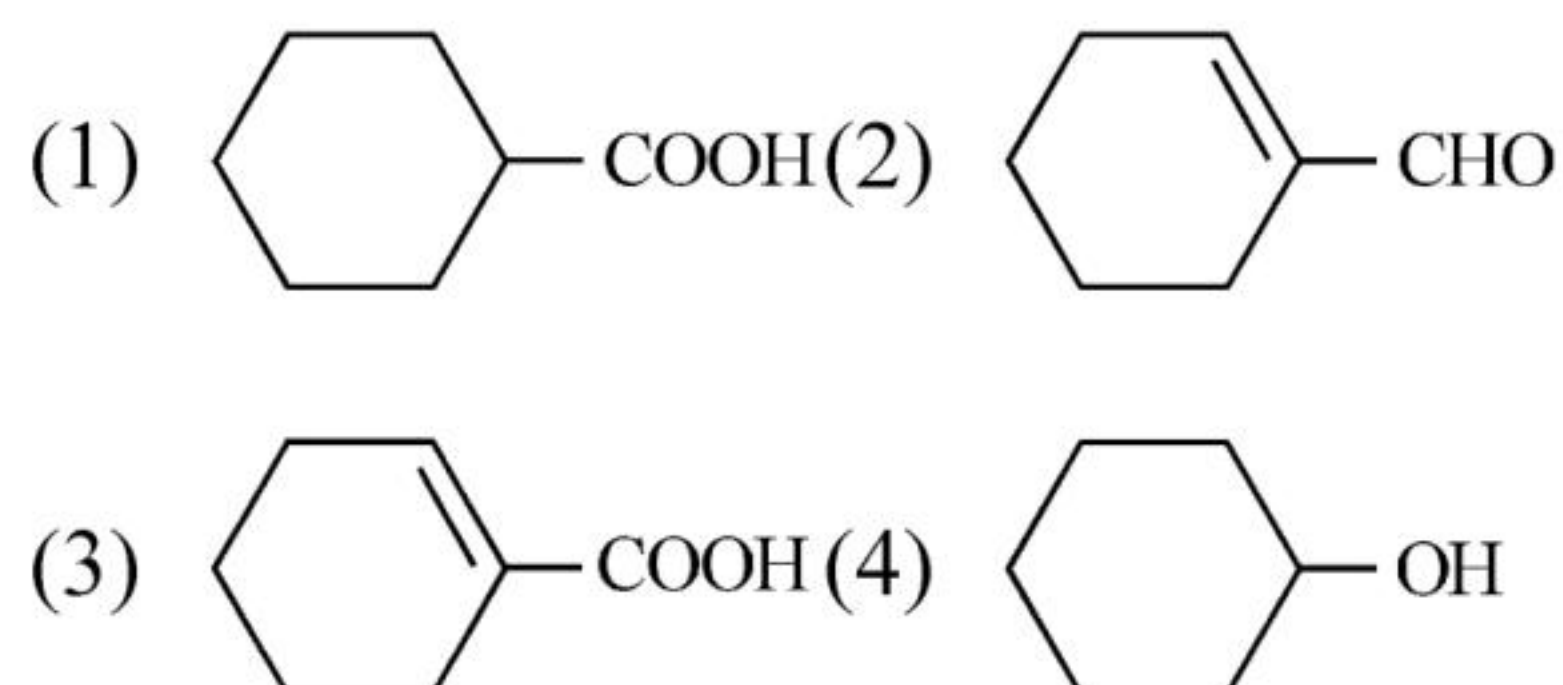
- 79 Which amongst the following molecules on polymerization produces neoprene?



- 80 Complete the following reaction :



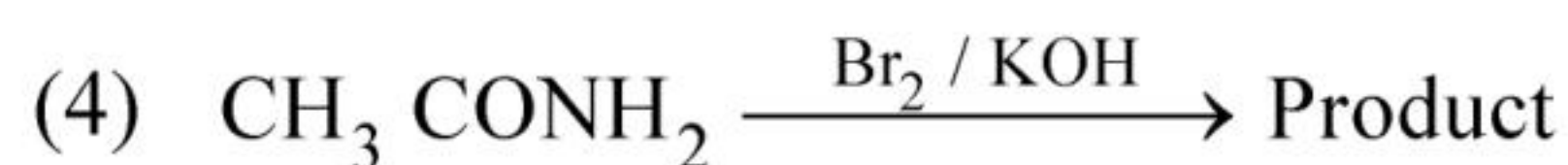
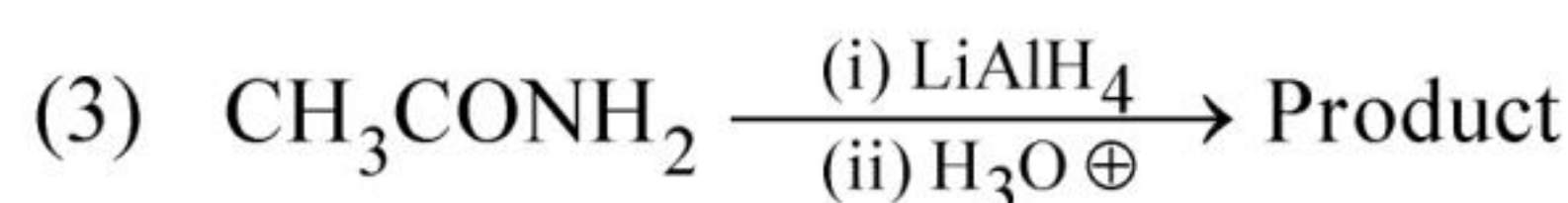
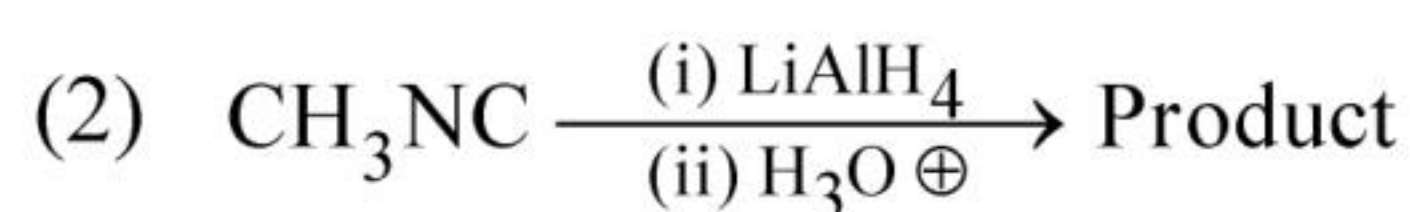
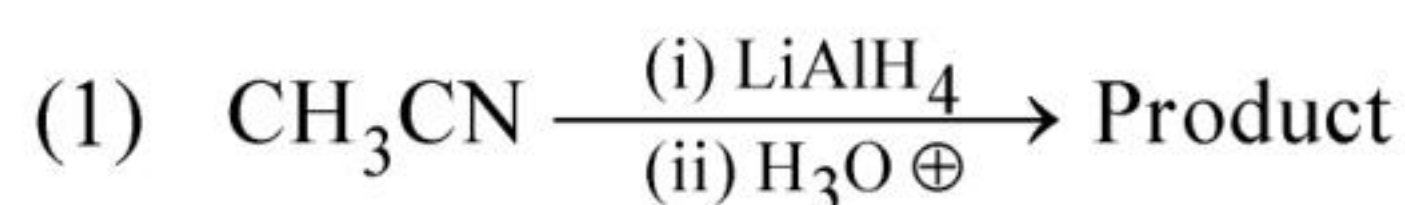
[C] is \_\_\_\_\_.



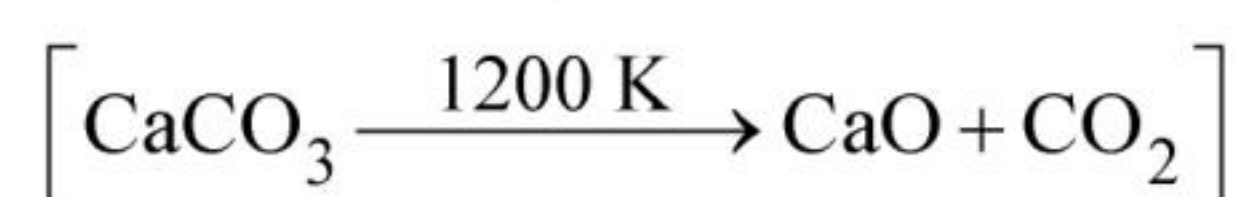
- 81 Weight (g) of two moles of the organic compound, which is obtained by heating sodium ethanoate with sodium hydroxide in presence of calcium oxide is :

- (1) 32                      (2) 30  
 (3) 18                      (4) 16

- 82 Which of the following reactions will NOT give primary amine as the product?

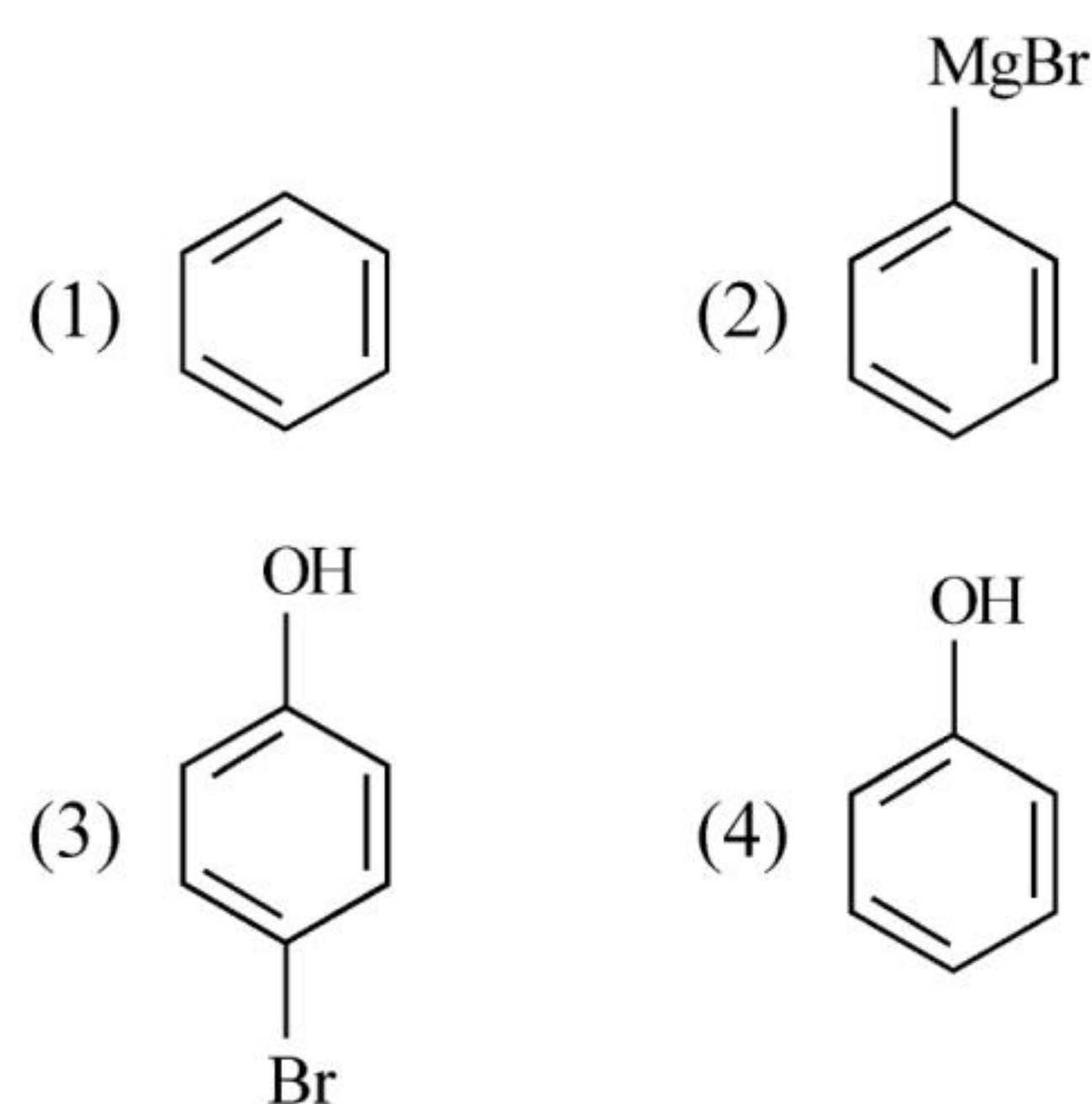
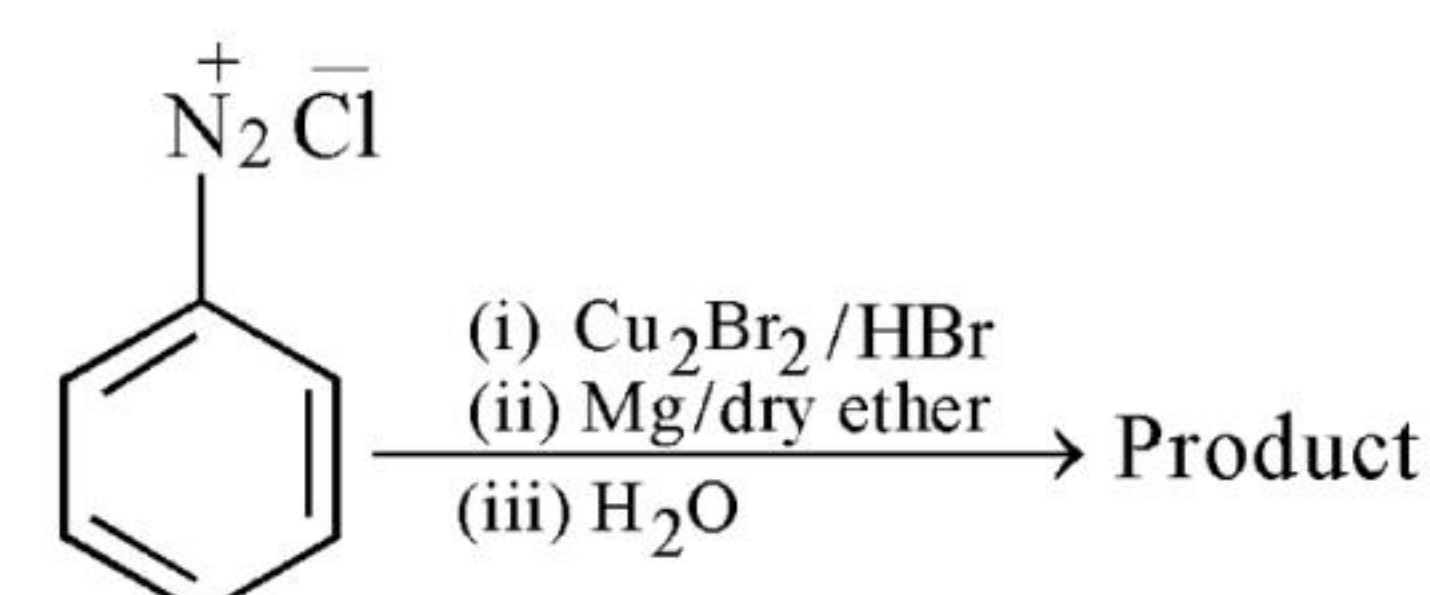


- 83 The **right** option for the mass of  $\text{CO}_2$  produced by heating 20 g of 20% pure limestone is (Atomic mass of Ca = 40)



- (1) 1.76 g                      (2) 2.64 g  
 (3) 1.32 g                      (4) 1.12 g

- 84 Identify the product in the following reaction:



- 85 The number of  $\sigma$  bonds,  $\pi$  bonds and lone pair of electrons in pyridine, respectively are:

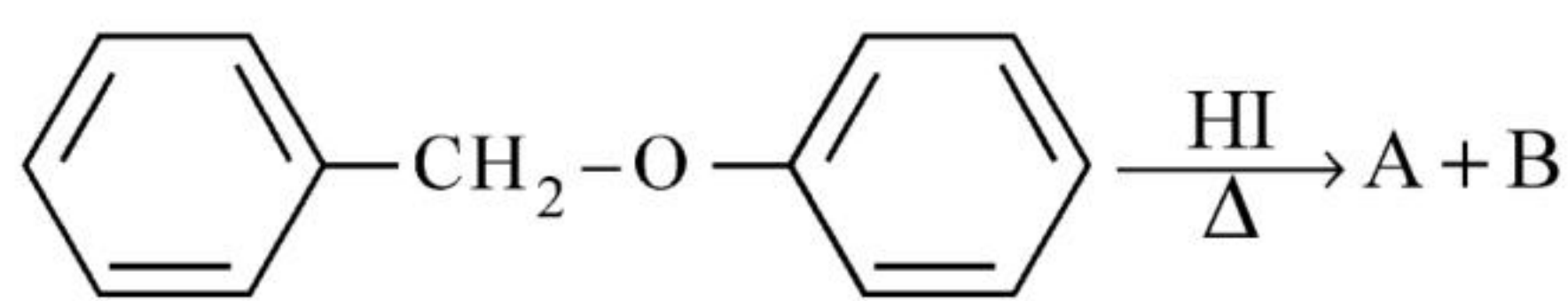
- (1) 12, 3, 0                      (2) 11, 3, 1  
 (3) 12, 2, 1                      (4) 11, 2, 0



86 Which amongst the following options is the **correct** relation between change in enthalpy and change in internal energy?

- (1)  $\Delta H = \Delta U + \Delta n_g RT$
- (2)  $\Delta H - \Delta U = - \Delta n RT$
- (3)  $\Delta H + \Delta U = \Delta n R$
- (4)  $\Delta H = \Delta U - \Delta n_g RT$

87 Consider the following reaction :



Identify products A and B.

- (1) A = and B =
- (2) A = and B =
- (3) A = and B =
- (4) A = and B =

88 Which of the following statements are **INCORRECT**?

- A. All the transition metals except scandium form MO oxides which are ionic.
  - B. The highest oxidation number corresponding to the group number in transition metal oxides is attained in  $\text{Sc}_2\text{O}_3$  to  $\text{Mn}_2\text{O}_7$ .
  - C. Basic character increases from  $\text{V}_2\text{O}_3$  to  $\text{V}_2\text{O}_4$  to  $\text{V}_2\text{O}_5$ .
  - D.  $\text{V}_2\text{O}_4$  dissolves in acids to give  $\text{VO}_4^{3-}$  salts.
  - E.  $\text{CrO}$  is basic but  $\text{Cr}_2\text{O}_3$  is amphoteric.
- Choose the **correct** answer from the options given below :

- (1) B and D only
- (2) C and D only
- (3) B and C only
- (4) A and E only

89 Which amongst the following will be most readily dehydrated under acidic conditions ?

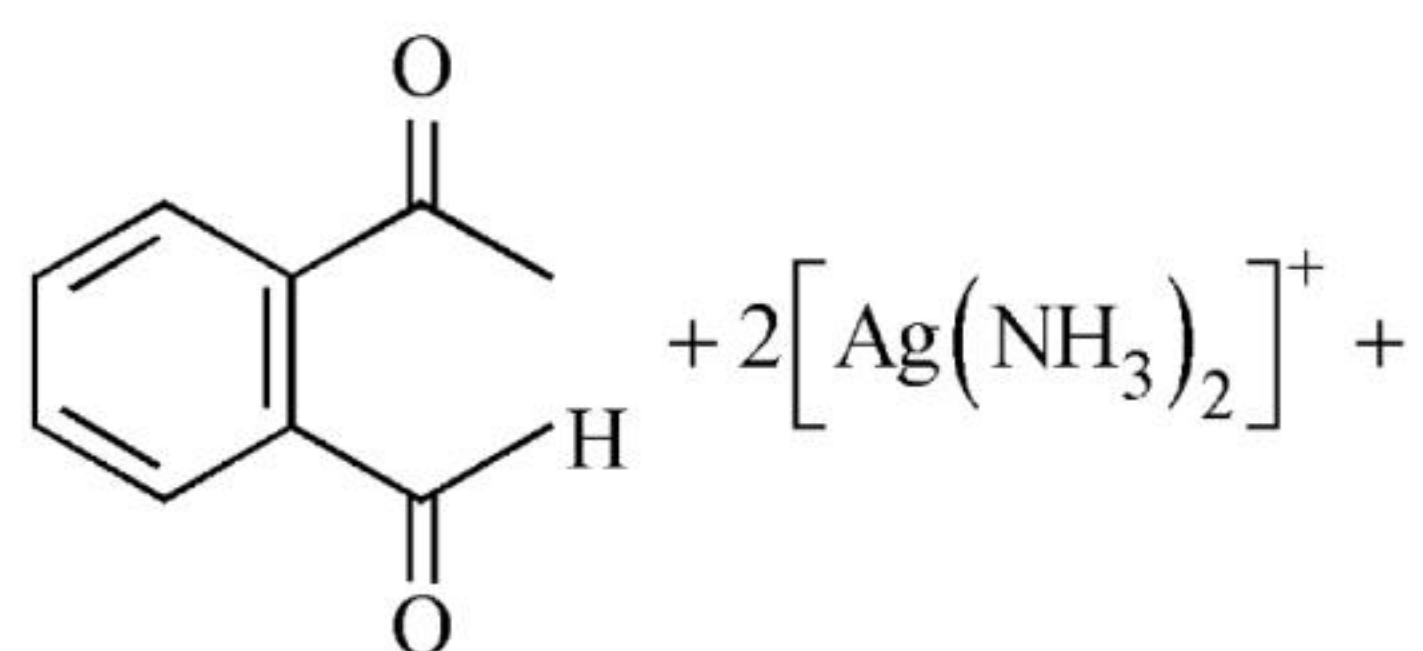
- (1)
- (2)
- (3)
- (4)



90 The reaction that does **NOT** take place in a blast furnace between 900 K to 1500 K temperature range during extraction of iron is :

- (1)  $\text{FeO} + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$
- (2)  $\text{C} + \text{CO}_2 \rightarrow 2\text{CO}$
- (3)  $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$
- (4)  $\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{FeO} + \text{CO}_2$

91 Identify the major product obtained in the following reaction :



$3^- \text{OH} \xrightarrow{\Delta} \text{major product}$

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

92 What fraction of one edge centred octahedral void lies in one unit cell of fcc?

- (1)  $\frac{1}{3}$
- (2)  $\frac{1}{4}$
- (3)  $\frac{1}{12}$
- (4)  $\frac{1}{2}$

93 The equilibrium concentrations of the species in the reaction  $\text{A} + \text{B} \rightleftharpoons \text{C} + \text{D}$  are 2, 3, 10 and 6 mol L<sup>-1</sup>, respectively at 300 K.  $\Delta G^\circ$  for the reaction is (R = 2 cal / mol K)

- (1) -137.26 cal
- (2) -1381.80 cal
- (3) -13.73 cal
- (4) 1372.60 cal

94 Consider the following compounds/species:

- i.
- ii.
- iii.
- iv.
- v.
- vi.
- vii.

The number of compounds/species which obey Huckel's rule is \_\_\_\_\_.

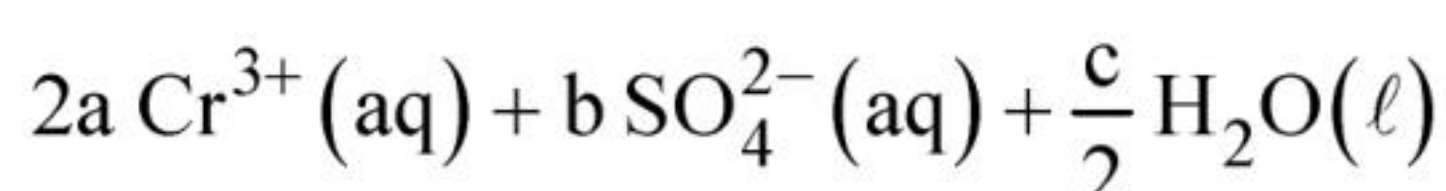
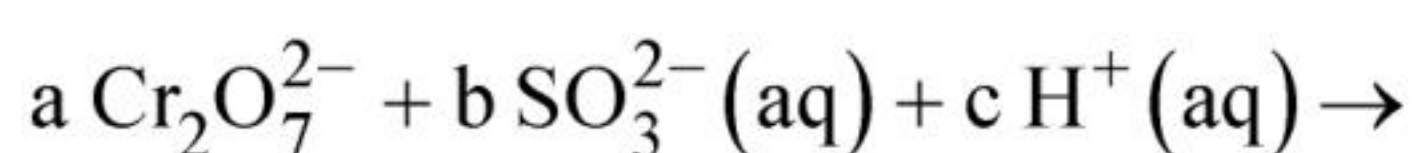
- (1) 6
- (2) 2
- (3) 5
- (4) 4



95 Which complex compound is most stable?

- (1)  $[\text{Co}(\text{NH}_3)_3(\text{NO}_3)_3]$
- (2)  $[\text{CoCl}_2(\text{en})_2]\text{NO}_3$
- (3)  $[\text{Co}(\text{NH}_3)_6]_2(\text{SO}_4)_3$
- (4)  $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Br}](\text{NO}_3)_2$

96 On balancing the given redox reaction,



the coefficients a, b and c are found to be, respectively -

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

97 Given below are two statements :

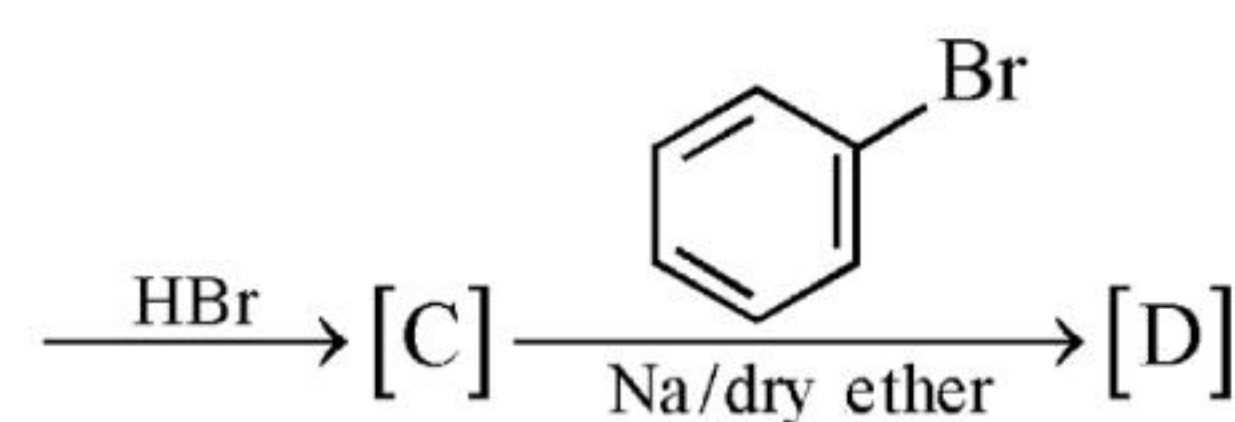
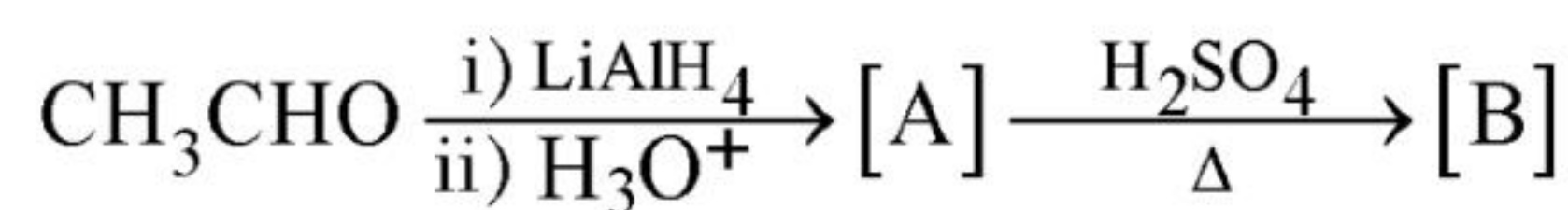
**Statement I :** The nutrient deficient water bodies lead to eutrophication.

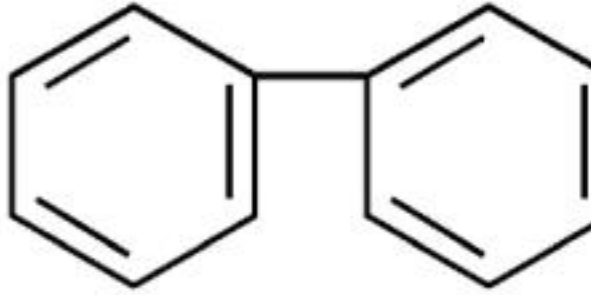
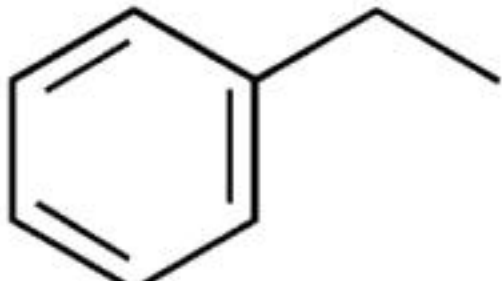
**Statement II :** Eutrophication leads to decrease in the level of oxygen in the water bodies.

In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both **Statement I** and **Statement II** are false.
- (2) **Statement I** is correct but **Statement II** is false.
- (3) **Statement I** is incorrect but **Statement II** is true.
- (4) Both **Statement I** and **Statement II** are true.

98 Identify the final product [D] obtained in the following sequence of reactions.



- (1) 
- (2)  $\text{C}_4\text{H}_{10}$
- (3)  $\text{HC} \equiv \text{C}^\ominus \text{Na}^+$
- (4) 

99 Pumice stone is an example of -

- (1) gel                              (2) solid sol
- (3) foam                              (4) sol

100 Match **List - I** with **List - II** :

**List - I (Oxoacids of Sulphur)**                      **List - II (Bonds)**

- |                           |                                      |
|---------------------------|--------------------------------------|
| A. Peroxodisulphuric acid | I. Two S-OH, Four S=O, One S-O-S     |
| B. Sulphuric acid         | II. Two S-OH, One S=O                |
| C. Pyrosulphuric acid     | III. Two S-OH, Four S=O, One S-O-O-S |
| D. Sulphurous acid        | IV. Two S-OH, Two S=O                |

Choose the **correct** answer from the options given below :

- (1) A-III, B-IV, C-I, D-II
- (2) A-I, B-III, C-IV, D-II
- (3) A-III, B-IV, C-II, D-I
- (4) A-I, B-III, C-II, D-IV