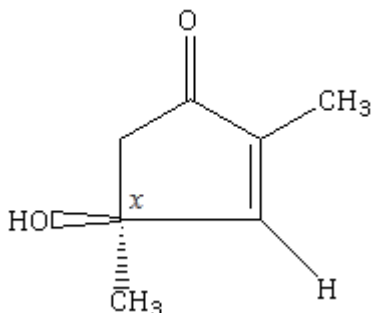


Q.No.

## CHEMISTRY

- The set of quantum numbers not allowed in the hydrogen atom is  
 A)  $n = 2, l = 1, m_l = -1$     B)  $n = 3, l = 2, m_l = 2$     C)  $n = 4, l = 3, m_l = 4$     D)  $n = 8, l = 7, m_l = -6$
- Gibbs energy of formation of two oxides (CO and  $\text{Al}_2\text{O}_3$ ) are given below as a function of temperature  $\Delta G_{\text{CO}} = -0.2 T - 195.4$  and  $\Delta G_{\text{Al}_2\text{O}_3} = 0.2 T - 1104$ . Which one of the scenarios is possible based on Ellingham diagram at  $T = 2000 \text{ K}$ ?  
 A) C reducing  $\text{Al}_2\text{O}_3$     B) Al reducing CO    C) No reaction between Al and CO  
 D) C reducing  $\text{Al}_2\text{O}_3$  and Al reducing CO
- In a face centered cubic unit cell, the relation between ionic radii ( $r^+$  and  $r^-$ ) and edge length 'a' is  
 A)  $r^+ + r^- = \sqrt{2}a$     B)  $r^+ + r^- = \sqrt{3}a$     C)  $r^+ + r^- = a/2$     D)  $r^+ + r^- = 2a$
- When a catalyst is added to a system at equilibrium, a decrease occurs in the  
 A) potential energy of the reactants    B) potential energy of the products    C) heat of reaction    D) activation energy
- The Nernst equation for the following electrochemical cell will be:  
 $\text{Ni(s)} \mid \text{Ni}^{2+}(\text{aq}) \parallel \text{Ag}^+(\text{aq}) \mid \text{Ag}$   
 A)  $E_{\text{cell}} = E_{\text{cell}}^{\circ} - RT/F \ln[\text{Ni}^{2+}]/[\text{Ag}^+]^2$     B)  $E_{\text{cell}} = E_{\text{cell}}^{\circ} - RT/2F \ln[\text{Ni}^{2+}]/[\text{Ag}^+]^2$   
 C)  $E_{\text{cell}} = E_{\text{cell}}^{\circ} - RT/2F \ln[\text{Ag}^+]^2/[\text{Ni}^{2+}]$     D)  $E_{\text{cell}} = E_{\text{cell}}^{\circ} - RT/2F \ln[\text{Ni}^{2+}]/[\text{Ag}^+]$
- The stereochemical description of the chiral centre (marked as 'x') and the olefin in the following compound is



- A) 4R, 2Z    B) 4S, 2Z    C) 4R, 2E    D) 4S, 2E
- The reaction of but-1-ene with  $\text{B}_2\text{H}_6$  followed by oxidation using  $\text{H}_2\text{O}_2/\text{NaOH}$  gives  
 A) Butan-2-ol    B) Butan-2-one    C) Butyraldehyde    D) Butan-1-ol
- In which one of the following reactions, a new carbon-carbon bond is not formed?  
 A) Cannizzaro reactions    B) Wurtz reaction    C) Aldol reaction    D) Friedel-Crafts reaction
- The product formed in the following reaction is  

$$\text{CH}_3\text{CHO} \xrightarrow[\text{ii) H}_3\text{O}^+]{\text{i) HCN}} ?$$
 A)  $\text{CH}_3\text{CH}_2\text{CN}$     B)  $\text{CH}_3\text{CH}(\text{CN})\text{CHO}$     C)  $\text{CH}_3\text{CH}(\text{OH})\text{CN}$     D)  $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$
- Nitrobenzene on reaction with  $\text{Sn}/\text{HCl}$  will produce  
 A) 2-nitroaniline    B) 4-nitroaniline    C) aniline    D) 4-chloroaniline