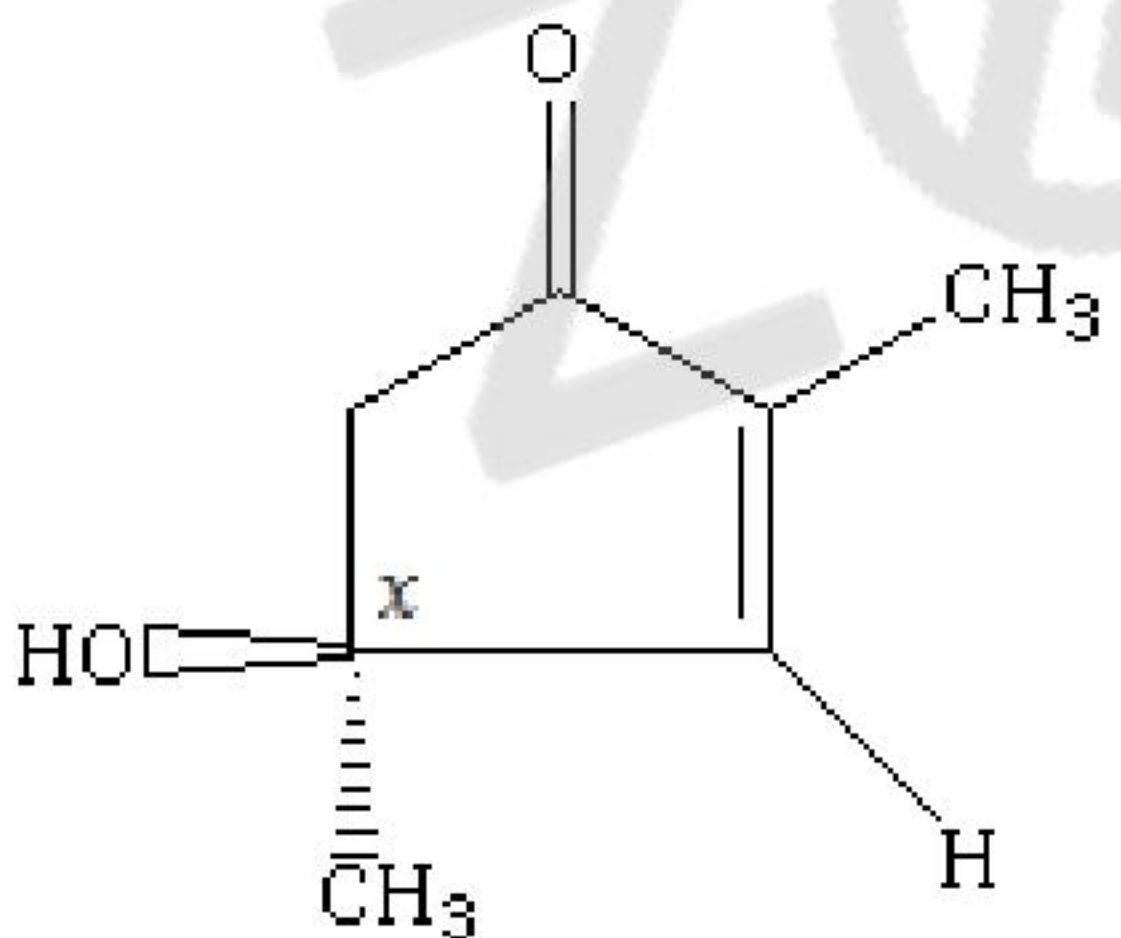


Q.No.

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 Al_2O_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 Al_2O_3 B) Al reducing CO C) No reaction between Al and CO
 D) C reducing Al_2O_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 B_2H_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

$$\text{CH}_3\text{CHO} \xrightarrow[\text{ii) } \text{H}_3\text{O}^+]{\text{i) } \text{HCN}} ?$$

 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 Sn/HCl will produce
 A) 2-nitroaniline B) 4-nitroaniline C) aniline D) 4-chloroaniline