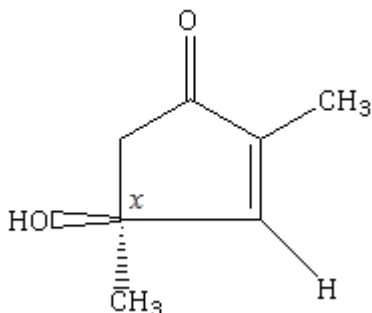


Q.No.

CHEMISTRY

1. 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) $n = 8, l = 7, m_l = -6$
2. 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
3. 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) $r^+ + r^- = 2a$
4. 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
5. 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) $E_{\text{cell}} = E_{\text{cell}}^{\circ} - RT/2F \ln[\text{Ni}^{2+}]/[\text{Ag}^+]$
6. 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
7. 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
8. 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
9. 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) $\text{CH}_3\text{CH}(\text{OH})\text{COOH}$
10. Nitrobenzene on reaction with Sn/HCl will produce
 A) 2-nitroaniline B) 4-nitroaniline C) aniline D) 4-chloroaniline