

MOCK TEST PAPER # 1

SOLUTION

IITJEE (Main) CHEMISTRY

1.(B) Temporary hardness is removed by :

- (i) boiling hard water (ii) treatment with CaO (Clark's method)

2.(C) Closest distance in FCC lattice = $\frac{a\sqrt{2}}{2} = \frac{4.070}{\sqrt{2}} = 2.878\text{\AA}$

3.(A) $E_n = -13.6 \frac{Z^2}{n^2} \text{ eV}$

$$\frac{E_H (n=1, Z=1)}{E_{Be^{3+}} (n=2, Z=4)} = \frac{1}{4}$$

4.(D) Bond length $\propto \frac{1}{\text{Bond order}}$

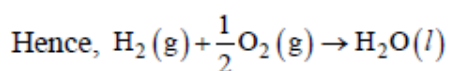
CO Triple

CO₂ double

CO₃²⁻ between single and double bond due to resonance

5.(C) $\Delta H = (\text{B.E.})_{\text{reactant}} - (\text{B.E.})_{\text{products}}$

(But all the species must be in gaseous state. In products, $[\text{H}_2\text{O}(l) \rightarrow \text{H}_2\text{O}(g)]\Delta H$ must be added.



$$\Delta H = \left[(\text{BE})_{\text{H-H}} + \frac{1}{2}(\text{BE})_{\text{O=O}} \right] - \left[(\Delta H)_{\text{vap}} + 2(\text{BE})_{\text{O-H}} \right] = x_1 + \frac{x_2}{2} - [x_4 + 2x_3] = x_1 + \frac{x_2}{2} - x_4 - 2x_3$$

6.(B) $\Delta T_f = K_f \times m' \times i$

$$\frac{\Delta T_f(\text{urea})}{\Delta T_f(\text{CH}_3\text{COOH})} = \frac{m'(\text{urea})}{m'(\text{CH}_3\text{COOH}) \times i}$$

$$i = 1.1 \quad \{\text{for CH}_3\text{COOH}\} \quad (i = 1 \text{ for urea})$$

$$1.1 = 1 + x$$

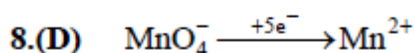
$$x = 0.1$$

$$[\text{H}^+] = Cx = 0.001$$

$$\text{pH} = 3$$

7.(C) $\kappa = \frac{2.303}{10} \log \frac{100}{90} = 0.01054 \text{ min}^{-1}$

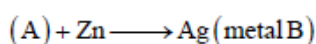
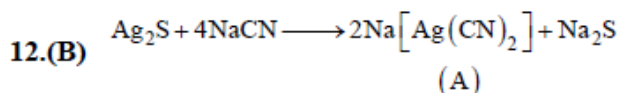
$$T_{50} = \frac{0.693}{\kappa} \approx 66 \text{ min}$$



9.(B) $k = Ae^{-E_a/RT}$, when T increases, $e^{-E_a/RT} \uparrow$

10.(A) After a while equilibrium is established as surface/site is completely occupied.

11.(B) % ionic nature = $\frac{\text{observed } \mu}{\text{calculated } \mu} \times 100 = \frac{1.02}{1.25 \times 4.8} \times 100 = 17\% \text{ ionic} = 83\% \text{ covalent}$



13.(A) PbO_2 is not a peroxide

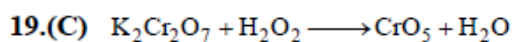


15.(B) Boron in BF_3 has six electrons. It can take up more electrons. Similarly in SiF_4 & PF_5 , e^- are accepted as they can expand their octet.

16.(B)

17.(A) Lattice energy order is $\text{NaF} > \text{NaCl} > \text{NaBr} > \text{NaI}$

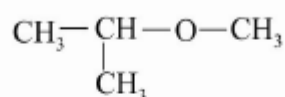
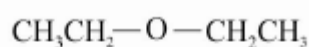
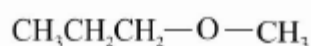
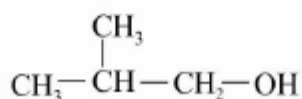
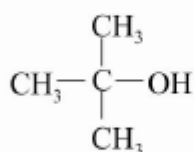
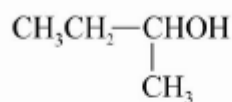
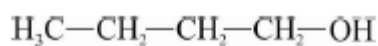
18.(C) Plane of symmetry in *trans*- $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ and *cis*- $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$



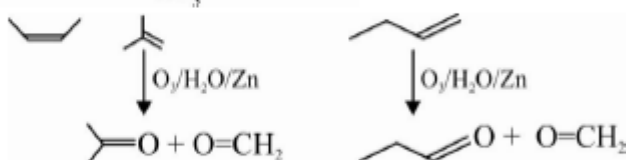
20.(D)

21.(A) Lassaigne's test for detection of nitrogen.

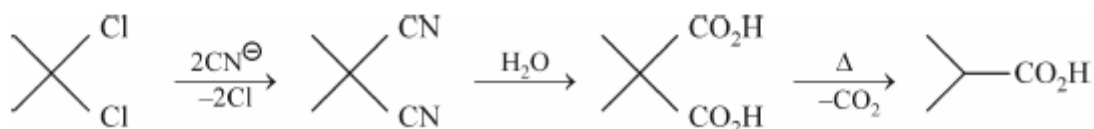
22.(D)



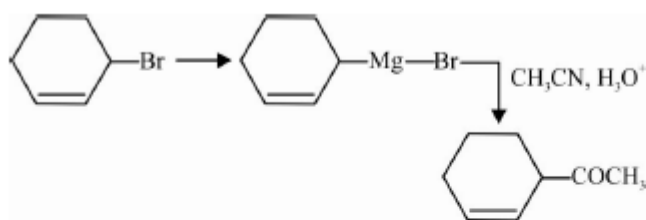
23.(A)



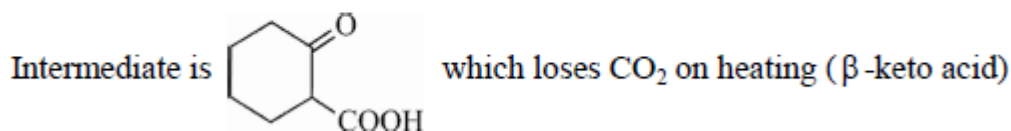
24.(C)



25.(B)



26.(C)



27.(B)

Benzene hexa chloride(BHC) has maximum percentage

28.(B)

29.(C)

Maltose is a disaccharide containing two glucose units

30.(B)

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