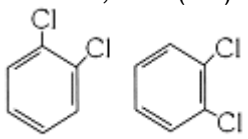
Studentpad

JEE-MAIN 2021-22

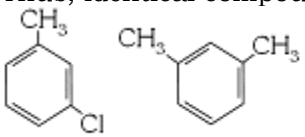
Time : 60 Min	Chem : Full Portion Paper	Marks : 120

Hints and Solutions

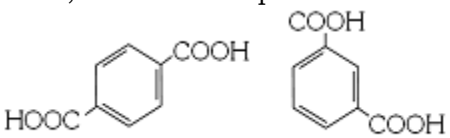
01) Ans: **2)** (ia) and (ib) are identical; (iia) and (iib) are identical, and (iiia) and (iiib) are isomers.



Sol: (i a) (i b) Both 1, 2-dichloro benzene
Thus, identical compounds.



(iia) (iib) Both, 1, 3-dimethyl benzene
Thus, identical compounds.



(iiia) (iiib)
(iiia) and (iiib) are position isomers.

02) Ans: **1)** - 125 kJ
Sol:

$CH_2 = CH_{2(g)} + H_{2(g)} \rightarrow H_3C - CH_{3(g)}$

$414 \times 4 = 1656$ $414 \times 6 = 2484$

$615 \times 1 = 615$ $347 \times 1 = 347$

$435 \times 1 = 435$ 2831

2706

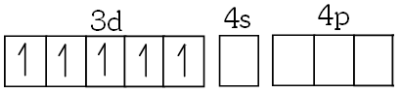
$\therefore \Delta H = 2706 - 2831 = -125$ kJ

03) Ans: **2)** One molal $CaCl_2$ solution
Sol: As $CaCl_2$ gives maximum ion, thus it has minimum freezing point.

04) Ans: **2)** 250
Sol: For reaction $A + 2B \rightleftharpoons C$, equilibrium constant is

$$K = \frac{[C]}{[A][B]^2} = \frac{0.216}{0.06 \times 0.12 \times 0.12} = 250$$

05) Ans: **2)** 5.91 BM
Sol: Given $K_3[FeF_6]$, $Fe^{3+} = [Ar]3d^5 4s^0$



So, Number of unpaired electrons = 5
$\therefore$ Magnetic moment $= \sqrt{n(n+2)} = \sqrt{5(5+2)}$
$= \sqrt{35}$ = 5.91 BM

06) Ans: **3)** 4-methyl-2-hexanol

07) Ans: **3)** N^{3-}, F^-, Na^+
Sol: N^{3-}, F^- and Na^+ because these three ions have $e^- = 10$, thus they are isoelectronic.

08) Ans: **1)** it is highly polymerized.
Sol: Since yellow phosphorus is most reactive form of phosphorus and is highly polymerized.

09) Ans: **3)** + 1.64 V
Sol: In this cell, Co is oxidized and it acts as an anode while Ce acts as cathode.

$E^0_{Cell} = E^0_{Cathode} - E^0_{Anode} \Rightarrow 1.89 = E^0_{Cell} - (-0.28)$

$E^0_{Cell} = 1.89 - 0.28 = 1.61$ Volts

10) Ans: **1)** Positive catalysts raise the energy of activation of the reaction they catalyze.

11) Ans: **1)** analgesic.
Sol: Morphine is an analgesic.

12) Ans: **4)** H_2O
Sol: Here, $NaOH + HCl \underset{\text{Reaction}}{\overset{\text{Neutralization}}{\rightleftharpoons}} \underset{\text{Salt}}{NaCl} + H_2O$

13) Ans: **1)** $CH_3CH_2NH_2$
Sol:

$CH_3CONH_2 \xrightarrow{P_2O_5} CH_3CN \xrightarrow{4H} CH_3CH_2NH_2$

14) Ans: **2)** 25.215 atm
Sol: No. of moles of $O_2 = \frac{4}{32} = 0.125$

No. of moles of $H_2 = \frac{2}{2} = 1$

$\therefore$ Total no. of moles = $1 + 0.125 = 1.125$

$$\therefore P = \frac{nRT}{V} = \frac{1.125 \times 0.082 \times 273}{1} = 25.184 \text{ atm}$$

15) Ans: **1)** similar size, same electronegativity and similar high polarizing power.

16) Ans: **1)** Maleic acid is stronger than fumaric acid
Sol: Maleic acid contains intramolecular hydrogen bonding while fumaric acid contains intermolecular hydrogen bonding.
Thus, maleic acid forms more stable maleate ion after the removal of H^+.
Therefore, maleic acid is a stronger acid than fumaric acid.

17) Ans: **3)** 3.93 g
Sol: Round off the digit at 2nd position of decimal i.e. 3.929 = 3.93.

18) Ans: **4)** Gun metal : Cu+Zn+Sn
Sol: Gun metal consists of Cu (88%), Zn (2%), Sn(10%), Pb (0.5%).

19) Ans: **4)** Vinyl chloride
Sol: Because of resonance, partial double bond character is created on vinyl chloride. Thus, chlorine atom is not replaced easily.

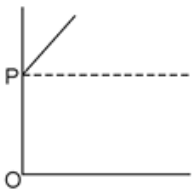
20) Ans: **2)** aluminium.
Sol: Corundum (Al_2O_3) is an ore of Al i.e. aluminium.

21) Ans: **3)** surface coating

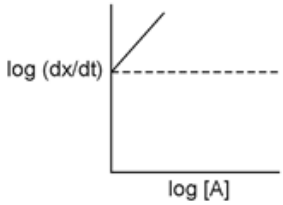
22) Ans: **3)** C_6H_5COOH
Sol: Benzoic acid i.e. C_6H_5COOH

23) Ans: **4)** diamagnetic.
Sol: In the compounds of alkaline earth metals, all the electrons are paired. Therefore, they are diamagnetic in nature.

24) Ans: **3)**



Sol: $\frac{dx}{dt} = k[A]^2 \Rightarrow \log\left(\frac{dx}{dt}\right) = \log k + 2\log[A]$



Slope $= 2 \Rightarrow$ Intercept $= \log k$.

25) Ans: **2)** Colloidal palladium
Sol: The order of adsorption of H_2 (occlusion) is Colloidal Palladium > Palladium > Platinum > Gold > Nickel.

26) Ans: **4)** MSO_4
Sol: $M_3(SO_4)_2$ implies that M is divalent, therefore formula of its sulphate is MSO_4.

27) Ans: **4)** + 7
Sol: In case of $\overset{*}{K}MnO_4$,
$1 + x - 2 \times 4 = 0 \Rightarrow x = 8 - 1 = +7$

28) Ans: **3)** aldopentose.
Sol: Ribose represents an aldopentose.

29) Ans: **2)** Cl_2CHCHO

Sol: $HC \equiv CH + 2HOCl \rightarrow [CHCl_2 - CH(OH)_2]$
$\downarrow -H_2O$
$CHCl_2 - CHO$
Dichloroacetaldehyde

30) Ans: **4)** All of the above
Sol: If a chemical industry follows green chemistry rules, it may be benefited by
-reduced costs associated with waste treatment and disposal.
-putting 'greener' products so that more and more customers are attracted.
-following environmental legislation.