

KCET PYQ 2020

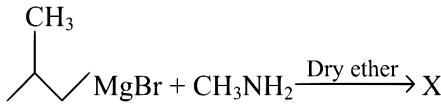
KCET PYQ 2020

CHEMISTRY

- Q1** Copper is extracted from copper pyrites by **[KCET 2020]**
 (A) thermal decomposition
 (B) reduction by coke
 (C) electrometallurgy
 (D) auto reduction
- Q2** Function of potassium ethyl xanthate in froth floatation process is to make the ore **[KCET 2020]**
 (A) lighter (B) hydrophobic
 (C) hydrophilic (D) heavier
- Q3** Sulphide ore on roasting gives a gas X. X reacts with Cl_2 in the presence of activated charcoal to give Y. Y is **[KCET 2020]**
 (A) SO_2Cl_2 (B) S_2Cl_2
 (C) SCl_6 (D) SOCl_2
- Q4** Aqueous solution of a salt (A) forms a dense white precipitate with BaCl_2 solution. The precipitate dissolves in dilute HCl to produce a gas (B) which decolourises acidified KMnO_4 solution. A and B respectively are **[KCET 2020]**
 (A) BaSO_3 , SO_2 (B) BaSO_4 , H_2S
 (C) BaSO_3 , H_2S (D) BaSO_4 , SO_2
- Q5** Bond angle is PH_4^+ is more than that of PH_3 . This is because **[KCET 2020]**
 (A) lone pair - bond pair repulsion exists in PH_3
 (B) PH_4^+ has square planar structure
 (C) PH_3 has planar trigonal structure
 (D) hybridisation of P changes when PH_3 is converted to PH_4^+
- Q6** Incorrectly matched pair is **[KCET 2020]**
 (A) XeO_3 pyramidal
 (B) XeF_4 tetrahedral
 (C) XeF_6 distorted octahedral
 (D) XeOF_4 square pyramidal
- Q7** Phosphorus pentachloride **[KCET 2020]**
 (A) on hydrolysis gives an oxo-acid of phosphorus which is tribasic
 (B) on hydrolysis gives an oxo-acid of phosphorus which is a good reducing agent
 (C) Has all the five equivalent bonds
 (D) exists as an ionic solid in which cation has octahedral structure and anion has tetrahedral structure
- Q8** Identify the set of paramagnetic ions among the following. **[KCET 2020]**
 (A) V^{2+} , Co^{2+} , Ti^{4+}
 (B) Ni^{2+} , Cu^{2+} , Zn^{2+}
 (C) Ti^{2+} , Cu^{2+} , Mn^{3+}
 (D) Sc^{3+} , Ti^{3+} , V^{3+}
- Q9** How many moles of acidified $\text{K}_2\text{Cr}_2\text{O}_7$ is required to liberate 6 moles of I_2 from an aqueous solution of I^- ? **[KCET 2020]**
 (A) 2 (B) 1
 (C) 0.25 (D) 0.5



- Q10** For Cu_2Cl_2 and CuCl_2 in aqueous medium, which of the following statement is correct? **[KCET 2020]**
 (A) CuCl_2 is more stable than Cu_2Cl_2
 (B) Stability of Cu_2Cl_2 is equal to stability of CuCl_2
 (C) Both are unstable
 (D) Cu_2Cl_2 is more stable than CuCl_2
- Q11** The coordination number of Fe and Co in the complex ions, $\text{Fe}(\text{C}_2\text{O}_4)_3^{3-}$ and $[\text{Co}(\text{SCN})_4]^{2-}$ are respectively **[KCET 2020]**
 (A) 3 and 4 (B) 6 and 8
 (C) 4 and 6 (D) 6 and 4
- Q12** Number of stereoisomers exhibited by $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ is **[KCET 2020]**
 (A) 4 (B) 2
 (C) 5 (D) 3
- Q13** Give the IUPAC name of $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_4]$ is **[KCET 2020]**
 (A) tetraammine platinum (0) tetrachlorido platinum (IV)
 (B) tetraammine palatinate (II) tetrachlorido platinum (II)
 (C) tetraammine palatinate (0) tetrachlorido platinum (IV)
 (D) tetraammine platinum (II) tetrachlorido palatinate (II)
- Q14** Prolonged exposure of chloroform in humans may cause damage to liver. It is due to the formation of the following compound. **[KCET 2020]**
 (A) CCl_4 (B) COCl_2
 (C) CH_2Cl_2 (D) Cl_2

- Q15** Which of the following halide shows highest reactivity towards $\text{S}_{\text{N}}1$ reaction? **[KCET 2020]**
 (A) $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$
 (B) $\text{CH}_3 - \text{CH}_2\text{Cl}$
 (C) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2\text{I}$
 (D) $\text{C}_6\text{H}_5\text{Cl}$
- Q16** In the reaction,

 The number of possible isomers for the organic compound X is **[KCET 2020]**
 (A) 4 (B) 5
 (C) 3 (D) 2
- Q17** Which of the following on heating gives an ether as major products?
 (P) $\text{C}_6\text{H}_5\text{CH}_2\text{Br} + \text{CH}_3\text{ONa}$
 (Q) $\text{C}_6\text{H}_5\text{ONa} + \text{CH}_3\text{Br}$
 (R) $(\text{CH}_3)_3\text{C} - \text{Cl} + \text{CH}_3\text{ONa}$
 (S) $\text{C}_6\text{H}_5\text{CH} = \text{CHCl} + \text{CH}_3\text{ONa}$ **[KCET 2020]**
 (A) Both (R) and (S)
 (B) Both (P) and (R)
 (C) Both (Q) and (S)
 (D) Both (P) and (Q)
- Q18** The steps involved in the conversion of propan-2-ol to propan-1-ol are in the order **[KCET 2020]**
 (A) dehydration, addition of HBr , heating with aq. KOH
 (B) heating with PCl_5 , heating with alc. KOH , acid catalysed addition of water
 (C) heating with PCl_5 , heating with alc. KOH , hydroboration oxidation
 (D) dehydration, addition of HBr in presence of peroxide, heating with alc. KOH

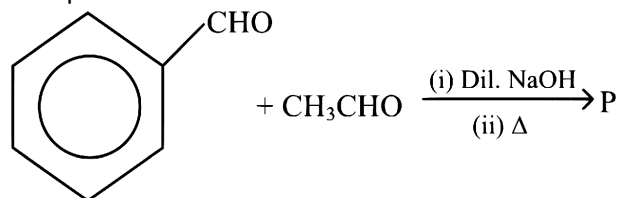


Q19 Which of the following is the strongest base ?

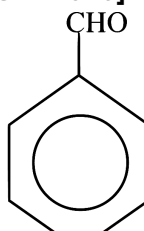
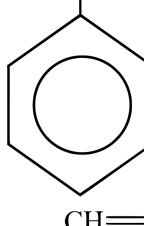
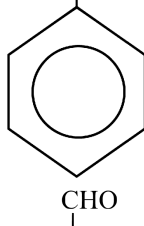
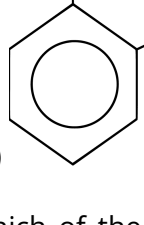
[KCET 2020]

- (A) CH_3O^- (B) Cl^-
(C) HO^- (D) CH_3COO^-

Q20 The product 'P' is



[KCET 2020]

- 
 (A) CH_2CHO
 $\text{CH}=\text{CH}-\text{CH}_3$

 (B) $\text{CH}=\text{CHCHO}$

 (C) CHO

 (D) CH_2CHO

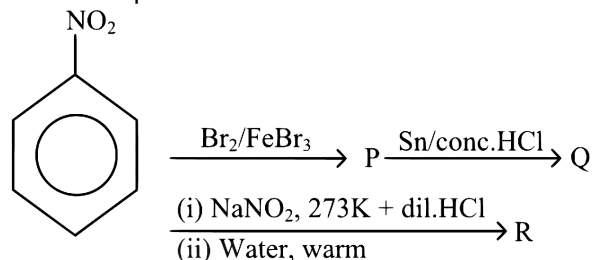
Q21 Which of the following has the lowest boiling point? [KCET 2020]

- (A) $\text{CH}_3\text{CH}_2\text{OH}$
(B) $\text{CH}_3-\text{CH}_2-\text{NH}_2$
(C) CH_3OCH_3
(D) HCOOH

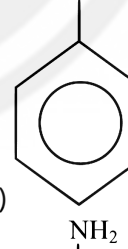
Q22 The carbonyl compound that does not undergo aldol condensation is [KCET 2020]

- (A) acetone
(B) dichloro acetaldehyde
(C) trichloro acetaldehyde
(D) acetaldehyde

Q23 The final product for the reaction is



[KCET 2020]

- 
 (A) 
 (B) 
 (C) 
 (D)

Q24 Hinsberg's reagent is [KCET 2020]

- (A) $(\text{CH}_3\text{CO})_2\text{O}$ /pyridine
(B) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$
(C) $\text{C}_6\text{H}_5\text{SO}_2\text{NH}_2$
(D) CH_3COCl /pyridine



- Q25** Which one of the following vitamins is not stored in adipose tissue ? **[KCET 2020]**
 (A) A (B) B₆
 (C) D (D) E
- Q26** Hypothyroidism is caused by the deficiency of **[KCET 2020]**
 (A) vitamin B-12 (B) adrenalin
 (C) thyroxine (D) glucocorticoid
- Q27** C₁ – C₄ glycosidic bond is not found in **[KCET 2020]**
 (A) maltose (B) sucrose
 (C) lactose (D) starch
- Q28** Which of the following polymer has strongest intermolecular forces of attraction ? **[KCET 2020]**
 (A) Neoprene (B) Terylene
 (C) Polythene (D) Polystyrene
- Q29** Which of the following monomers can undergo condensation polymerisation? **[KCET 2020]**
 (A) Styrene (B) Glycine
 (C) Isoprene (D) Propene
- Q30** A food additive that acts as an antioxidant is **[KCET 2020]**
 (A) BHA (B) saccharin
 (C) sugar syrup (D) salt
- Q31** Which of the following is not related to drug-enzyme interaction? **[KCET 2020]**
 (A) Allosteric site
 (B) Antagonist
 (C) Co-enzymes
 (D) Enzyme inhibitor
- Q32** 0.4 g of dihydrogen is made to react with 7.4 g of dichlorine to form hydrogen chloride. The volume of hydrogen chloride formed at 273 K and 1 bar pressure is **[KCET 2020]**
 (A) 9.08 L (B) 4.67 L
 (C) 90.8 L (D) 45.4 L
- Q33** With regard to photoelectric effect, identify the correct statement among the following.
 (A) Energy of electron ejected increases with the increase in the intensity of incident light.
 (B) Number of electron ejected increases with the increase in the frequency of incident light.
 (C) Number of electron ejected increases with the increase in work function.
 (D) Number of electron ejected increases with the increase in the intensity of incident light.
- Q34** The last element of the p-block in 6th period is represented by the outer most electronic configuration.
 (A) 7s², 7p⁶
 (B) 5f¹⁴, 6d¹⁰, 7s², 7p⁵
 (C) 4f¹⁴, 5d¹⁰, 6s², 6p⁴
 (D) 4f¹⁴, 5d¹⁰, 6s², 6p⁶
- Q35** The conjugate base of NH₃ is **[KCET 2020]**
 (A) NH₄⁺ (B) NH₄OH
 (C) NH₂OH (D) NH₂⁻
- Q36** A gas mixture contains 25% He and 75% CH₄ by volume at a given temperature and pressure.
 The percentage by mass of methane in the mixture is approximately. _____ **[KCET 2020]**
 (A) 75% (B) 25%
 (C) 92% (D) 8%
- Q37** The percentage of s-character in the hybrid orbitals of nitrogen in NO₂⁺, NO₃⁻, NH₄⁺ respectively are **[KCET 2020]**
 (A) 33.3%, 50%, 25%
 (B) 33.3%, 25%, 50%
 (C) 50%, 33.3%, 25%
 (D) 25%, 50%, 33.3%



Q38 The formal charge on central oxygen atom in ozone is **[KCET 2020]**

- (A) -1 (B) 0
(C) +2 (D) +1

Q39 When the same quantity of heat is absorbed by a system at two different temperatures T_1 and T_2 , such that $T_1 > T_2$, change in entropies are ΔS_1 and ΔS_2 respectively. Then **[KCET 2020]**

- (A) $\Delta S_1 < \Delta S_2$
(B) $\Delta S_1 = \Delta S_2$
(C) $S_1 > S_2$
(D) $\Delta S_2 < \Delta S_1$

Q40 The oxidation number of nitrogen atoms in NH_4NO_3 are **[KCET 2020]**

- (A) +5, +5
(B) -3, +5
(C) +3, -5
(D) -3, -3

Q41 A Lewis acid 'X' reacts with LiAlH_4 in ether medium to give a highly toxic gas. This gas when heated with NH_3 gives a compound commonly known as inorganic benzene. The gas is **[KCET 2020]**

- (A) B_2O_3 (B) B_2H_6
(C) $\text{B}_3\text{N}_3\text{H}_6$ (D) BF_3

Q42 The oxide of potassium that does not exist is **[KCET 2020]**

- (A) K_2O (B) KO_2
(C) K_2O_2 (D) K_2O_3

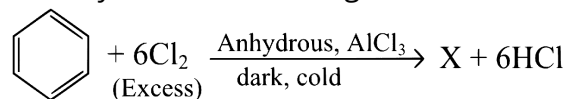
Q43 The metal that produce H_2 with both dil. HCl and NaOH(aq) is **[KCET 2020]**

- (A) Zn (B) Mg
(C) Ca (D) Fe

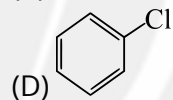
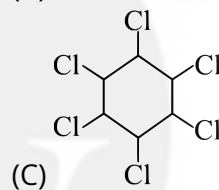
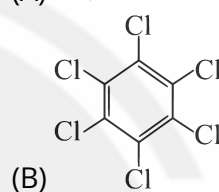
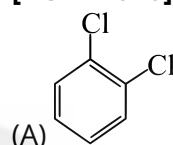
Q44 Which of the following is not a pair of functional isomers? **[KCET 2020]**

- (A) $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ and $\text{C}_3\text{H}_7\text{OCH}_3$
(B) $\text{CH}_3\text{CH}_2\text{OH}$ and CH_3OCH_3
(C) $\text{CH}_3\text{CH}_2\text{NO}_2$ and $\text{H}_2\text{NCH}_2\text{COOH}$
(D) CH_3COOH and HCOOCH_3

Q45 Identify 'X' in the following reaction.



[KCET 2020]



Q46 Which of the following is not a green house gas? **[KCET 2020]**

- (A) CFC (B) CO_2
(C) O_2 (D) NO_2

Q47 A metal exists as an oxide with formula $\text{M}_{0.96}\text{O}$. Metal, M can exist as M^{2+} and M^{3+} in its oxide $\text{M}_{0.96}\text{O}$. The percentage of M^{3+} in the oxide is nearly **[KCET 2020]**

- (A) 8.3% (B) 4.6%
(C) 5% (D) 9.6%



Q48 A metal crystallises in face centred cubic structure with metallic radius $\sqrt{2}A$. The volume of the unit cell (in m^3) is **[KCET 2020]**

- (A) 4×10^{-10}
 (B) 6.4×10^{-29}
 (C) 4×10^{-9}
 (D) 6.4×10^{-30}

Q49 Silicon doped with gallium forms **[KCET 2020]**

- (A) n-type semiconductor
 (B) both n and p-type semiconductor
 (C) an intrinsic semiconductor
 (D) p-type semiconductor

Q50 The pair of electrolytes that possess same value for the constant (A) in the Debye-Huckel-Onsager equation, $\Lambda_m = \Lambda_m^\circ - A\sqrt{C}$ is **[KCET 2020]**

- (A) $MgSO_4$, $NaSO_4$ (B) NH_4Cl , $NaBr$
 (C) $NaBr$, $MgSO_4$ (D) $NaCl$, $CaCl_2$

Q51 Which of the following pair of solutions is isotonic? **[KCET 2020]**

- (A) 0.01 M $BaCl_2$ and 0.015 M $NaCl$
 (B) 0.001 M $Al_2(SO_4)_3$ and 0.001 M $BaCl_2$
 (C) 0.001 M $CaCl_2$ and 0.001 M $Al_2(SO_4)_3$
 (D) 0.01 M $BaCl_2$ and 0.001 M $CaCl_2$

Q52 Solute 'X' dimerises in water to the extent of 80%. 2.5g of 'X' in 100 g of water increases the boiling point by 0.3° . The molar mass of 'X' is

$[K_b = 0.52 \text{ K kg mol}^{-1}]$ **[KCET 2020]**

- (A) 13 (B) 52
 (C) 65 (D) 26

Q53 Given

$$E_{Fe^{3+}/Fe^{2+}}^\circ = +0.76V \text{ and } E_{I_2/I^-}^\circ = +0.55 V$$

The equilibrium constant for the reaction taking place in galvanic cell consisting of above two electrodes is $\left[\frac{2303 RT}{F} = 0.06\right]$ **[KCET 2020]**

- (A) 1×10^7 (B) 1×10^9
 (C) 3×10^8 (D) 5×10^{12}

Q54 If an aqueous solution of NaF is electrolysed between inert electrodes, the product obtained at anode is **[KCET 2020]**

- (A) F_2 (B) H_2
 (C) Na (D) O_2

Q55 In which of the following cases a chemical reaction is possible? **[KCET 2020]**

- (A) $ZnSO_4(aq)$ is placed in a copper vessel
 (B) $AgNO_3$ solution is stirred with a copper spoon
 (C) Conc. HNO_3 is stored in a platinum vessel
 (D) gold ornaments are washed with dil. HCl

Q56 The time required for 60% completion of a first order reaction is 50 min. The time required for 93.6% completion of the same reaction will be **[KCET 2020]**

- (A) 100 min (B) 83.8 min
 (C) 50 min (D) 150 min

Q57 For an elementary reaction $2A + 3B \rightarrow 4C + D$ the rate of appearance of C at time 't' is $2.8 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$. Rate of disappearance of B at 't' will be **[KCET 2020]**

- (A) $\frac{4}{3}(2.8 \times 10^{-3}) \text{ mol L}^{-1} \text{ s}^{-1}$
 (B) $\frac{3}{4}(2.8 \times 10^{-3}) \text{ mol L}^{-1} \text{ s}^{-1}$
 (C) $2(2.8 \times 10^{-3}) \text{ mol L}^{-1} \text{ s}^{-1}$
 (D) $\frac{1}{4}(2.8 \times 10^{-3}) \text{ mol L}^{-1} \text{ s}^{-1}$



Q58 The rate constant of a reaction is given by $k = PZe^{-E_a/RT}$ under standard notation. In order to speed up the reaction, which of the following factors has to be decreased? [KCET 2020]

- (A) Z (B) Both Z and T
(C) E_a (D) T

Q59 A sol of AgI is prepared by mixing equal volumes of 0.1 M AgNO_3 and 0.2 M KI, which of the following statement is correct ? [KCET 2020]

- (A) Sol obtained is a negative sol with NO_3^- adsorbed on AgI.
(B) Sol obtained is a positive sol with Ag^+ adsorbed on AgI.
(C) Sol obtained is a positive sol with K^+ adsorbed on AgI.
(D) Sol obtained is a negative sol with I^- adsorbed on AgI.

Q60 During adsorption of a gas on a solid at low temperature [KCET 2020]

- (A) $\Delta G < 0, \Delta H < 0, \Delta S < 0$
(B) $\Delta G > 0, \Delta H > 0, \Delta S > 0$
(C) $\Delta G < 0, \Delta H < 0, \Delta S > 0$
(D) $\Delta G < 0, \Delta H > 0, \Delta S < 0$



Answer Key

Q1 D
Q2 B
Q3 A
Q4 A
Q5 A
Q6 B
Q7 A
Q8 C
Q9 A
Q10 A
Q11 D
Q12 D
Q13 D
Q14 B
Q15 A
Q16 D
Q17 D
Q18 C
Q19 D
Q20 C
Q21 C
Q22 C
Q23 B
Q24 B
Q25 B
Q26 C
Q27 B
Q28 B
Q29 B
Q30 A

Q31 B
Q32 B
Q33 D
Q34 D
Q35 D
Q36 C
Q37 C
Q38 D
Q39 A
Q40 B
Q41 B
Q42 D
Q43 A
Q44 A
Q45 B
Q46 C
Q47 A
Q48 B
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Q50 B
Q51 A
Q52 D
Q53 A
Q54 D
Q55 B
Q56 D
Q57 B
Q58 C
Q59 D
Q60 A

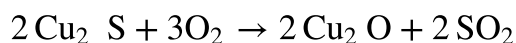
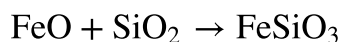
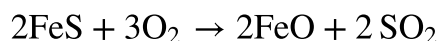


Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

Copper is extracted from copper pyrites by auto reduction process in the following manner.

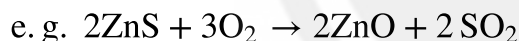
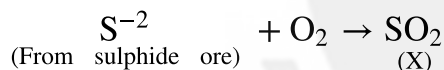


Q2 Text Solution:

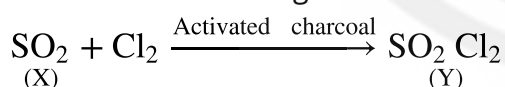
The role/function of potassium ethyl xanthate in the froth floatation process is to increase the non-wettability of mineral particles by making it hydrophobic. These are also given the name collectors.

Q3 Text Solution:

When sulphide ore is roasted it means that sulphide ore is being heated in the presence of excess of air to form a gas SO_2 .



Thereafter, X reacts with Cl_2 in the presence of activated charcoal to give



Q4 Text Solution:

$\text{BaSO}_3(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4 + \text{other product}$
dense white precipitate

$\text{BaSO}_4 + \text{HCl} \rightarrow \text{SO}_2(\text{g}) + \text{other product}$ white ppt.

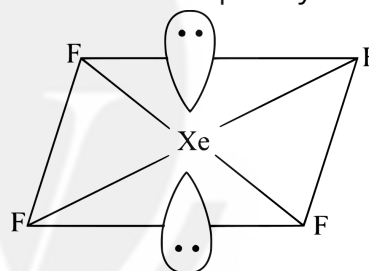
We know that, KMnO_4 can be decoloured by gas SO_2 . So, A will be BaSO_3 and B will be SO_2 .

Q5 Text Solution:

Bond angle of PH_4^+ is more than that of PH_3 as in PH_3 due to greater lone pair-bond pair repulsions than the bond pair-bond pair repulsions, the tetrahedral angle decreases from $109^\circ 28'$ to 93.6° and has a pyramidal structure. In PH_4^+ , there are four bond pairs and no lone pair and due to the absence of lone pair-bond pair repulsions and presence of four identical bond pair-bond pair interactions PH_4^+ has tetrahedral geometry with bond angle 109° .

Q6 Text Solution:

XeF_4 tetrahedral is the incorrectly matched pair as XeF_4 is actually having square planar structure with sp^3d^2 hybridisation.



Q7 Text Solution:

Phosphorus pentachloride on hydrolysis gives an oxo acid of phosphorus which is tribasic.



Here, phosphoric acid (H_3PO_4) is tribasic.



Q8 Text Solution:

Out of the given four options, the following set of ions is paramagnetic: Ti^{2+} , Cu^{2+} , Mn^{3+}

Ti $4s^2, 3d^2$ (ground state) Ti^{2+} $3d^2$ 2 unpaired electrons.

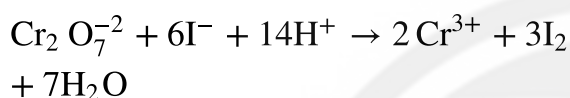
Cu $4s^1, 3d^{10}$ (ground state) Cu^{2+} $3d^9$ 1 unpaired electrons.

Mn $4s^2, 3d^5$ (ground state) Mn^{3+} $3d^4$ 4 unpaired electrons.

A substance is called paramagnetic if it contains at least one unpaired electron.

Q9 Text Solution:

We know,



Here, 3 moles of I_2 liberation requires one mol of $\text{K}_2\text{Cr}_2\text{O}_7$ for getting 6 moles of I_2 we will require two moles of $\text{K}_2\text{Cr}_2\text{O}_7$.

Q10 Text Solution:

Out of Cu_2Cl_2 and CuCl_2 in aqueous medium, CuCl_2 is more stable than Cu_2Cl_2 as Cu^{2+} (aq) is more stable than Cu^+ (aq) due to more negative enthalpy of hydration which compensates for the second ionisation enthalpy of Cu.

In CuCl_2 , Cu is in Cu^{2+} state and in Cu_2Cl_2 , Cu is in Cu^+ state

Q11 Text Solution:

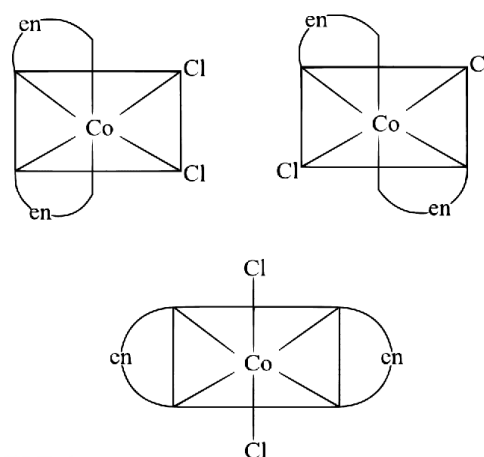
The coordination number of Fe in $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ is 6 and Co in $[\text{Co}(\text{SCN})_4]^{2-}$ is 4. It is because $\text{C}_2\text{O}_4^{2-}$ is a bidentate ligand. So, $3 \times 2 = 6$

SCN^- is a monodentate ligand $4 \times 1 = 4$

So, depending upon the number of the ligands, we can calculate the coordination number of central metal atom.

Q12 Text Solution:

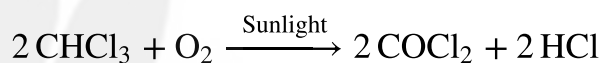
The number of stereoisomers exhibited by $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ is

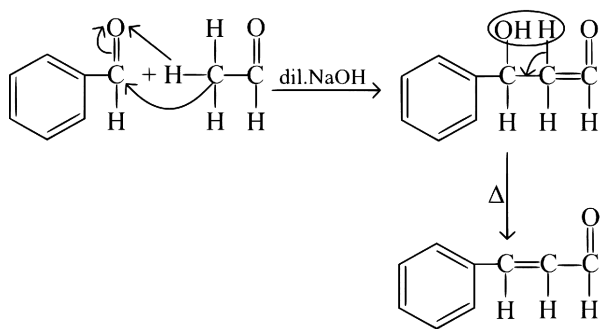
**Q13 Text Solution:**

The IUPAC name of $[\text{Pt}(\text{NH}_3)_4][\text{PtCl}_4]$ is tetraammineplatinum (II) tetrachloridoplatinate (II).

Q14 Text Solution:

The prolonged exposure of chloroform in humans may cause damage to liver. It is because of the formation of phosgene COCl_2 .



Q20 Text Solution:

Here, aldol condensation reaction is taking place.

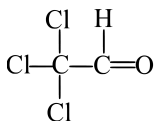
Q21 Text Solution:

We are given alcohol, carboxylic acid, amine and ether. So, the boiling point of ether ($\text{CH}_2 - \text{O} - \text{CH}_3$) will be lowest in alcohol and carboxylic acid and amines, there is H-bonding responsible for higher boiling point as compared to ether.

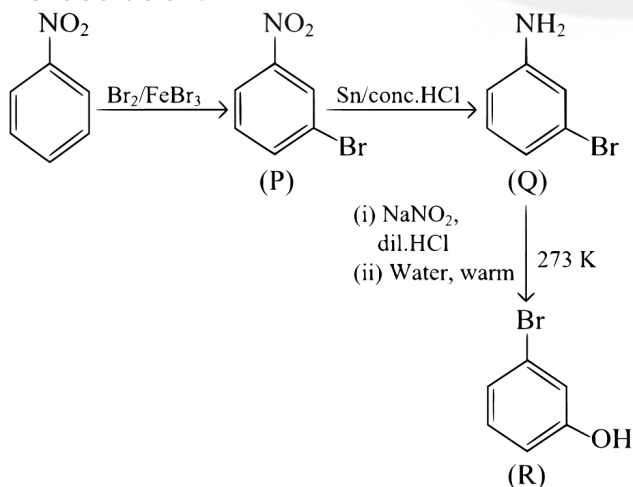
Q22 Text Solution:

Any carbonyl compound having α -hydrogen will undergo aldol condensation.

In



there is no α -hydrogen on trichloroacetaldehyde and hence, it will not show aldol condensation reaction.

Q23 Text Solution:**Q24 Text Solution:**

Hinsberg reagent is $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$, (benzene sulphonyl chloride) which is used for detection and confirmation of primary, secondary and tertiary amines.

Q25 Text Solution:

Vitamin B_6 is not stored in adipose tissue. It is a water-soluble vitamin, unlike vitamins A, D, and E which are fat-soluble and hence stored in adipose tissue.

Q26 Text Solution:

Hypothyroidism is caused due to deficiency of thyroxine. Which is normally secreted by thyroid gland and it controls the metabolism of carbohydrates lipids and proteins.

Q27 Text Solution:

Sucrose does not contain $\text{C}_1 - \text{C}_4$ glycosidic linkage as the glycosidic linkage in sucrose is between $\text{C}_1 - \alpha$ of glucose and $\text{C}_2 - \beta$ of fructose.

Q28 Text Solution:

Neoprene have the weakest intermolecular forces as it is a elastomer. There are only few cross-links between the chains.

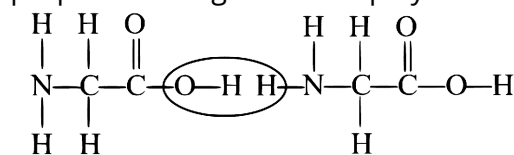
Terylene have strong intermolecular forces like dipole-dipole interaction. It is a fibre type of polymer.

Polyster and polythene are thermoplastic types of polymer. They have intermolecular forces, which are intermediate between those of elastomers and fibres.

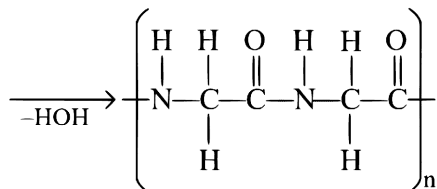


Q29 Text Solution:

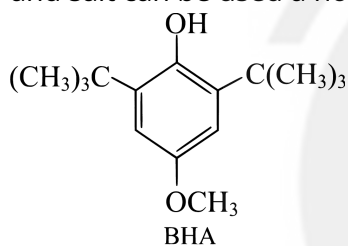
Glycine undergo condensation polymerisations while styrene, isoprene and propene undergo addition polymerisation.



(Glycine)

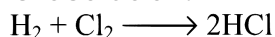
**Q30 Text Solution:**

BHA-Butylated hydroxy anisole acts as a food additive, which works as antioxidant. While saccharin is a sugar substitute and sugar syrup and salt can be used as normal preservatives.

**Q31 Text Solution:**

Antagonist is not related to drug enzyme interaction as antagonist is a substance which interferes with or inhibits the physiological action of another substance. LSD is a serotonin antagonist.

While allosteric site, Co-enzymes and enzymes inhibitors are all related to drug enzyme interaction.

Q32 Text Solution:

1 mol	1 mol	2 mol or (2 × 22.4 L at STP)
2g	71g	73g

71 g Cl₂ requires 2 g H₂, then 7

.4 g Cl₂ will require,

how much gram H₂.

$$\therefore \text{H}_2 \text{ required} = \frac{2 \times 7.4}{71} = 0.208 \text{ gm}$$

$\therefore$ Cl₂ is limiting reagent [$\because$ H₂ is in excess]

$\therefore$ Amount of HCl formed will depend on

71 gm Cl₂ 44.8 L HCl

7.4 gm Cl₂ x L HCl

$$\therefore x = \frac{7.4 \times 44.8}{71}$$

x = 4.67 L of HCl gas is formed.

Q33 Text Solution:

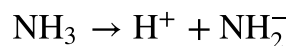
Photoelectric effect takes place when the rays of light falls on the surface of a metal with low ionisation energy, ejection of electrons from the surface of the metal takes place. The frequency of light being used, should be suitable. Also, the number of electrons emitted is directly proportional to the intensity of light but does not depend upon its frequency. However, the velocity of the emitted electrons is dependent on frequency of light used.

Q34 Text Solution:

The last element in the sixth period will be noble gas Rn with atomic number 86 and electronic configuration 4f¹⁴, 5d¹⁰, 6s², 6p⁶.

Q35 Text Solution:

The conjugate base of NH₃ can be obtained after removal of one hydrogen ion.



So, NH₂⁻ is the conjugate base of NH₃.

Q36 Text Solution:

Gas mixture contains 25% He and 75% CH₄ by volumes. We have to calculate the mass percentage of methane in the mixture.

molar mass of He = 4 molar mass of CH₄ = 16

$\therefore$ Mass percentage of methane in the mixture

$$\text{shall be} = \frac{75 \times 16}{25 \times 4 + 75 \times 16} \times 100 = 92\%$$



Q37 Text Solution:

NO_2^+ shows sp -hybridisation and as such the s -character here shall be 50%.

NO_3^- shows sp^2 hybridisation, so the s -character shall be 33.3%.

NH_4^+ shows sp^3 hybridisation, so the s -character shall be 25%

Q38 Text Solution:

The formal charge can be calculated as:

$$\begin{aligned} \text{Formal charge on atom in Lewis structure} &= \left[\begin{array}{l} \text{Total number of valence electrons on free atom} \\ \text{Total number of shared electrons on atom} \\ \text{Total number of unshared valence electron of the atom} \end{array} \right] \\ &= \left[\begin{array}{l} \text{Total number of valence electrons on free atom} \\ - \frac{1}{2} \left[\text{Total number of shared electrons on atom} \right] \\ - \left[\text{Total number of unshared valence electron of the atom} \right] \end{array} \right] \end{aligned}$$

Here, formal charge on central oxygen in ozone = $6 - \frac{1}{2}(6) - 2 = +1$

Q39 Text Solution:

When the same quantity of heat is absorbed by a system at two different temperatures, T_1 and T_2 , such that $T_1 > T_2$, the change in entropies are ΔS_1 and ΔS_2 respectively.

Given that entropy change is given by :

$$\Delta S = \frac{Q}{T}$$

$$\Delta S = \frac{Q}{T}$$

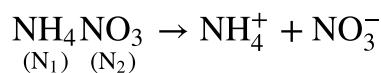
For the same heat absorbed,

$$\Delta S_1 = \frac{Q}{T_1}$$

$$\Delta S_2 = \frac{Q}{T_2}$$

Since $T_1 > T_2$,

$$\Delta S_1 < \Delta S_2.$$

Q40 Text Solution:

For oxidation number of

$$\text{N}_1 \rightarrow x + 4 = +1$$

$$x = +1 - 4 = -3$$

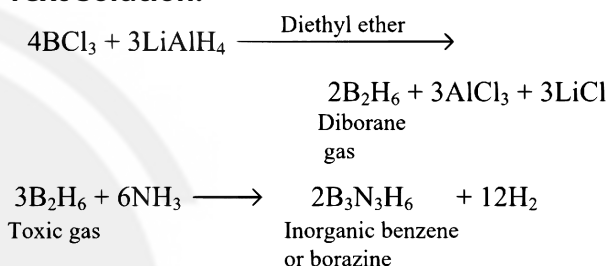
So, oxidation state of first nitrogen is -3 .

For oxidation state of second nitrogen

$$(\text{N}_2) \rightarrow x - 6 = -1$$

$$x = -1 + 6 = +5$$

So, the answer is -3 and $+5$.

Q41 Text Solution:

So, the toxic gas is diborane.

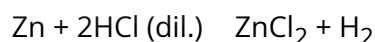
Q42 Text Solution:

K_2O_2 may exist.

K_2O exists.

KO_2 also exists.

But, K_2O_3 can not exist as O_3^{2-} is not a stable entity.

Q43 Text Solution:

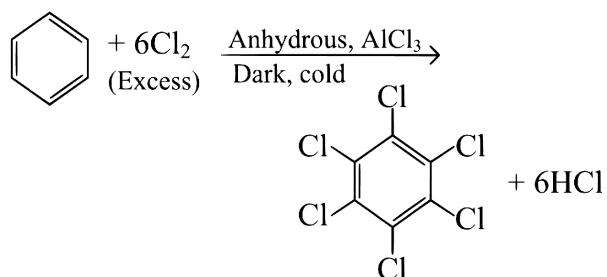
But, Mg, Ca and Fe do not produce hydrogen, when react with aqueous NaOH.

Q44 Text Solution:

Functional isomers contain two different functional groups like aldehydes $\text{CH}_3\text{CH}_2\text{CHO}$ and ketones CH_3COCH_3

But, in case of $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$ and $\text{C}_3\text{H}_7\text{OCH}_3$ both functional groups are same i.e. ether.



Q45 Text Solution:**Q46 Text Solution:**

Green house gases are the gases which are forming a layer in the atmosphere and prevent the reflected sun rays going upward and as such are responsible for increasing the temperature. CFC, CO_2 and NO_2 are green house gases while O_2 is not a green house gas.

Q47 Text Solution:

We are given metal oxide with formula $\text{M}_{0.96}\text{O}$

Here, M can exist as M^{2+} as well as M^{3+} Here, for every 100 oxide ions there are 96 M ions.

Let out of this 96M ions, M^{2+} exists = x and M^{3+} will be = (96 - x)

Total positive charge on 96 M-atoms = $2x + 3(96 - x)$

Total negative charge on 1000-atoms = $100 \times 2 = 200$

As per electrical neutrality concept

$$2x + 3(96 - x) = 200$$

$$2x + 288 - 3x = 200$$

$$-x = 200 - 288$$

$$-x = -88 \text{ or } x = 88$$

$$96 - 88 = 8$$

So, the ratio of M^{3+} will be $\frac{8}{96} \times 100 = 8.3\%$

Q48 Text Solution:

For a face-centred cubic (FCC) structure, the relation between the edge length (a) and the

atomic radius (r) is given by: $a = 2\sqrt{2}r$

Given the metallic radius (r) is $\sqrt{2}\text{\AA}$

$$: r = \sqrt{2}\text{\AA} = \sqrt{2} \times 10^{-10} \text{ m}$$

Thus, the edge length (a) becomes : a

$$= 2\sqrt{2} \times \sqrt{2} \times 10^{-10} \text{ m} = 4 \times 10^{-10} \text{ m}$$

The volume of the unit cell

(V) in cubic meters is given by : $V = a^3$

Substituting the edge length : V

$$= (4 \times 10^{-10} \text{ m})^3 = 64 \times 10^{-30} \text{ m}^3 = 6.4 \times 10^{-29} \text{ m}^3$$

Therefore,

the correct volume of the unit cell is

: Option B $6.4 \times 10^{-29} \text{ m}^3$

Q49 Text Solution:

Silicon belongs to group 14 and gallium comes in group 13. So, when Si is doped with Ga, p-type of semiconductor is produced as group 13 elements have only 3 valence electrons, there on combination with group 14 elements produce an electron deficient bond or have electron vacancy and as such can move through the crystal like a positive charge giving rise to electrical conductivity.

Q50 Text Solution:

$$\Lambda_m = \Lambda_m^\circ - A\sqrt{C}$$

Out of all the given pairs, the pair having same (similar) charges will possess the same value of A.

Here, MgSO_4 and Na_2SO_4 Mg^{2+} and Na^+

NH_4Cl and $\text{NaBr} \rightarrow \text{NH}_4^+$ and Na^+

NaBr and $\text{MgSO}_4 \rightarrow \text{Na}^+$ and Mg^{2+}

NaCl and $\text{CaCl}_2 \rightarrow \text{Na}^+$ and Ca^{2+}

So, only in NH_4Cl and NaBr , the charge is same on both the cations and hence, there will have same value of A.



Q51 Text Solution:

To solutions are isotonic, if their osmotic pressure are same.

Here, 0.01 M BaCl_2 and 0.015 M NaCl will have same value of osmotic pressure.

We know, $\pi = CRT$

Here, R and T are constant and their value is same for both the solutions.

$\pi = C_{\text{effective}} RT$

If $C_{\text{effective}}$ of two solutions are equal then their osmotic pressures will also be equal.



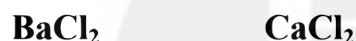
(a) $C_{\text{effective}} = 0.01 \times 3 = 0.03$ and $0.015 \times 2 = 0.03$



(b) $C_{\text{effective}} = 0.001 \times 5 = 0.005$ and $0.01 \times 3 = 0.03$



(c) $C_{\text{effective}} = 0.001 \times 3 = 0.003$ and $0.001 \times 5 = 0.005$



(d) $C_{\text{effective}} = 0.01 \times 3 = 0.03$ and $0.001 \times 3 = 0.003$

So, option (a) has equal value of $C_{\text{effective}}$ and hence, this pair will be isotonic.

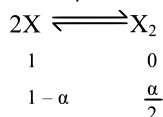
Q52 Text Solution:

Here, 2.5 gX in 100 g water is increasing boiling point by 0.3°C and X is getting dimerise to the extent of 80%.

Molar mass of X = ?

$K_b = 0.52$

Here,



$$i = \frac{1 - \alpha + \frac{\alpha}{2}}{1} = 1 - 0.8 + \frac{0.8}{2} \left(\text{Due to } 80\% \text{ dimerisation} \right)$$

$i = 0.6$

$$\begin{aligned} \text{Now, } M &= K_b \left(\frac{w_B \times 1000}{w_A \times \Delta T_b} \right) \times i \\ &= 0.52 \left(\frac{2.5 \times 1000}{100 \times 0.3} \right) = \frac{52}{100} \times \frac{25}{3} \times 10 \times 0.6 \\ &= 26 \end{aligned}$$

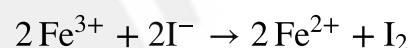
Q53 Text Solution:

$E^\circ_{\text{Fe}^{3+}/\text{Fe}^{2+}} = 0.76 \text{ V}$ and $E^\circ_{\text{I}_2/\text{I}^-} = 0.55 \text{ V}$

$K = ?$

Also $\frac{2.303 RT}{F} = 0.06$

Here, I_2/I^- will act as anode and $\text{Fe}^{3+}/\text{Fe}^{2+}$ will act as cathode.



Here, $n = 2$

$$E^\circ_{\text{cell}} = E_{\text{cathode}} - E_{\text{anode}} = 0.76 - 0.55 = +0.21$$

$$\begin{aligned} \Delta G^\circ &= -nFE^\circ_{\text{cell}} = -2(96500) \times 0.21 \\ &= -40530 \text{ J} \end{aligned}$$

Also, $\Delta G = -2.303 RT \log K_c$

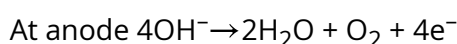
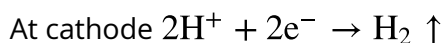
$$\begin{aligned} \text{So, } \log K_c &\&= \frac{\Delta G}{- \left(\frac{2.303 RT}{F} \right) \times F} \\ &= \frac{+40530}{-(0.06) \times 96500} = \frac{40530}{5790} \end{aligned}$$

$\log K_c = 7$

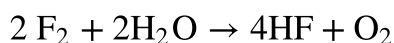
$K_c = 1 \times 10^7$

Q54 Text Solution:

Aqueous NaF , when electrolysed between inert electrodes we always get O_2 at anode, as:



Also, if any fluorine is liberated, that too reacts with H_2O .



So, ultimate product is oxygen.



Q55 Text Solution:

A chemical reaction is possible when AgNO_3 solution is stirred with copper spoon as copper has lesser positive value of standard electrode reduction potential as compared to Ag.

The reaction will be, $2\text{AgNO}_3 + \text{Cu} \rightarrow \text{Cu}(\text{NO}_3)_2 + 2\text{Ag}$

Q56 Text Solution:

Time for 60% completion 50 min for first order reaction.

Time required for 93.6% completion = ?

$$k = \frac{2.303}{50} \log \frac{a}{a-0.6a} \Rightarrow k = \frac{2.303}{50} \log \frac{a}{0.4a}$$

$$k = \frac{2.303}{50} \log 2.5$$

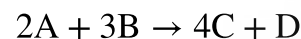
$$\text{Also, } k = \frac{2.303}{x} \log \frac{a}{a-0.936a}$$

$$\therefore \frac{2.303 \log 2.5}{50} = \frac{2.303}{x} \log \frac{a}{0.064a}$$

$$x = 50 \times \frac{\log \frac{1000}{64}}{\log 2.5}$$

$$= 50 \times \frac{\log 15.625}{\log 2.5} = \frac{1.19 \times 50}{0.398} = \frac{59.5}{0.398}$$

$$= 150 \text{ min}$$

Q57 Text Solution:

$$\frac{d(\text{C})}{dt} = 2.8 \times 10^{-3} \text{ mol L}^{-1}$$

$$\text{s}^{-1} \left(\text{at time } t \right)$$

$$-\frac{d(\text{B})}{dt} = ?$$

$$-\frac{1}{3} \frac{d(\text{B})}{dt} = +\frac{1}{4} \frac{d(\text{C})}{dt}$$

$$\text{Rate of disappearance of B} = \frac{3}{4}$$

$$\times \text{rate of appearance of C}$$

$$= \frac{3}{4} \times 2.8 \times 10^{-3}$$

Q58 Text Solution:

$$\therefore k = PZ e^{-E_a/RT}$$

The above reaction expression is given in terms of exponents. We have to increase the speed of reaction. So, value of k has to be more and as per the given expression.

$$k \propto \frac{1}{e^{E_a/RT}}$$

if E_a decreases,

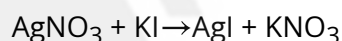
than $[e^{E_a/RT}]$ also decreases and $\left[\frac{1}{e^{E_a/RT}} \right]$ increases.

$\therefore k$ also increases

Q59 Text Solution:

Whenever a sol of silver iodide is prepared by mixing equal volumes of 0.1 M AgNO_3 and 0.2

M KI, the sol will be a negative sol with I^- adsorbed on AgI. The reaction will be.



Here, molarity of KI is more than that of AgNO_3 and hence, I^- will be adsorbed on AgI to produce a negative sol.

Q60 Text Solution:

Adsorption is an exothermic process with $\Delta H =$ negative and since, gas is being adsorbed to a solid the randomness of the gas is decreasing making $\Delta S < 0$

$$\text{Also, } \Delta G = \Delta H - T\Delta S$$

Here, $T\Delta S$ is small negative value at low temperature and hence, $\Delta G < 0$

Which supports the spontaneity of the adsorption.


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