



DETAILED SOLUTIONS

1. The first chlorinated organic insecticide prepared is:
 A) Gammexane B) Chloroform C) COCl_2 D) DDT

Ans: D

2. Which of the following crystals has the unit cell such that $a = b \neq c$ and $\alpha = \beta = 90^\circ$, $\gamma = 120^\circ$?
 A) Zinc blende B) Graphite
 C) Cinnabar D) Potassium dichromate

Ans: B

3. MnO exhibits:
 A) Ferrimagnetism B) Antiferromagnetism
 C) Ferromagnetism D) Paramagnetism

Ans: B

4. The number of atoms in 4.5 g of a face-centred cubic crystal with edge length 300 pm is: (Given density = 10 g cm^{-3} and $N_A = 6.022 \times 10^{23}$)
 A) 6.6×10^{20} B) 6.6×10^{23} C) 6.6×10^{19} D) 6.6×10^{22}

Ans: D

$$d = \frac{Zm}{a^3 N_A} \quad m = \frac{da^3 N_A}{Z} = \frac{10 \times (3 \times 10^{-8})^3 \times 6.022 \times 10^{23}}{4} = 40.64 \text{ g / mol}$$

$$40.64 \text{ g} \longrightarrow 6.022 \times 10^{23} \text{ atoms}$$

$$4.5 \text{ g} \longrightarrow x \text{ atoms}$$

$$x = 6.6 \times 10^{22} \text{ atoms}$$

5. 0.48 g of an organic compound on complete combustion produced 0.22 g of CO_2 . The percentage of C in the given organic compound is:
 A) 25 B) 50 C) 12.5 D) 87.5

Ans: C

$$\%C = \frac{12}{44} \times \frac{\text{Weight of } \text{CO}_2}{\text{Weight of organic compound}} \times 100$$

$$= \frac{12}{44} \times \frac{0.22}{0.48} \times 100 = 12.5\%$$

6. In the given sequence of reactions, identify 'P', 'Q', 'R' and 'S' respectively

$$\text{CH}_2 = \text{CH}_2 \xrightarrow{\text{P}} \underset{\text{Br}}{\text{CH}_2} - \underset{\text{Br}}{\text{CH}_2} \xrightarrow{\text{Q}} \text{CH}_2 = \text{CH} - \text{Br} \xrightarrow{\text{R}} \text{CH} \equiv \text{CH} \xrightarrow{\text{S}} \text{C}_6\text{H}_6$$



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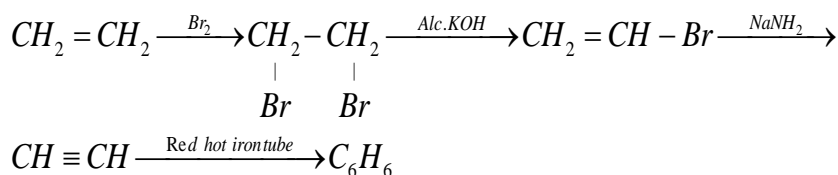
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- A) Br₂, Alc, KOH, NaOH, Al₂O₃
- B) HBr, Alc, KOH, CaC₂, KMnO₄
- C) HBr, Alc, KOH, NaNH₂, Red hot iron tube
- D) Br₂, Alc, KOH, NaNH₂, Red hot iron tube

Ans: D



7. Gold sol is not a
- A) Macromolecular colloid
 - B) Lyophobic colloid
 - C) Multimolecular colloid
 - D) Negatively charged colloid

Ans: A

8. The incorrect statement about Hall-Heroult process is:
- A) Carbon anode is oxidized to CO and CO₂.
 - B) Na₃AlF₆ helps to decrease the melting point of the electrolyte.
 - C) CaF₂ helps to increase the conductivity of the electrolyte.
 - D) Oxidation state of hydrogen changes in the overall cell reaction.

Ans: D

9. Select the correct statement:
- A) Roasting involves heating the ore in the absence of air.
 - B) Calcination involves heating the ore above its melting point.
 - C) Smelting involves heating the ore with suitable reducing agent and flux below its melting point.
 - D) Calcination of calcium carbonate is endothermic.

Ans: D

10. NO₂ gas is:
- A) Colourless, neutral
 - B) Colourless, acidic
 - C) Brown, acidic
 - D) Brown, neutral

Ans: C



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11. Identify the incorrect statement from the following:

- A) Oxides of nitrogen in the atmosphere can cause depletion of the ozone layer.
- B) Ozone absorbs the intense ultraviolet radiation of Sun.
- C) Depletion of ozone layer is because of its chemical reactions with chlorofluoro alkanes.
- D) Ozone absorbs infrared radiation.

Ans: D

12. The correct decreasing order of boiling point of hydrogen halides is:

- A) $HF > HCl > HBr > HI$
- B) $HI > HBr > HCl > HF$
- C) $HF > HI > HBr > HCl$
- D) $HI > HF > HBr > HCl$

Ans: C

Due to hydrogen bonding HF has highest boiling point.

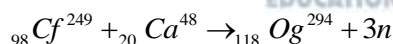
For other hydrogen halides as molecular mass increases, boiling point increases.

13. The synthetically produced radioactive nobles gas by the collision of ${}_{98}^{248}\text{Cf}$ with

${}_{20}^{48}\text{Ca}$ is

- A) Radon
- B) Radium
- C) Oganesson
- D) Xenon

Ans: C



14. The transition element ($\approx 5\%$) present with lanthanoid metal in Misch metal is

- A) Mg
- B) Fe
- C) Zn
- D) Co

Ans: B

Misch metal lanthanoid = 95% Fe = 5%

Traces = S, C, Ca, Al, etc

15. Match the following:

- I. Zn^{2+} i. d^8 configuration
- II. Cu^{2+} ii. Colourless
- III. Ni^{2+} iii. $\mu = 1.73$ BM



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Codes:

- | | I | II | III |
|----|----|-----|-----|
| A) | i | ii | iii |
| B) | ii | iii | i |
| C) | ii | I | iii |
| D) | i | iii | ii |

Ans: B

$Zn^{+2} = 4s^0 3d^{10}$ absence of $up e^{\ominus}$ \therefore hence colourless

$Cu^{+2} = 4s^0 3d^9$ $n=1$ $\mu = \sqrt{n(n+2)} + 2 = \sqrt{3} = 1.73 BM$

$Ni^{+2} = 4s^0 3d^8$ d^8 configuration

16. Which of the following statements related to lanthanoids is incorrect?

- A) Lanthanoids are silvery white soft metals.
- B) Samarium shows +2 oxidation state.
- C) Ce^{+4} solutions are widely used as oxidising agents in titrimetric analysis.
- D) Colour of Lanthanoid ion in solution is due to $d-d$ transition.

Ans: D

Colour of Lanthanoid ions may be attributed to the presence of unpaired f electrons.

17. On treating 100 mL of 0.1 M aqueous solution of the complex $CrCl_3 \cdot 6H_2O$ with excess of $AgNO_3$, 2.86 g of $AgCl$ was obtained. The complex is

- A) $[Cr(H_2O)_3 Cl_3] \cdot 3H_2O$
- B) $[Cr(H_2O)_4 Cl_2] Cl \cdot 2H_2O$
- C) $[Cr(H_2O)_5 Cl] Cl_2 \cdot H_2O$
- D) $[Cr(H_2O)_6 Cl_3]$

Ans: C

Number of moles of complex $CoCl_3 \cdot 6H_2O = V_{(L)} \times M = \frac{100m_L}{1000m_L} \times 0.1 mol = 0.01 moles$

Number of moles of $AgCl = \frac{\text{Given mass}}{\text{molar mass}} = \frac{2.86}{143.5} = 0.0199 \approx 0.02$

0.01 moles of complex can produce 0.02 moles of $AgCl$.

\therefore 1 mole of complex can produce 2 moles of $AgCl$.

$[Cr(H_2O)_5 Cl] Cl_2 \cdot H_2O \rightarrow [Cr(H_2O)_5 Cl]^{+2} + 2Cl^-$

Hence complex $[Cr(H_2O)_5 Cl] Cl_2 \cdot H_2O$



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18. The complex compounds $[Co(NH_3)_5SO_4]Br$ and $[Co(NH_3)_5Br]SO_4$ are

- A) Coordination isomers B) Geometrical isomers
B) Optical isomers D) Ionisation isomers

Ans: D

Ionisation isomers

19. Which of the following statements are true about $[CoF_6]^{3-}$ ion ?

- I. The complex has octahedral geometry
II. Coordination number of Co is 3 and oxidation state is +6.
III. The complex is sp^3d^2 hybridized
IV. It is a high spin complex
A) I, II and IV B) I, III AND IV C) II and IV D) II, III and IV

Ans: B

20. A haloalkane undergoes S_N2 or S_N1 reaction depending on:

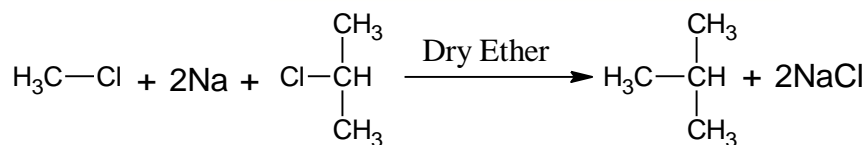
- A) Solvent used in the reaction B) Low temperature
C) The type of halogen atom D) stability of the haloalkane

Ans: A

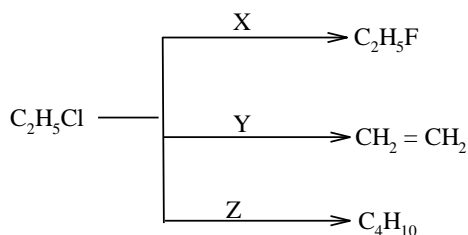
21. 2-Methyl propane can be prepared by Wurtz reaction. The haloalkanes taken along with metallic sodium and dry ether are:

- A) Chloromethane and 2-chloropropane B) chloroethane and chloromethane
C) Chloroethane and 1-chloropropane D) Chloromethane and 1-chloropropane

Ans: A



22. In the following scheme of reaction,

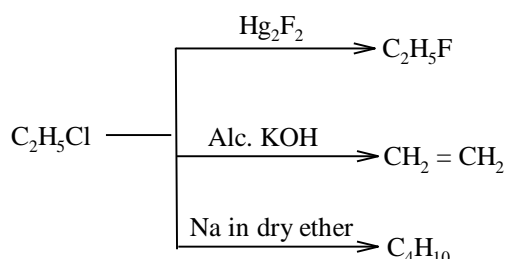


X, Y and Z respectively are :

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- A) AgF, alcoholic, KOH and benzene
 B) HF, aqueous KOH and Na in dry ether
 C) Hg₂F₂, alcoholic KOH and Na in dry ether
 D) CoF₂ aqueous KOH and benzene

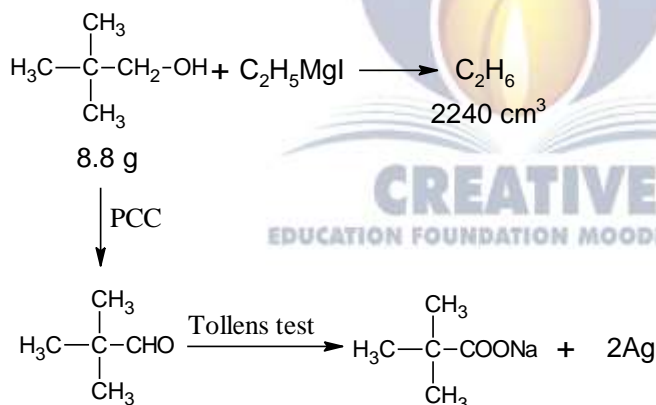
Ans : C



23. 8.8 g of monohydric alcohol added to ethyl magnesium iodide in ether liberates 2240 cm³ of ethane at STP. This monohydric alcohol when oxidised using pyridinium-chlorochromate, forms a carbonyl compound that answers silver mirror test (Tollen's test). The monohydric alcohol is :

- A) Butan-2-ol
 B) 2, 2-dimethyl propan-1-ol
 C) Pentan-2-ol
 D) 2, 2-dimethyl ethan-1-ol

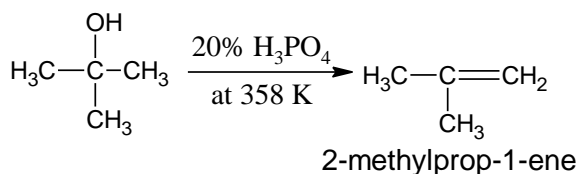
Ans : B



24. When a tertiary alcohol 'A' (C₄H₁₀O) reacts with 20% H₃PO₄ at 358 K, it gives a compound 'B' (C₄H₈) as a major product. The IUPAC name of the compound 'B' is:

- A) But-1-ene
 B) But-2-ene
 C) Cyclobutane
 D) 2-Methylpropene

Ans : D



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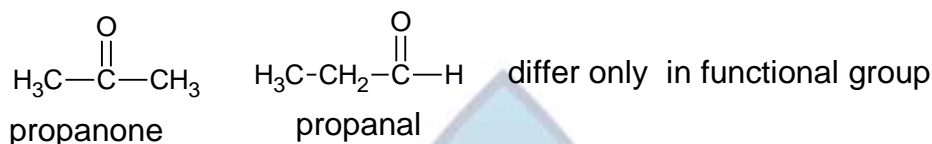
25. PCC is :

- A) $K_2Cr_2O_7 + \text{Pyridine}$
- B) $CrO_3 + CHCl_3$
- C) $CrO_3 + H_2SO_4$
- D) A complex of chromium trioxide with pyridine + HCl

Ans : D

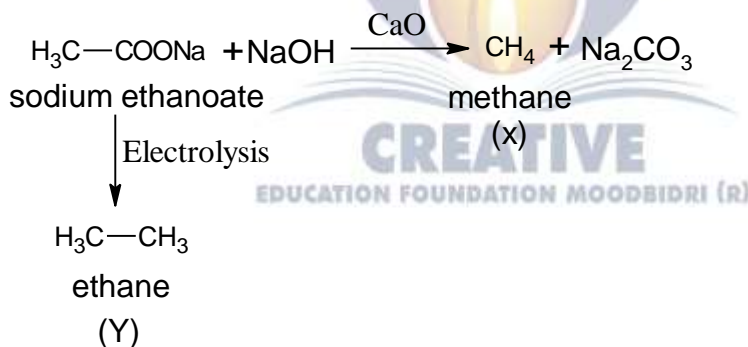
26. Propanone and Propanal are:

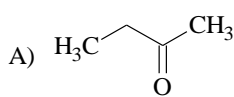
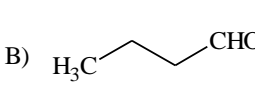
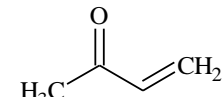
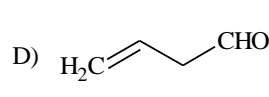
- A) Position isomers
- B) Functional isomers
- C) Chain isomers
- D) Geometrical isomers

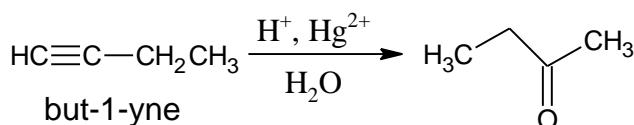
Ans : B

27. Sodium ethanoate on heating with soda lime gives 'X'. Electrolysis of aqueous solution of sodium ethanoate gives 'Y'. 'X' and 'Y' respectively are :

- A) Methane and Ethane
- B) Methane and Methane
- C) Ethane and Methane
- D) Ethane and Ethane

Ans : A28. But-1-yne on reaction with dil. H_2SO_4 in presence of Hg^{2+} ions at 333 K gives:

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

Ans : A

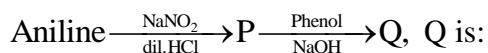
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29. Biologically active adrenaline and ephedrine used to increase blood pressure contain

- A) Primary amino group B) Secondary amino group
C) Tertiary amino group D) Quaternary ammonium salt

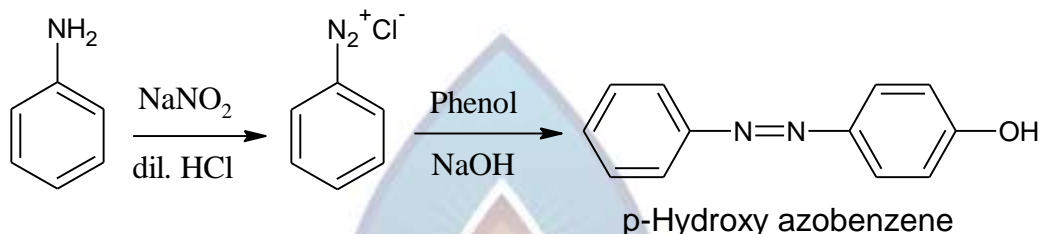
Ans : B

30. In the reaction



- A) $\text{C}_6\text{H}_5\text{N}_2\text{Cl}$ B) ortho-hydroxyazobenzene
C) Para-hydroxyazobenzene D) meta-hydroxyazobenzene

Ans : C



31. The female sex hormone which is responsible for the development of secondary female characteristics and participates in the control of menstrual cycle is:

- A) Testosterone B) Estradiol C) Insulin D) Thyroxine

Ans : B

32. The type of linkage present between nucleotides is:

- A) Phosphoester linkage B) Phosphodiester linkage
C) Amide linkage D) Glycosidic linkage

Ans : B

33. α - D - (+) - glucose and β - D - (+) - glucose are :

- A) Enantiomers B) Conformers C) Epimers D) Anomers

Ans : D

34. Which of the following set of polymers are used as fibre?

- (i) Teflon (ii) Starch (iii) Terylene (iv) Orlon
A) (i) and (ii) B) (ii) and (iii) C) (iii) and (iv) D) (i) and (iv)

Ans : C



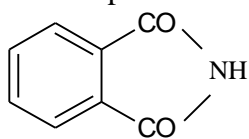
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35. The biodegradable polymer obtained by polymerisation of Glycine and Aminocaproic acid is:

- A) Nylon 6 B) PHBV C) Nylon 2 – Nylon 6 D) Nylon 6, 10

Ans : C

36. The compound



is:

- A) Sucralose B) Aspartame C) Saccharin D) Alitame

Ans : None (Given structure is wrong)

37. Which of the following is a cationic detergent?

- A) Cetyltrimethylammonium bromide B) Sodium dodecylbenzene sulphonate
C) Dodecylbenzene sulphonic acid D) Dodecylbenzene

Ans : A

Cetyltrimethyl ammonium bromide is example for cationic detergent.

38. Vapour pressure of a solution containing 18 g of glucose and 178.2 g of water at 100°C is: (Vapour pressure of pure water at 100°C = 760 torr)

- A) 76.0 torr B) 752.4 torr C) 7.6 torr D) 3207.6 torr

Ans : B

$$\frac{P^0 - P}{P^0} = X_2 = \frac{n_2}{n_1} = \frac{W_2 M_1}{M_2 \cdot W_1}$$

$$\frac{760 - P}{760} = \frac{18 \times 18}{180 \times 178.2}$$

$$\frac{760 - P}{760} = 0.01$$

$$P = 752.4 \text{ Torr}$$

39. A mixture of phenol and aniline shows negative deviation from Raoult's law. This is due to the formation of :

- A) Polar covalent bond B) Non-polar covalent bond
C) Intermolecular Hydrogen bond D) Intramolecular Hydrogen bond

Ans : C

Phenol and Aniline shows inter molecular H- bond



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40. Which one of the following pairs will show positive deviation from Raoult's Law?

- A) Water – HCl
B) Benzene – Methanol
C) Water - HNO₃
D) Acetone – Chloroform

Ans : B

$\frac{-v \text{ deviation}}{\text{water} - \text{HCl}} \quad \frac{+v \text{ deviation}}{\text{Benzene} + \text{methanol}}$

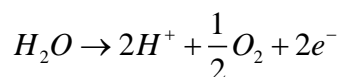
water – HNO₃

Acetone -chloroform

41. How many Coulombs are required to oxidise 0.1 mole of H₂O to oxygen?

- A) $1.93 \times 10^5 \text{ C}$ B) $1.93 \times 10^4 \text{ C}$ C) $3.86 \times 10^4 \text{ C}$ D) $9.65 \times 10^3 \text{ C}$

Ans : B



$$Q = 2 \times 96500 \text{ C}$$

$$1 \text{ mol} \rightarrow 2 \times 96,500$$

$$0.1 \text{ mol} \rightarrow ?$$

$$0.2 \times 96500$$

$$= 1.93 \times 10^4$$



42. A current of 3 A is passed through a molten calcium salt for 1 hr 47 min 13 sec. The mass of calcium deposited is : (Molar mass of Ca = 40 g mol⁻¹)

- A) 6.0 g B) 2.0 g C) 8.0 g D) 4.0 g

Ans : D

$$W = \frac{\text{at mass} \times I \times t}{\text{Valency} \times 96,500}$$

$$T = 1 \text{ hr } 47 \text{ min } 13 \text{ sec}$$

$$= 6433 \text{ sec}$$

$$W_{\text{Ca}} = \frac{40 \times 3 \times 6433}{2 \times 96500} = 3.999 \approx 4.09$$

43. The value of 'A' in the equation $\lambda_m = \lambda_m^\circ - A\sqrt{C}$ is same for the pair:

- A) NaCl and CaCl₂ B) CaCl₂ and MgSO₄
C) NaCl and KBr D) MgCl₂ and NaCl

Ans : C

Value of A depends on charge of the ions. In NaCl and KBr, the charges on the ions are same.



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44. For the reaction, $A \rightleftharpoons B$, $E_a = 50 \text{ kJ mol}^{-1}$ and $\Delta H = -20 \text{ kJ mol}^{-1}$. When a catalyst is added, E_a decreases by 10 kJ mol^{-1} . What is the E_a for the backward reaction in the presence of catalyst?

- A) 60 kJ mol^{-1} B) 40 kJ mol^{-1} C) 70 kJ mol^{-1} D) 20 kJ mol^{-1}

Ans : A

$$E_a(\text{forward}) - E_a(\text{backward}) = \Delta H$$

$$40 - E_a(\text{backward}) = -20$$

$$E_a(\text{backward}) = 60 \text{ kJ mol}^{-1}$$

45. For the reaction $PCl_5 \rightarrow PCl_3 + Cl_2$, rate and rate constant are $1.02 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ and $3.4 \times 10^{-5} \text{ s}^{-1}$ respectively at a given instant. The molar concentration of PCl_5 at that instant is

- A) 8.0 mol L^{-1} B) 3.0 mol L^{-1} C) 0.2 mol L^{-1} D) 2.0 mol L^{-1}

Ans : B

$$\text{rate} = k[PCl_5]^1$$

$$1.02 \times 10^{-4} = 3.4 \times 10^{-5} [PCl_5]$$

$$[PCl_5] = 3 \text{ mol L}^{-1}$$

46. Which one of the following does not represent Arrhenius equation?

A) $\log k = \log A - \frac{E_a}{2.303RT}$ B) $k = Ae^{-E_a/RT}$

C) $\ln k = -\frac{E_a}{RT} + \ln A$ D) $k = Ae^{E_a/RT}$

Ans : D

47. Identify the incorrect statement :

- A) Values of colligative properties of colloidal solution are of small order compared to values of true solution.
B) Tyndall effect is observed only when diameter of the dispersed particles is not much smaller than wavelength of incident light.
C) Colour of colloidal solution depends on the wavelength of light scattered by the dispersed particles.
D) Brownian movement is due to balanced bombardment of molecules of dispersion medium on colloidal particles.

Ans : D

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48. For the coagulation of positively charged hydrated ferric – oxide sol, the flocculating power of the ions is in the order.



Ans : D

Hardy Schulze rule

49. A metalloid is

A) Bi

B) Sb

C) P

D) Se

Ans : B & D

50. A pair of isoelectronic species having bond order of one is

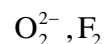
A) N_2, CO

B) N_2, NO^+

C) O_2^{2-}, F_2

D) CO, NO^+

Ans : C



51. Identify the wrong relation for real gases :

A) $Z = \frac{V_{ideal}}{V_{real}}$

B) $P_{ideal} = P_{ideal} + \frac{an^2}{V^2}$

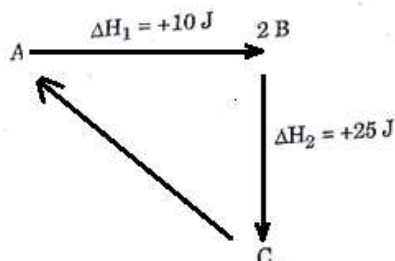
C) $V_{ideal} = V_{ideal} - nb$

D) $\left(p + \frac{a}{V^2}\right)(V-b) = RT$

Ans : A

$$Z = \frac{V_{real}}{V_{ideal}}$$

52. From the diagram



$\Delta_r H$ for the reaction $C \rightarrow A$ is

A) + 35 J

B) - 15 J

C) -35 J

D) + 15 J

Ans : C



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53. For which one of the following mixtures is composition uniform throughout?

- A) Sand and water B) Grains and pulses with stone
C) Mixture of oil and water D) Dilute aqueous solution of sugar

Ans : D

54. The energy associated with first orbit of He^+ is

- A) 0 J B) $-8.72 \times 10^{-18} J$ C) $-4.58 \times 10^{-18} J$ D) $-0.545 \times 10^{-18} J$

Ans : B

$$\begin{aligned} E_n &= -2.18 \times 10^{-18} \left(\frac{Z^2}{n^2} \right) J \\ &= -2.18 \times 10^{-18} \left(\frac{2^2}{1^2} \right) J \\ &= -8.72 \times 10^{-18} J \end{aligned}$$

55. In the reaction between moist SO_2 and acidified permanganate solution:

- A) SO_2 is oxidized to SO_4^{2-}
 MnO_4^- is reduced to Mn^{2+}
B) SO_2 is reduced to S
 MnO_4^- is oxidised to MnO_4
C) SO_2 is oxidised to SO_3^{2-}
 MnO_4^- is reduced to MnO_2
D) SO_2 is reduced to H_2S
 MnO_4^- is oxidised to MnO_4

Ans: A

56. Which one of the following properties is generally not applicable to ionic hydrides?

- A) Non-volatile B) Non-conducting in solid state
C) Crystalline D) Volatile

Ans: D

57. Which one of the following nitrate will decompose to give NO_2 on heating?

- A) $NaNO_3$ B) KNO_3 C) $RbNO_3$ D) $LiNO_3$

Ans: D



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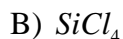
Sub : Chemistry

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THE LEADER TO GET SUCCESS IN ALL COMPETITIVE EXAMS...

DETAILED SOLUTIONS

58. Which of the following halides cannot be hydrolysed?



Ans: A

59. In the analysis of III group basic radicals of salts, the purpose of adding $NH_4Cl_{(s)}$ to NH_4OH is

A) To increase the concentration of OH^- ions

B) To precipitate the radicals of group IV and V

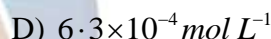
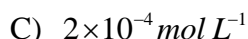
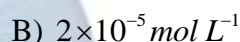
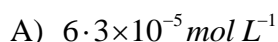
C) To suppress the dissociation of NH_4OH

D) To introduce Cl^- ions

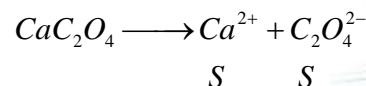
Ans: C

60. Solubility product of CaC_2O_4 at a given temperature in pure water is

$4 \times 10^{-9} (mol L^{-1})^2$. Solubility of CaC_2O_4 at the same temperature is



Ans: A



$$K_{sp} = (S)^2$$

$$4 \times 10^{-9} = S^2$$

$$S = \sqrt{4 \times 10^{-9}} = \sqrt{0.4 \times 10^{-8}} = 0.63 \times 10^{-4} = 6.3 \times 10^{-5}$$

DEPARTMENT OF CHEMISTRY

CREATIVE EDUCATION FOUNDATION MOODBIDRI (R)

Website : www.creativeedu.in

Phone No. : +91 9019844492