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India's Number 1 Education App

CHEMISTRY

BOOKS - XII BOARD PREVIOUS YEAR PAPER ENGLISH

XII BOARDS

SET-I

1. Of physiosorption or chemisorption, which has a higher enthalpy of adsorption?

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2. Name the method used for refining of copper metal

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3. Name two poisonous gases which can be prepared from chlorine gas.

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4. Write the IUP AC name of the following compound :

$$CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - C \mid ClH - CH_3$$

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5. Rearrange the following compounds in the increasing order of their boiling points :

$CH_3 - CHO, CH_3 - CH_2 - OH, CH_3 - CH_2 - CH_3$

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6. Write the structure of N-methyl-ethanamine.

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7. What are the hydrolysis products of sucrose ?

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8. Is $\left(CH_2 - CH_2\right)_n$ a homopolymer or a copolymer?

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9. Account for the following :

(i) Schottky defects lower the density of related solids.

(ii) Conductivity of silicon increases on doping it with phosphorus.

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10. Aluminium crystallizes in an fcc structure. Atomic radius of the metal is 125 pm. What is the length of the side of the unit cell of the metal?

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11. Calculate the equilibrium constant for the reaction at 298 K

$Zn(s) + Cu^{2+}(aq) \leftrightarrow Zn^{2+}(aq) + Cu(s)$

Given $E^{\circ}_{Zn^{2+}/Zn} = -0.76V$ and $E^{\circ}_{Cu^{2+}/Cu} = +0.34V$

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12. (a) For a reaction $AB \rightarrow P$, the rate law is given by, $r = k[A]^{1/2}[B]^2$. What is the order of this reaction?

(b) A first order reaction is found to have a rate constant $k = 5.5 \times 10^{-14} s^{-1}$, Find the half life of the reaction.

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13. (a) Name the method used for removing gangue from sulphide ores.

(b) How is wrought iron different from steel?

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14. Draw the structures of the following molecules :

$(i) XeOF_4$,(ii) H_3PO_3

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15. How are interhalogen compounds formed? What general compositions can be assigned to them?

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16. $CH_3CH_2OH \xrightarrow{Conc.\,H_2SO_4} 443K X + H_2O$

Complete the above reaction and explain the mechanism.

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17. Write the equations involved in the following reactions :

(i) Reimer-Tiemann reaction

(ii) Williamson's ether synthesis

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18. Define thermoplastics and themosetting polymers and give examples of each.

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19. What is a biodegradable polymer ? Give an example of a biodegradable aliphatic polyester.

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20. The rate of a reaction becomes 4 times when temperature is raised from 293 K to 313 K. The activation energy for such reaction would be

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21. What are the characteristics of the following colloids ? Give one example of each

(i) Multimolecular colloids

(ii) Lyophobic sol

(iii) Emulsions.

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22. Give reasons for the following :

(i) Where R is an alkyl group, $R_3P = O$ exists but $R_3N = O$ does not.

(ii) $PbCl_4$ is more covalent than $PbCl_2$.

(iii) At room temperature, N_2 is much less reactive.

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23. For the complex $\left[NiCl_4\right]^{2-}$, write

(i) the IUPAC name

(ii) the hybridisation type

(iii) the shape of the complex (Atomic no. of $Ni = 28$)

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24. What is meant by crystal field splitting energy? On the basis of crystal field theory, write the electronic configuration of d^4 in terms of t_{2g} and e_g in an octahedral field when

(i) $\Delta_o > P$

(ii) $\Delta_o < P$

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25. Give reasons for the following :

(t) Ethyl iodide undergoes SN_2 reaction faster than ethyl bromide.

(ii) ($\pm$) 2-Butanol is optically inactive.

(iii) C- X bond length in halobenzene is smaller than C-X bond length in CH_3 - X.

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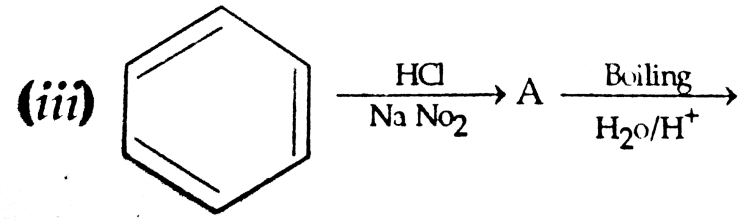
26. Complete the following reactions : (i)

$CH_3CH_2NH_2 + CHCl_3 + alc.KOH \rightarrow$

(ii) $C_6H_5N_2^+ Cl^- \xrightarrow[\text{Room temp.}]{H_2O}$

(iii) 

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27. (i) What class of drug is Ranitidine?

(ii) If water contains dissolved Ca^{2+} ions, out of soaps and synthetic detergents, which will you use for cleaning clothes?

(iii) Which of the following is an antiseptic? 0.2% phenol, 1 % phenol

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28. Calculate the emf of the following cell at $25^\circ C: Ag(s)\left|Ag^+\left(10^{-3}M\right)\right|\left|Cu^{2+}\left(10^{-1}M\right)\right|Cu(s)$ Give $E^\circ_{\text{cell}} = -0.46V$ and log

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29. Shanti, a domestic helper of Mrs. Anuradha, fainted while mopping the floor. Mrs. Anuradha immediately took her to the nearby hospital where she was diagnosed to be severely 'anaemic'. The doctor prescribed an iron rich diet and multivitamins supplement , to her. Mrs. Anuradha supported her financially to get the medicines. After a month, Shanti was diagnosed to be normal. After reading the above passage, answer the following

questions :

(i) What values are displayed by Mrs. Anuradha?

(ii) Name the vitamin whose deficiency causes 'pernicious anaemia'.

(iii) Give an example of a water soluble vitamin.

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30. (a) State Raoult's law for a solution containing volatile components. How does Raoult' s law become a special case of Henry's law?

(b) 1.00 g of a non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 K. Find the molar mass of the solute. $\left(K_f \text{ for benzene } = 5.12 kgmol^{-1}\right)$

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31. (a) Define the following terms :

(i) Ideal solution (ii) Azeotrope (iii) Osmotic pressure

(b) A solution of glucose $\left(C_6H_{12}O_6\right)$ in water is labelled as 10% by

weight. What would be the molality of the solution? (Molar mass of glucose= 180 g mol^{-1})

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32. (a) Give reasons for the following :

(i) Mn^{3+} is a good oxidising agent.

(ii) $E_M 2+/M)^\circ$ values are not regular for first row transition metals (3d series).

(iii) Although 'F' is more electronegative then 'O', the highest Mn fluoride is MnF_4 whereas the highest oxide is Mn_2O_7.

Complete the following equations :

(ii) $2CrO_4^{2-} + 2H^+ \rightarrow$

(ii) $KMnO_4 \xrightarrow{\text{heat}}$

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33. (a) Why do transition elements show variable oxidation states?

(i) Name the element showing maximum number of oxidation states among the first series of transition metals from Sc (Z = 21) to Zn (Z = 30).

(ii) Name the element which shows only + 3 oxidation state.

(b) What is lanthanoid contraction? Name an important alloy which contains some of the lanthanoid metals.

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34. (a) How will you convert the following:

(i) Propanone to Propan-2-o1

(ii) Ethanal to 2-hydroxy propanoic acid

(iii) Toluene to benzoic acid

(b) Give simple chemical test to distinguish between:

(i) Pentan-2-one and Pentan-3-one

(ii) Ethanal and Propanal

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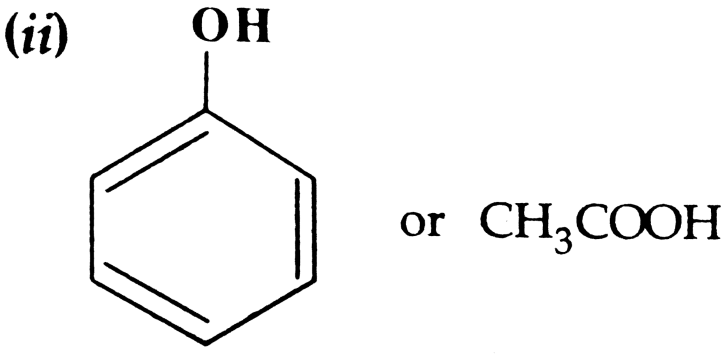
35. (a) Write the products of the following reactions : (i) $CH_3 - C(=O) - CH_3 \xrightarrow[conc.HCl]{Zn-Hg}$?

(ii) $CH_3 - C(=O) - Cl + H_2 \xrightarrow{Pd-BaSO_4}$?

(b) Which acid of each pair shown here would you expect to be stronger?

(i) $F - CH_2 - COOH$ or $Cl - CH_2 - COOH$

(ii) 

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36. Write the formula of the compound of phosphorus which is obtained when conc. HNO_3 oxidises P_4.

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37. Write the IUPAC name of the following compound:

$H_3C - C(CH_3) = C(Br) - CH_2 - OH$

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38. What is the effect of adding a catalyst on

(a) Activation energy (Ea), and

(b) Gibbs energy (ΔG) of a reaction?

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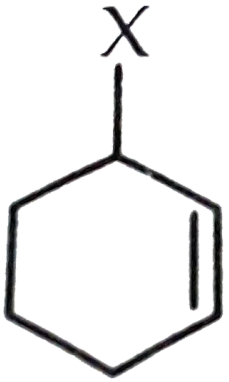
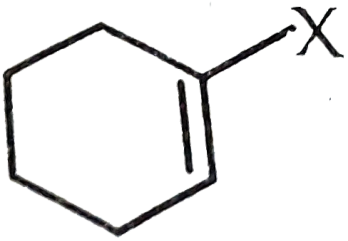
39. Out of  and 

Which is an example of allylic halide?

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40. What type of colloid is formed when a liquid is dispersed in a solid? Give an example:

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41. (a) Arrange the following compounds in the increasing order of their acid strength:

p-creson, p-nitrophenol, phenol ltbr. (b) Write the mechanism (using curved arrow notation) of the following reaction:

$$CH_2 = CH_2 \xrightarrow{H_3O^+} CH_3 - CH_2^+ + H_2O$$

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42. Write the structures of the products when butan-2-ol reacts with (a) CrO_3 (b) $SOCl_2$.

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43. Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a face-centred cubic (f.c.c.) structure. (atomic mass of Al=27g mol^{-1})

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44. Draw the structure of the following:

(a) H_2SO_3

(b) $HClO_3$

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45. Write the name of the cell which is generally used in hearing aids. Write the reactions taking place at the anode and the cathode of this cell.

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46. Using IUPAC norms write the formulae for the following:

(a) Sodium dicyanidoaurate (I)

(b) Tetraamminechloridonitrito-N-platinum (IV) sulphate.

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47. (a) Based on the nature of intermolecular forces, classify the following solids:

Silicon carbide, Argon

(b) ZnO turns yellow on heating. Why?

(c) What is meant by groups 12-16 compounds? Give an example.

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48. (a) The cell in which the following reactions occurs:

$2Fe^{3+}(aq) = 2I^{-}(aq) \rightarrow 2Fe^{2+}(aq) + I_2(s)$

has $E^{\circ}_{cell} = 0.236V$ at 298 K. Calculate the standard Gibbs energy of the cell reaction.

(Given: $1F = 96,500\ \text{C}\ mol^{-1}$)

(b) How many electrons flow through a metallic wire if a current of 0.5 A is passed for 2 hours? (Given: $1F = 96,500\ \text{C}\ mol^{-1}$)

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49. (a) What type of isomerism is shown by the complex $\left[Co\left(NH_3\right)_5(SCN)\right]^{2+}$?

(b) Why is $\left[NiCl_4\right]^{2-}$ paramagnetic while $\left[Ni(CN)_4\right]^{2-}$ is diamagnetic ? (Atomic number of $Ni = 28$)

(c) Why are low spin tetrahedral complexes rarely observed?

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50. Write on difference in each of the following:

(a) Multimolecular colloid and Associated colloid

(b) Coagulation and Peptization

(c) homogenous catalysis and Heterogeneous catalysis.

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51. (a) Write the dispersed phase and dispersion medium of milk.

(b) Write one similarity between physisorption and chemisorption.

(c) Write the chemical method by which $Fe(OH)_3$ sol is prepared from $FeCl_3$

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52. A first order reaction takes 20 minutes for 25% decomposition. Calculate the time when 75% of the reaction will be completed.

(Given, $\log 2 = 0.3010, \log 3 = 0.4771, \log 4 = 0.6021$)

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53. The following compounds are given to you

2-Bromopentane,2-Bromo-2-methylbutane,1-Bromopentane

(a) Write the compound which is most reactive towards S_N2 reaction.

(b) Write the compound which is optically active.

(c). Write the compound which is most reactive towards β-elimination reaction.

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54. Write the principle of the following

(a) Zone refining

(b) Froth floatation process

(c) Chromatography

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55. Write the structures of compounds A,B and C in the following reactions:

(a) $CH_3\text{-}COOH \xrightarrow{NH_3/\Delta} A \xrightarrow{Br_2/KOH(aq)} B \xrightarrow{CHCl_3+alc.KOH} C$

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56. Write the structures of the monomers used for getting the following polymers:

(a) Polyvinyl chloride (PVC)

(b) Melamine-formaldehyde polymer

(c) Buna-N

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57. Define the following:

(a) Anionic detergents

(b) Limited spectrum antibiotics

(c) Antiseptics

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58. Give reasons for the following:

(a) Red phosphorus is less reactive than white phosphorus.

(b) Electron gain enthalpies of halogens arelargely negative.

(c) N_2O_5 is more acidic than N_2O_3.

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59. (a) Account for the following,

(i) Transition metals show variable oxidation states.

(ii) Zn, Cd and Hg are soft metals.

(c) E° value for the Mn^{3+}/Mn^{2+} couple is highly positive (+1.57V) as compared to Cr^{3+}/Cr^{2+}

(b) Write one similarity and one difference the chemistry of lanthanoid and actinoid elements.

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60. (a) Following are the transition metal ions of 3d series:

$Ti^{4+}, V^{2+}, Mn^{3+}, Cr^{3+}$

(Atomic numbers: $Ti = 22, V = 23, Mn = 25, Cr = 24$)

Answer the following:

(i) Which ion is most stable in an aqueous solution and why?

(ii) Which ion is a strong oxidising agent and why?

(iii) Which ion is colourless and why?

(b) Complete the following equations:

(i) $2MnO_4^- + 16H^+ + 5S^- \rightarrow$

(ii) $KMnO_4 \xrightarrow{heat}$

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61. 30 g of urea (M=60g mol^{-1}) is dissolved in 846g of water. Calculate the vapour pressure of water for this solution if vapour pressure of pure water at 298 K is 23.8 mm Hg.

(b) Write two differences between ideal solutions and non-ideal solutions,

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62. Give simple chemical tests to distinguish between the following pairs of compounds:

(i) Butanal and Butan-2-one

(ii) Benzoic acid and Phenol

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63. (a) Write the reactions involved in the following:

(i) Etard reaction

(ii) Stephen reduction

(b) How will you convert the following in not more than two steps:

(i) Benzoic acid to Benzaldehyde

(ii) Acetophenone to Benzoic acid

(iii) Ethanoic acid to 2-Hydroxyethanoic acid.

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64. What are emulsions? Give an example.

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65. What is meant by chelate effect?

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66. Write the IUPAC name of the following:

CH_3 - CH_2 - CHO

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67. Arrange the following in increasing order of basic strength:

Aniline,p-Nitroaniline and p-toluidine

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68. What type of stoichiometric defect is shown by AgCl?

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69. Describe the preparation of potassium permanganate. How does the acidicfied permanganate solution react with oxalic acid? Write the ionic equation for the reaction.

OR

Describe the oxidising action of potassium dischromate and write the ionic equaitons for its reaction with (i) an iodide (ii) H_2S.

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70. Write the mechanism of dehydration of ethanol.

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71. Define the following terms:

(i) Mole fraction (x)

(ii) Molality of a solution (m)

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72. Write units of rate constant for zero order and for the second order reactions if the concentration is expressed in mol L^{-1} and time in second.

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73. Answer the Following :

(i) What is the role of cryolite in the metallurgy of aluminium?

(ii) Differentiate between roasting and calcination.

(iii) What is meant by the term 'chromatography' ?

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74. Write the IUPAC name of the following :

(i) $\left[Co\left(NH_3\right)_6\right]Cl_3$

(ii) $\left[NiCl_4\right]^{2-}$

(iii) $K_3\left[Fe(CN)_6\right]$

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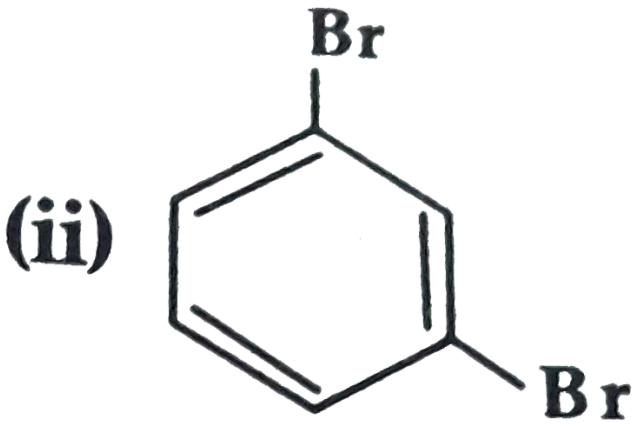
75. Give the IUPAC names of the following compounds:

(i) $CH_3 - C(Br)H - CH_2 - CH_3$

(ii)



(iii) $CH_2 = CH - CH_2 - Cl$

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76. How are the following conversions carried out ?

i. Propene → Propan-2-ol

ii. Benzyl chloride → Benzyl alcohol

iii. Ethyl magnesium chloride → Propan-1-ol

iv. Methyl magnesium bromide → 2-Methylpropan-2-ol

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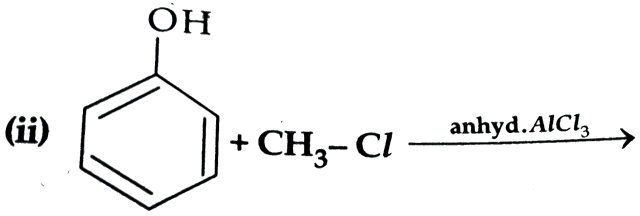
77. Write the major product in the following equations:

(i) $CH_3 - CH_2OH \xrightarrow{PCl_5} ?$

(ii) 

(iii) $CH_3 - Cl + CH_3CH_2 - ONa \rightarrow ?$

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78. Defines the following as related to proteins :

(i)Peptide linkage, (ii)Primary structure

(iii)Denaturation

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79. Explain the term copolymerisation and give two examples.

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80. Silver crystallises in fcc latice. If edge length of the unit cell is $4.077 \times 10^{-8} cm$, then calculate the radius of silver atom.

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81. A 5 percent solution (by mass) of cane-sugar (M.W. 342) is isotonic with 0.877% solution of substance X. find the molecular weight of X.

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82. The rate constant for a first order reaction is $60 s^{-1}$. How much time will it take to reduce the initial concentration of the reactant to its $1/10^{th}$ value?

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83. Describe the following processes:

(i) dialysis

(ii) Electrophoresis

(iii) tyndall effect

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84. (a) Element of Gr. 16 generally show lower value of first ionization enthalpy compared to the corresponding periods of Br. 15 Why?

(b) What happens with

(i) concentrated H_2SO_4 is added to CaF_2?

(ii) sulphur dioxide reacts with chlorine in the presence of charcoal?

(iii) ammonium chloride is treated with $Ca(OH)_2$?

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85. Draw the structure of the following:

(i) BrF_3

(ii) XeO_3

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86. Draw the structure of the following

(i) p-Methylbenzaldehyde

(ii) 4-Methylpent-3-ene-2-one

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87. Draw the structure of the following derivatives:

(i) Propanone oxime (ii) Semicarbazone of CH_3CHO

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88. Calculate $\Delta_r G^\circ$ and e.m.f. (E) that can be obtained from the following cell under the standard conditions at $25^\circ C: Zn(s)\left|Zn^{2+}(aq)\right.\ \ Sn^{2+}(aq)\left|Sn(s)\right.$

Given $E^\circ_{Zn^{2+}/Zn} = -0.76V, E^\circ_{Sn^{2+}/Sn} = -0.14V$

And $F = 96500C\ \ mol^{-1}$

OR

(a) Define conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.

(b) Calculation the standard cell potential of the galvanic cell in which the following reaction takes place: $Fe^{2+}(aq) + Ag^{+}(aq) \rightarrow Fe^{3+}(aq) + Ag(s)$

Calculate the $\Delta_r G^\circ$ and equilibrium constant of the reaction also.

$\left(E^\circ_{Ag^{+}/Ag} = 0.80, E^\circ_{Fe^{3+}/Fe^{2+}} = 0.77V\right)$

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89. Out $CH_3 - CH\,|\,CH_3 - CH_2 - Cl$ and $CH_3 - CH_2 - CH\,|\,CH_3 - Cl$, which is more reactive towards S_N1 reaction and why?

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90. ON adding NaOH to ammonium sulphate, a colourless gas with pungent odour is evolved which forms a blue coloured complex with Cu^{2+} ions. Identify the gas.

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91. What type of magnetism is shown by a substance if magnetic moments of domains are arranged in same direction?

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92. Write the main reason for the stability of colloidal sols.

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93. From the given cells :

Answer the following :

(i) Which cell is used in hearing aids?

(ii) Which cell was used in Apollo Space Programme?

(iii) Which cell is used in automobiles and inverters?

(iv) Which cell does not have long life?

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94. When chromite ore $FeCr_2O_4$ is fuse with NaOH in presence of air, a yellow coloured compound (A) is obtained which on acidification with dilute sulphuric acid gives a compound (B). Compound (B) on reaction with KCl formed an orange colured crystalline compound (C).

(i) Write the formula of the compounds (A),(B) and (C).

(ii) Write one use of compounds (C).

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95. Complete the following chemical equations :

(i) $8MnO_4^- + 3S_2O_3^{2-} + H_2O \rightarrow$

(ii) $Cr_2O_7^{2-} + 3Sn^{2+} + 14H^+ \rightarrow$

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96. When a co-ordination compound $CrCl_3.5H_2O$ is mixed with $AgNO_3$, 2 moles of AgCl are precipitated per mole of the compound. Write

(i) Structural formula of the complex.

(ii) IUPAC name of the complex.

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97. For a reaction :

$2NH_3(g) \xrightarrow{Pt} N_2(g) + 3H_2(g)$ Rate = k

(i) Write the order and molecularity of this reaction.

(ii) Write the unit of k.

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98. Write the mechanism of the following reaction :

$$2CH_3CH_2OH \xrightarrow[413K]{\text{Conc. } H_2So_4} CH_3CH_2 - O - CH_2 - CH_3$$

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99. Give reasons:

(i). $C - Cl$ bond length in chlorobenzene is shorter than $C - Cl$ bond length in $CH_3 - Cl$

(ii). The dipole moment of chlorobenzene is less than of cyclohexyl chloride.

(c). S_{N^1} reactions are accompanied by racemisation is optically active alkyl halides.

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100. An element crystallizes in a f.c.c. lattice with cell edge of 250 pm. Calculate the density if 300 g of this element contain 2×10^{24} atoms.

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101. The rate constant for the first order decomposition of H_2O_2 is given by the following equation : log K = 14.2 - $\frac{1.0 \times 10^4}{T}K$

Calculate E for this reaction and rate constant k if its half life period be 200 minutes. (Given : R = 8.314 $JK^{-1}mol^{-1}$)

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102. (i) Differentitate between adsorbtion and absorption.

(ii) Out of $MgCl_2$ and $AlCl_3$, which one is more effective in causing coagulation of negatively charged sol and why?

(iii) Out of sulphur sol and proteins, which one forms multimolecular colloids?

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103. (i) Name the method of refining of metals such as Germanium.

(ii) In the extraction of Al, impure Al_2O_3 is dissolved in conc. NaOH to form sodium aluminate and leaving impurities behind. What is the name of this process?

(iii) What is the role of coke in the extraction of iron from its oxides?

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104. What is the potential for the cell

$$Cr\left|Cr^{3+}(0.1M)\right|\left|Fe^{2+}(0.01M)\right|Fe$$

$$E^{\circ}Cr^{3+}/Cr = -0.74V,$$

$$E^{\circ}Fe^{2+}/Fe = -0.44V$$

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105. Give reason for the following :

(i) Mn shows the highest oxidation state of +7 with oxygen but with fluorine, it shows the highest oxidation state of +4

(ii) Transition metals show variable oxidation states.

(iii) Actinoids show irregularities in their electronic configurations.

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106. Write the main product (s) in each of the following reaction :

(i) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - O - CH_3 + HI \rightarrow$

(ii) $CH_3 - CH = CH_2 \xrightarrow{(i)\, B_2H_6} \xrightarrow{(ii)\, 3H_2O_2/OH^-}$

(iii) $C_6H_5 - OH \xrightarrow{(i)\, aq.\, NaOH} \xrightarrow{(ii)\, CO_2, H^+}$

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107. Write the structures of A, B and C in the following :

(i) $C_6H_5\text{-}CONH_2 \xrightarrow{Br_2/aq.KOH} A \xrightarrow[0\text{-}5.^\circ C]{NaNO_2+HCl} B \xrightarrow{KI} C$

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108. (i) What is the role of t-butyl peroxide in the polymerization of ethene?

(ii) Identify the monomers in the following polymer:

$$\text{-}\left(NH\text{-}\left(CH_2\right)_6\text{-}NH\text{-}CO\text{-}\left(CH_2\right)_4\text{-}CO\right)\text{-}_n$$

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109. Write the free radical mechanism for the polymerisation of ethene.

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110. (i) Write the name of two monosaccharides obtained on hydrolysis of lactose sugar.

(iii) Why Vitamin C cannot be stored in our body?

(iii) What is the difference between a nucleoside and nucleotide?

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111. (a) For the complex $\left[Fe\left(H_2O\right)_6\right]^{3+}$, write the hybridization, magnetic character and spin of the complex. (At. Number : Fe =26)

(b) Draw one of the geometrical isomers of the complex $\left[Pt(en)_2Cl_2\right]^{2+}$ which is optically inactive.

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112. Due to hectic and busy schedule, Mr. Angad made his life full of tension and anxiety. He started taking sleeping pills to overcome the depression without consulting the doctor. Mr. Deepak, a close friend of

Mr. Angad, advised him to stop taking sleeping pills and suggested to changes his lifestyle by doing Yoga, meditation and some physical exercise. Mr. Angad followed his friend's advice and after few days he started feeling better.

After reading the above passage, answer the following :

(i) What are the values (at least two) displayed by Mr. Deepak?

(ii) Why is it not advisable to take sleeping pills without consulting doctor?

(iii) What are tanquilizers? Give two examples.

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113. (a) Account for the following :

(i) Ozone is thermodynamically unstable.

(ii) Solid PCl_5 is ionic in nature.

(iii) Fluorine forms only one oxoacid HOF.

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114. Arrange the following in increasing order of the property indicated :

(a) $H_3PO_3, H_3PO_4, H_{3PO_2}$ (Reducing Character)

(b) $NH_3, PH_3, AsH_3, SbH_3, BiH_3$(Basic Strength)

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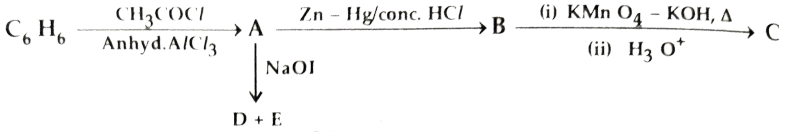
115. Write the structures of A, B, C, D and E in the following reactions :



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116. (a) Write the chemical equation for the reaction involved in Cannizzaro reaction.

(b) Draw the structure of the semicarbazone of ethanal.

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117. Calculate the freezing point of solution when 1.9 g of $MgCl_2$ (M = 95 g Mol^{-1}) was dissolved in 50g of water, assuming $MgCl_2$ undergoes complete ionization. (K_f for water = 1.86 K kg mol^{-1}).

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118. When 2.56 g of sulphur was dissolved in 100 g of CS_2, the freezing point lowered by 0.383 K. Calculate the formula of sulphur $\left(S_x\right)$.

(K_f for CS_2 = 3.83 K kg mol^{-1}, Atomic mass of sulphur = 32g mol^{-1}]

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119. What is primitive cell ?

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120. Define the term 'Tyndall effect'.

Watch Video Solution

121. Why is the froth flotation method selected for the concentration of Sulphide ores ?

Watch Video Solution

122. Why is Bi(V) a stronger oxidant than Sb(V) ?

Watch Video Solution

123. Give the IUPAC name of the following compound :

$$CH_3 - C \mid CH_3 \quad = \quad C \mid Br - CH_2OH$$

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124. Give the structure of 3-Oxopentanal.

Watch Video Solution

Watch Video Solution

125. Why is an alkylamine more basic than ammonia ?

Watch Video Solution

126. Give an example of elastomers .

Watch Video Solution

127. A reaction is of second order with respect to its reactant. How will its reaction rate be affected if the concentration of the ractant is (i) doubled (ii) reduced to half ?

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128. Which of the following pairs , will have greater conduction ?

(i) 0.1M acetic acid solution or 1 M acetic acid solution .

(ii) 0.1M NaCl solution at $25^{\circ}C$ and 0.1 M NaCl solution at $50^{\circ}C$.

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129. Draw the structural formulae of molecules of following compounds :

(i)BrF_3 and (ii)XeF_4

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130. Complete the following chemical equations :

(i)$P_4(s) + NaOH(aq) + H_2O(l) \rightarrow$

(ii) $I^-(aq) + H_2O(l) + O_3(g) \rightarrow$

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131. Differentiate between molarity and molality of a solution .How can we change molality value of solution in to molarity value?

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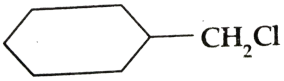
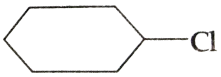
132. Which ones in the following pairs of substances undergoes S_N2 substitution reaction faster and why ?

(i)  or 

(ii) or

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133. Define a 'Peptide linkage'.

Watch Video Solution

134. Name two water soluble vitamins, their sources and diseases caused due to their deficiency in diet.

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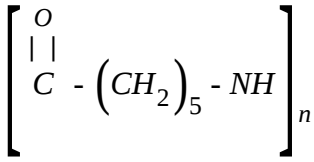
135. Write the names of monomers of the following polymers .

(i) 

(ii) $\left[CF_2 - CF_2\right]_n$

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136. What is the repeating unit in the condensation polymer obtained by combining $HO_2CCH_2CH_2CO_2H$ (succinic acid) and $H_2NCH_2CH_2NH_2$ (ethylene diamine) ?

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137. Iron has body centred cubic cell with a cell edge of 286.5 pm. The density of iron is 7.87 g cm^{-3}. Use this information to calculate Avogadro's number. (Atomic mass of Fe = 56 mol^{-3})

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138. 100 mg of a protein was disoved in just enough water to make 10 mL of the solution. If the solution has an osmotic pressure of 13.3 mm Hg at $25^{\circ} C$, what is the mass of prtein $\left(R = 0.0821 L atm mol^{-1} K^{-1}\right)$

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139. A first order reaction has a rate constant of $0.0051 \min^{-1}$. If we begin with $0.10 M$ concentration of the reaction , what concentration of reactant will remain in solution after 3 hours ?

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140. How are the following colloids different with respect to dispersed phase and dispersion medium ? Give one example of each

(i) Aerosol (ii) Emulsion (iii) Hydrosol.

Watch Video Solution

141. Account for the following :

(i) NH_3 is a stronger base than PH_3

(ii) Sulphur has a greater tendency for catenation than oxygen.

(iii) Bond dissociation energy of F_2 is less than that of Cl_2.

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142. Explain the following situations :

(i) In the structure of HNO_3 molecule , the N-O bond (121 pm) is shorter than N-OH bond (140pm).

(ii) SF_4 is easily hydrolysed whereas SF_6 is not easily hydrolysed.

(iii) XeF_2 has a straight linear structure and not a bent angular structure.

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143. For the complex $\left[Fe(en)_2Cl_2\right]Cl$ (en = ethylene diamine) , identify

(i) the oxidation number of iron ,

(ii) the hybrid orbitals and the shape of the complex,

(iii) the magnetic behaviour of the complex ,

(iv) the number of geometrical isomers ,

(v) whether there is an optical isomer also , and

(vi) name of the complex . (At. no. of Fe = 26)

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144. Explain the mechanism of the following reactions :

(i) Addition of Grignard reagent to a carbonyl compound forming an adduct followed by hydrolysis.

(ii) Acid catalysed dehydration of alcohol forming an alkene.

Watch Video Solution

145. How will you bring about the following conversions :

(i) Ethanol to acetone

(ii) Benzene to acetophenone

(iii) Benzoic acid to benzaldehyde.

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146. Explain the following types of substances with one suitable example , for each case :

(i) Cationic detergents .

(ii) Food preservatives .

(iii) Analgesics.

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147. A voltaic cell is set up at $25^{\circ}C$ with the following half cells :

$Ag^{+}(0.001M)$ | Ag and $Cu^{2+}(0.10M)$ | Cu

What would be the voltage of this cell ? $\left(E^{\circ}_{\text{cell}} = 0.46V\right)$

Watch Video Solution

148. (a) State the relationship amongst cell constant of a cell , resistance of the solution in the cell and conductivity of the solution . How is molar

conductivity of solute related to conductivity of its solution ?

(b) A voltanic cell is set up at $25^{\circ}C$ with the following half-cells :

$Al \mid Al^{3+}(0.001M)$ and $Ni \mid Ni^{2+}(0.50M)$

Calculate the cell voltage $[E^{\circ}_{Ni^{2+} \mid Ni} = -0.25V, E^{\circ}_{Al^{3+} \mid Al} = -1.66V]$

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149. (a) Complete the following chemical reaction equations :

(i) $MnO^{-}_{4(aq)} + C_2O^{2-}_{4(aq)} + H^{+}_{(aq)} \rightarrow$

(ii) $Cr_2O^{2-}_{7(aq)} + Fe^{2+}_{(aq)} + H^{+}_{(aq)} \rightarrow$

(b) Explain the following observations about the transition/inner transition elements :

(i) There is in general an increase in density of element from titanium (Z = 22) to copper (Z= 29).

(ii) There occurs much more frequent metal-metal bonding in compounds of heavy transition elements (3rd series).

(iii) The members in the actinoid series exhibit a larger number of oxidation states than the corresponding members in the lanthanoid series.

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150. (a) Complete the following chemical equations for reactions :

(*i*) $MnO_{4(aq)}^{-} + S_2O_{3(aq)}^{2-} + H_2O_{(l)} \rightarrow$

(ii) $Cr_2O_{7(aq)}^{2-} + H_2S_{(g)} + H_{(aq)}^{+} \rightarrow$

(b) Give an explanation for each of the following observations :

(i) The gradual decrease in size (actinoid contraction) from element to element is greater among the actinoids than that among the lanthanoids (lanthanoid contraction.)

(ii) The greatest number of oxidation states are exhibited by the members in the middle of a transition series.

(iii) With the same d-orbitals configuration $\left(d^4\right)Cr^{2+}$ ion is a reducing agent but Mn^{3+} ion is an oxidising agent .

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151. (a) Illustrate the following name reactions by giving example :

(i) Cannizzaro's reaction

(ii) Clemmensen reduction

(b) An organic compound A contains 69.77% carbon , $11.63\ \%$ hydrogen and rest oxygen .

The molecular mass of the compound is 86. it does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and give positive iodoform test.

On vigorous oxidation it gives ethanoic and propanoic acid. Derive the possible structure of compound A .

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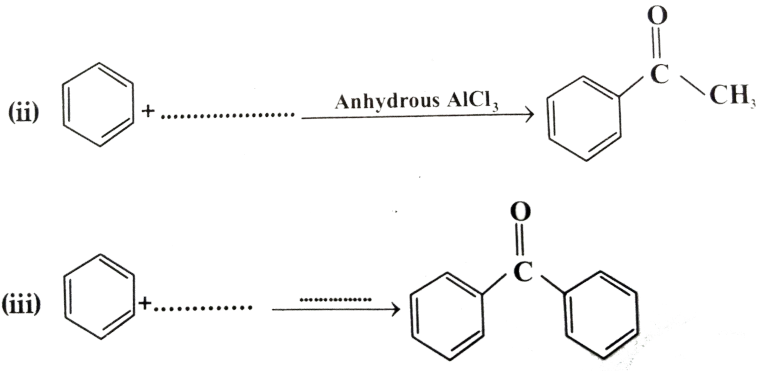
152. (a) How are the following obtained ?

(i) Benzoic acid from ethyl benzene .

(ii) Benzaldehyde from toluene.

(b) Complete each synthesis by giving the missing material , reagent or

products :



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153. How may the conductivity of an intrinsic semiconductor be increased ?

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154. Define 'peptization'

Watch Video Solution

155. How is copper extracted from low grade copper ores?

Watch Video Solution

156. Which is a stronger reducing agent , SbH_3 of BiH_3 , and why ?

Watch Video Solution

157. What happens when bromine attacks $CH_2 = CH - CH_2 - C \equiv CH$?

Watch Video Solution

158. Write the IUPAC name of

$$CH_3 - CH_2 - CH = CH - \overset{\overset{O}{\|}}{C} - H$$

Watch Video Solution

159. Write the structure of the product obtained when glucose is oxidised with nitric acid .

Watch Video Solution

160. Differentiate between disinfectants and antiseptics .

Watch Video Solution

161. Express the relation among cell constant , resistance of the solution in the cell and conductivity of the solution . How is molar conductivity of a solution related to its conductivity ?

Watch Video Solution

162. The molar conductivity of a 1.5 M solution of an electrolyte is found to be $138.9 Scm^2 mol^{-1}$. Calculate the conductivity of this solution.

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163. A reactions is of second order with respect to a reactant. How is the rate of reaction affected if the concentration of the reactant is reduced to half?

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164. Which methods are usually employed for purifying the following metals :

(i) Nickel

(ii) Germanium

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165. Explain the following facts giving appropriate reason in each case :

(i) NF_3 is an exothermic compound whereas NCl_3 is not .

(ii) All the bonds in SF_4 are not equivalent

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Watch Video Solution

166. Complete the following reactions :

(i) $Cr_2O_7^{2-} + Sn^{2+} + H^+ \rightarrow$

(ii) $MnO_4^- + Fe^{2+} + H^+ \rightarrow$

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167. Explain the mechanism of acid catalysed of an alkene to form corresponding alcohol.

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168. Explain why is ortho nitrophenol more acidic than ortho methoxyphenol ?

Watch Video Solution

169. Write the chemical equations involeved in the following reactions:

(i) Hoffmann-bromamide degradation reaction

(ii) Carbylamine reaction

Watch Video Solution

170. Complete the following reaction equations :

(i) $C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

$(ii) C_6H_5NH_2 + Br_2(aq.) \rightarrow$

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171. What are food preservatives ? Name two such substances .

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172. Copper crystallises with face centred cubic unit cell . If the radius of copper atom is 127.8 pm , calculate the density of copper metal.

(Atomic mass of Cu = 63.55 u and Avogadro's number $N_A = 6.02 \times 10^{23} mol^{-1}$)

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173. The elctrical resistance of a column of $0.05 MNaOH$ solution of diameter $1 cm$ and length $50 cm$ is $5.55 \times 10^3 ohm$. Calculate its resisteivity , conductivity, and molar conductivity.

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174. The reaction , $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ contribute to air pollution whenever a fuel is burnt in air at a high temperature . At 1500 K , quilibrium constant K for its is 1.0×10^{-5} . Suppose in a case $\left[N_2\right] = 0.80 molL^{-1}$ and $\left[O_2\right] = 0.20 molL^{-1}$ before any reaction occurs .

Calculate the equilibrium concentrations of the reactants and the product after the mixture has been heated to 1500 K.

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175. Explain the following terms giving a suitable example for each :

(i) Aerosol

(ii) Emulsion

(iii) Micelle

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176. How would you account for the following :

(i) Among lanthanoids , Ln(III) compounds are predominant , However, occasionally in solutions or in solid compounds , +2 and +4 ions are also obtained .

(ii) The $E^{\circ}_{M2+/M}$ for copper is positive (0.34V) . Copper is the only metal in the first series of transition elements showing this behaviour .

(iii) The metallic radii of the third (5d) series of transition metals are

nearly the same as those of the corresponding members of the second series .

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177. Name the following coordination entities and draw the structures of their stereoisomers :

(i) $\left[Co(en)_2Cl_2\right]^+$ (en = ethane-1,2-diamine

(ii) $\left[Cr\left(C_2O_4\right)_3\right]^{3-}$

(iii) $\left[Co\left(NH_3\right)_3Cl_3\right]$

(Atomic number Cr = 24 , Co = 27)

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178. Answer the following questions :

(i) What is meant by chirality of a compound ? Give an example .

(ii) Which one of the following compounds is more easily by hydrolyzed

by KOH and why ?

$CH_3CHClCH_2CH_3$ or $CH_3CH_2CH_2Cl$

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179. What is essentially the difference between α-glucose and β-glucose ?

What is meant by pyranose structure of glucose ?

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180. Differentiate between thermoplastic and thermosetting polymers . Give one example of each.

Watch Video Solution

181. (a) Define the following terms :

(i) Mole fraction

(ii) Ideal solution

(b) 15.0g of an unknown molecular material is dissolved in 450g of water . The resulting solution freezes at $-0.34\,^{\circ}C$. What is the molar mass of the material ?

$\left(K_f \text{ for water} = 1.86 \text{ K kg } mol^{-1}\right)$

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182. A solution of glycerol $\left(C_3H_8O_3\right)$ in water was prepared by dissolving some glycerol in 500 g of water . This solution has a boiling point of $100.42\,^{\circ}C$. what mass of glycerol was dissolved to make this solution ? (K_b for water = 0.512 K kg mol^{-1})

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183. (a) Draw the molecular structures of the following compounds :

(i) N_2O_5 (ii) $XeOF_4$

(b) Explain the following observations :

(i) Sulphur has a greater tendency for catenation than oxygen.

(ii) ICI is more reactive than I_2.

(iii) Despite lower value of its electron gain enthalpy with negative sign, fluorine $\left(F_2\right)$ is a stronger oxidizing agent than Cl_2.

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184. (A) Complete the following chemical equations :

(i) $Cu + HNO_3$ (dilute) $\rightarrow$

(ii) $XeF_4 + O_2F_2 \rightarrow$

(B) Explain the following observations:

(i) Phosphorous has greater tendency for catenation than nitrogen.

(ii) Oxygen is a gas but sulphur is a solid.

(iii) The halogens are coloured. Why ?

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185. Write a suitable chemicals equation to complete each of the following transformations :

(i) Butan-1-o1 to butanoic acid

(ii) 4-Methylacetophenone to benzene-1,4-dicarboxylic acid

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186. Give chemical tests to distinguish between

(i) Propanal and propanone

(ii) Acetophenone and Benzophenone

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187. Why are crystalline solids anisotropic ?

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188. What are emulsions ? Name an emulsion in which water is dispersed phase.

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189. What are the collectors used in froth floatation process? Name a substance that can be used as such.

Watch Video Solution

190. Whys is F_2 a stronger oxidising agent than Cl_2 ?

Watch Video Solution

191. Name the alcohol that is used to make the following ester :

$$CH_3 - \overset{\overset{O}{||}}{C} - O - C | CH_3H - CH_3$$

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192. How does a homopolymer differ form a copolymer ?

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193. Set up Nernst equation for the standard dry cell. Using this eqation show that the voltage of a dry cell has to decrease with use.

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194. What is the effect of temperature on the rate constant of reaction? How can this temperature effect on the rate constant be represented quantitatively?

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195. Describe the underlying principle of each of the following processes :

(i) Recovery of silver from the solution obtained by leaching silber ore with a solution of NaCN

(ii) Electrolytic refining of crude metal.

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196. Describe the principle involved in each of the following processes :

(i) Zone refining of a metal

(ii) Vapour phase refining of metals

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197. Complete the following chemical equations :

(i) $SO_2 + MnO_4^- + H_2O \rightarrow$

(ii) $F_2(g) + H_2O(l) \rightarrow$

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198. Assign a reasons for the following .

(i) Copper (I) ion is not known to exist in aqueous solutions.

(ii) Both O_2 and F_2 stabilize high oxidation states of transition metals but the ability of oxygen to do so exceeds that of fluorine.

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199. Write the IUPAC names fo the following compounds :

(i) $CH_2 = ChCH_2Br$

(ii) $\left(CCl_3\right)_3CCl$

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200. What are ambident nucleophiles? Explain with an example.

Watch Video Solution

201. (i) Arrange the following compounds in an increasing order of basic strength :

$C_6H_5NH_2, C_6H_5N\left(CN_3\right)_2, \left(C_2H_5\right)_2NH$ and CH_3NH_2

(ii) Arrange the following compounds in a decreasing order of pK_b values:

$C_2H_5NH_2, C_6H_5NHCH_3, \left(C_2H_5\right)_2NH$ and $C_6H_5NH_2$

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202. Give a chemical test to distinguish between each of the following pairs of compounds : 2

(i) Ethylamine and Aniline

(ii) Aniline and Benzylamine

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203. Write the names and structures of the monomers of the following polymers:

(i) Buna-S (ii) Neoprene (iii) Nylon-6, 6

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204. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1} . Calculate its molar conductivity.

Watch Video Solution

205. For a decomposition reaction the values of rate constant k at two different temperatures are given below :

$K_1 = 2.15 \times 10^{-8} L \text{mol}^{-1} s^{-1} \text{at } 650K$

$K_2 = 2.39 \times 10^{-7} L \text{mol}^{-1} s^{-1} \text{at } 700K$

Calclate the value of activation energy for this reaction.

$\left(R = 8.314 JK^{-1} \text{mol}^{-1}\right)$

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206. Giving appropriate examples, explain how the types of processes of adsorption (physisorption and chemisorption) are influenced by the prevailing temperature , the surface area of adsorbent and the activation energy of the process?

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207. Explain how the phenomenon of pdsorption finds application in each of the following processes :

(i) Production of vacuum

(ii) Heterogeneous catalysis

(iii) Froth Floatation process

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208. Give reasons for the following:

(i) Transition metals exhibit a wide range of oxidation states.

(ii) Cobalt (II) is very stable in aqueous solutions but gets easily oxidised in the presence of strong ligands.

(iii) Actinoids exhibit a greater range of oxidation states than lanthanoids.

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209. Write the IUPAC name the draw the structure of each of the following complex entities :3

(i) $\left[Co\begin{pmatrix} COO \\ | \\ COO \end{pmatrix}_3\right]^{3-}$

(ii) $\left[Cr(CO)_6\right]$

(iii) $\left[PtCl_3\left(C_2H_4\right)\right]^-$

(At.nos. Cr=25,Co,27, Pt=78)

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210. Explain the following with an example for each :

(i) Kolbe's reaction

(ii) Reimer-Tiemann reaction

(iii) Williamson ether synthesis

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211. What is meant by the following terms ? Explain with an example for each.

(i) Target molecules as used in medicinal chemistry

(ii) Food preservatives

(iii) Non-ionic detergents

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212. (a) What is van't Hoff factor? What types of values it can have if the solute molecules undergo

(i) Dissociation ?

(ii) Association ?

(b) How many mL of a 0.1 M HCl solution are required to react completely with 1 g of a mixture of Na_2CO_3 and $NaHCO_3$ containing equimolar amounts of both ?

(Molar mass : $Na_2CO_3 = 106g, NaHCO_3 = 84g$)

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213. Define

(i) Mole fraction

(ii) Molality

(iii) Raoult's law

(b) Assuming complete dissociation, calculate the expected freezing point of a solution prepared by dissolving 6.00 g of Glauber's salt, $Na_2SO_4.10H_2O$ in 0.100 kg of water. (K_f for water $=1.86 Kkg mol^{-1}$, Atomic massess : Na=23, S=32, O=16 , H=1)

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214. (a) Write the formula and describe the structure of a noble gas species which is isostructural with

(i) Ibr_2^-

(ii) BrO_3^-

(b) Assign reasons for the following :

(i) SF_6 is kinetically inert.

(ii) NF_3 is an exothermic compound whereas NCl_3 is not.

(iii) HCl is a stronger acid than HF though fluorine is more electronegative than chlorine.

View Text Solution

215. (a)How is ammonia prepared on a large scale ? Name the process and mention the optimum conditions for the production of ammonia by this process.

(b) Assign reasons for the following :

(i) H_2S is more acidic than H_2O

(ii) NH_3 is more basic than PH_3

(iii) Sulphur has a greater tendency of catenation than oxygen

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216. (a) Write the IUPAC names of the following compounds.

(i) $CH_3CO\left(CH_2\right)_4CH_3$

(ii) $Ph - CH = CH - CHO$

(b) Describe the following conversions is not more than two steps :

(i) Ethanol to 3-Hydroxybutanal

(ii) Benzoic acid to m-Nitrobenzyl alcohol

(iii) Propanone to Propene

Watch Video Solution

217. Draw the structures of the following compounds :

(i) 4-Chloropentan-2-one

(ii) p-Nitropropiophenone

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218. Give tests to distinguish between the following pairs of compounds :

(i) Ethanol and Propanal

(ii) Phenol and Benzoic acid

(iii) Benzaldehyde and Acetophenone

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219. Why are low spin tetrahedral complexes not formed ?

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220. What is the coordination number of each type of ions in a rock-salt type crystal structure?

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221. Define the term 'order of reaction' for chemical reactions.

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222. What causes Brownian movement in a colloidal solution?

Watch Video Solution

223. In which one of the two structures, NO_2^+ and NO_2^- the bond angle has a higher value ?

Watch Video Solution

224. What is the IUPAC name of the following compound :

$CH_3CH(Cl)CH(Br)CH_3$

Watch Video Solution

225. Arrange the following compounds in an increasing order of their acid strengths :

$\left(CH_3\right)_2CHCOOH, CH_3CH_2CH(Br)COOH, CH_3CH(Br)CH_2COOH$

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226. Write a chemical reaction in which the iodide ion replaces the diazonium group in a diazonium salt.

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227. Name a substance that can be used as an antiseptic as well as a disinfectant.

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228. Explain as to why haloarenes are much less reactive than halo-alkanes towards nucleophilic substitution reactions.

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229. Which compound in each of the following pairs will react faster in S_N2 reaction with -OH ? Why?

(i) CH_3Br or CH_3I (ii) $\left(CH_3\right)_3CCl$ or CH_3Cl

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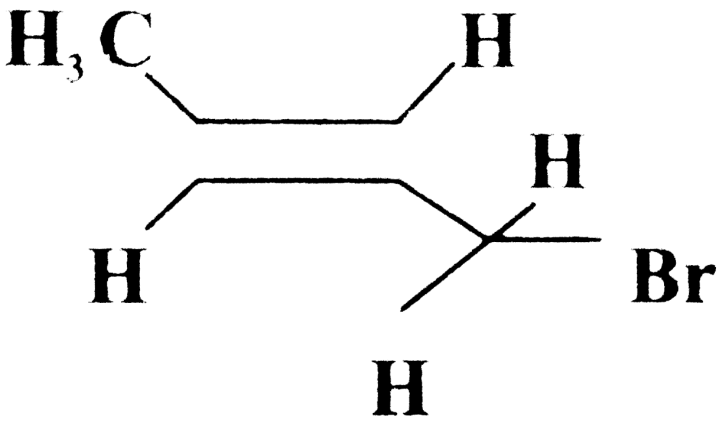
230. (a) State the IUPAC name of the following compound :



(b) Complete the following chemical equation :

$$CH_3CH_2CH = CH_2 + HBr \xrightarrow{\text{Peroxide}} .....$$

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231. State Henry's law correlating the pressure of a gas and its solubility in a solvent and mention two applications for the law.

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232. A first order decomposition reaction takes 40 minutes for 30% decomposition. Calculate its $t_{1/2}$ value.

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233. What is meant by the 'rate constant, k' of a reaction ? If the concentration be expressed in mol L^{-1} units and time in seconds, what would be the units for k (i) for a zero order reaction and (ii) for a first order reaction?

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234. Define the following term in relation to proteins :

(i) Peptide bond

(ii) Denaturation of proteins.

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235. Explain glucose. What is the role of glucose (cane sugar) from Sucrose.

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236. Assign a reason for each of the following statements :

(i) Ammonia is a stronger base than phosphine.

(ii) Sulphur in vapour state exhibits a paramagnetic behaviour.

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237. Draw the structures of the following molecules :

(i) SF_4 (ii) XeF_4

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238. What are biodegradable and non-biodegradable detergents? Give one example of each class.

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239. What is point defects. Describe two types of point defects.

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240. Calculate the temperature at which a solution containing 54g of glucose, $\left(C_6H_{12}O_6\right)$ in 250g of water will freeze. (K_f for water = 1.86 K mol^{-1} kg)

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241. What are lyophilic and lyophobic sols ? Give one example of each type. Which one of these two types of sols is easily coagulated and why?

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242. State briefly the principles which serve as basis for the following operations in metallurgy :

(i) Froth floatation process

(ii) Zone refining

(iii) Refining by liquation

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243. Write chemical equations for the following processes :

(i) Chlorine reacts with a hot concentrated solution of sodium hydroxide

(ii) Orthophosphorous acid is heated

(iii) PtF_6 and xenon are mixed together

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244. Complete the following chemical equations :

(i) $Ca_3P_2(s) + H_2O(l) \rightarrow$ .....

(ii) $Cu^{2+}(aq) + NH_3(aq)(\text{excess}) \rightarrow$ .....

(iii) $F_2(g) + H_2O(l) \rightarrow$ .....

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245. (a) What is a ligand ? Give an example of a bidentate ligand.

(b) Explain as to how the two complexes of nickel, $\left[Ni(CN)_4\right]^{2-}$ and $Ni(CO)_4$ have different structures but do not differ in their magnetic behaviour. (Ni = 28)

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246. Name the reagents whch are used in the following conversions :

(i) A primary alcohol to an aldehyde

(ii) Butan-2-one to butan-2-ol

(iii) Phenol to 2, 4, 6-tribromophenol

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247. Account for the following observations :

(i) pK_b for aniline is more than that for methylamine.

(ii) Methylamine solution in water reacts with ferric chloride solution to give a precipitate of ferric hydroxide.

(iii) Aniline does not undergo Friedel-Crafts reaction.

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248. Write the names and structures of the monomers of the following polymers :

(i) Buna-S

(ii) Neoprene

(iii) Nylon-6

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249. Conductivity of 0.00241 M acetic acid solution is 7.896 $\times 10^{-5} Scm^{-1}$. Calculate its molar conductivity in this solution. If Λ°_{M} for acetic acid be

390.5 S $cm^2 mol^{-1}$, what would be its dissociation constant?

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250. Three electrolytic celss A,B,C containing solutions of $ZnSO_4$, $AgNO_3$ and $CuSO_4$, respectively are connected in series. A steady current of 1.5 amperes was passes through them until 1.45 g of silver deposited at the cathode of cell B. How long did the current flow ? What mass of copper and zinc were deposited.

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251. Assign reasons for the following :

(i) The enthalpies of atomisation of transition elements are high.

(ii) The transition metals and many of their compounds act as good catalyst.

(iii) From element to element the actinoid contraction is greater than the lanthanoid contraction.

(iv) The E° value for the Mn^{3+}/Mn^{2+} couple is much more positive than

that for Cr^{3+}/Cr^{2+}.

(v) Scandium (Z = 21) does not exhibit variable oxidation states and yet it is regarded as transition element.

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252. Write down the number of 3d electrons in each of the following ions : $Ti^{2+}, V^{2+}, Cr^{3+}, Mn^{2+}, Fe^{2+}, Co^{2+}, Ni^{2+}$ and Cu^{2+}. Indicate how would you expect the five 3d orbitals to be occupied for these hydrated ions (octahedral).

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253. (a) How many you account for the following :

(i) Aldehydes are more reactive than ketones towards nucleophiles.

(ii) The boiling points of aldehydes and ketones are lower than of the corresponding acids.

(iii) The aldehydes and ketones undergo a number of addition reactions.

(b) How will you distinguish between these compounds:

(i) Acetaldehyde and benzaldehyde

(ii) Propanone and propanol

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254. What is meant by 'doping' in a semiconductor ?

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255. What is the role of graphite in the electrometallurgy of aluminium ?

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256. Which one of $PCl_4^+ \& PCl_4^-$ is not likely to exist and why ?

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257. Give the IUPAC name of the following compound.

$CH_2 = C$ - C | CH_3H_2Br

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258. Draw the structural formula of 2-methylpropan-2 of molecule.

Watch Video Solution

259. Arrange the following compounds in increasing order of their reactivity in nucleophilic addition reactions.

(i) Ethanal, Propanal, Propanone, Butanone.

(ii) Benzaldehyde, p-Tolualdehyde, p-Nitrobenzaldehyde, Acetophenone.

Hint: Consider steric effect and electronic effect.

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260. Arrange the following in the decreasing order of their basic strength in aqueous solutions :

CH_3CSNH_2, $\left(CH_3\right)_2NH$, $\left(CH_3\right)_3N$ and NH_3

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261. Define the term, 'homopolymerisation' giving an example.

Watch Video Solution

262. A 1.00 molal aqueous solution of trichloroacetic acid $\left(\mathbb{C}l_3COOH\right)$ is heated to its boiling point. The solution has the boiling point of $100.18^\circ C$. Determine the van't Hoff factor for trichloroacetic acid.

(K_b for water $= 0.512 Kkg\text{mol}^{-1}$)

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263. Define the following terms:

(i) Mole fraction (ii) Isotonic solutions (iii) Van't Hoff factor (iv) Ideal solution

Watch Video Solution

264. What do you understand by the order of a reaction ? Identify the reaction order from each of the following units of the reaction rate constant :

(i) $L^{-1}mols^{-1}$

(ii) $Lmols^{-1}$

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265. Name the two groups into which phenomenon of catalysis can be divided. Give an example of each group with the chemical equation involved.

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266. What is meant by coagulation of a colloidal solution ? Describe briefly any three methods by which coagulation of a lyophobic sol can be carried out.

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267. Describe the principe involved in the following process.

(i) Mond process for refining of Nickel.

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268. Explain the following giving an appropriate reason in each case.

(i) O_2 and F_2 both stabilize higher oxidation states of metals but O_2 exceeds F_2 in doing so.

(ii) Structure of Xenon fluorides cannot be explained by Valence Bond approach.

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269. Complete the following chemical equations :

(i) $Cr_2O_7^- + H^+ + I^- \rightarrow$

(ii) $MnO_4^- + NO_2^- + H^+ \rightarrow$

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270. What is meant by

(i) peptide linkage

(ii) biocatalysts ?

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271. Write such reactions and facts about glucose which cannot be explained by its open chain structure.

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272. Draw the structure of the monomer for each of the polymers:

(i) Nylon6

(ii)Polypropene

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273. Tungsten crystallizes in body centred cubic unit cell. If the edge of the unit cell is 316.5 pm, what is the radius of tungsten atom ?

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274. Iron has a body centered cubic unit cell with a cell edge of 286.65 pm . The density of iron is $7.87 gcm^{-3}$. Use this information to calculate Avogadro's number (At. Mass of Fe = 56g mol^{-1}).

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275. Calculate the amount of KCl which must be added to $1kg$ of water so that the freezing point is depressed by $2K$. (K_f for water $= 1.86 Kkg mol^{-1}$).

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276. For the reaction $2NO_{(g)} + Cl_{2(g)} \rightarrow 2NOCl_{(g)}$ the following data were collected.

All the measurements were taken at $263K$:

Experiment No.	Initial [NO] (M)	Initial [Cl_2] (M)	Initial rate of disappearance of Cl2 (M/min)
1	0.15	0.15	0.60
2	0.15	0.30	1.20
3	0.30	0.15	2.40
4	0.25	0.25	?

Write the expression for rate law.

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277. How would you account for the following ?

(i) Many of the transition elements are known to form interstitial

compounds.

(ii) The metallic radii of the third (5d) series of transition metals are virtually the same as those of the correponding group members of the second (4d) series.

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278. Give the formula of each of the following coordination entities :

(i) Co^{3+} ions is bound to one Cl^- one NH_3 molecules and two bidentate ethylene diamine (en) molecules.

(ii) Ni^{2+} ions is bound to two water molecules and two oxalate ions.

Write the name and magnetic behaviour of each of the abvoe coordination entities.

(At. nos. $Co = 27, Ni = 28$)

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279. Althrough chlorine is an electron withdrawing group, yet it is ortho-para-directing in electrophilic aromatic substitution reactions. Explain

why it is so ?

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280. Draw the structrue and name the product formed if the following alcohols are oxidized. Assume that an excess of oxidising agent is used.

(i) $CH_3CH_2CH_2CH_2OH$

(ii) 2-butenol

(iii) 2-methyl-1-propanol

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281. Write chemical equations for the following conversion :

(i) Nitrobenzene to benzoic acid.

(ii) Benzyl chloride to 2-pheylethanamine .

(iii) Aniline to benzyl alcohol.

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282. What are the following substances? Give one example of each one of them.

(i) Tranquilizers

(ii) Food preservatives

(iii) Synthetic detergents

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283. (a) What type of a battery is the lead storage battery ? Write the anode and the cathode reactions and the overall occuring in a lead storage battery when current is drawn from it.

(b) In the buttom cell, widely used in watches the following reaction take place

$Zn_{(s)} + Ag_2O_{(l)} \rightarrow Zn^{2+}(aq) + 2Ag_{(s)} + 2OH^-_{(aq)}$.

Determine E° and ΔG° for the reaction.

(given : $E^\circ_{Ag^+/Ag} = +0.80V, E^\circ_{Zn^{2+}/Zn} = -0.76V$)

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284. (a) Define molar conductivity of a solution and explain how molar conductivity changes with change in concentration of solution for a weak and a strong electrolyte.

(b) The resistance of conductivity cell containing $0.001MKCl$ solution at $298K$ is $1500ohm$. What is the cell constant if the conductivity of $0.001MKCl$ solution at $298K$ is $0.146 \times 10^{-3}Scm^{-1}$

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285. (a) Complete the following chemical reaction equations :

(i) $P_4 + SO_2Cl_2 \rightarrow$

(ii) $XeF_6 + H_2O \rightarrow$

(b) Predict the shape and the asked angle (90° or mor or less) in each of the following cases :

(i) SO_3^{2-} and the angle O - S - O

(ii) ClF_3 and the angle F - Cl - F

(iii) XeF_2 and the angle F - Xe - F

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286. Complete the following chemical equations :

(i) $NaOH + Cl_2 \rightarrow$ (hot and conc.)

(ii) $XeF_4 + O_2F_2 \rightarrow$

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287. Illustrate the following name reactions giving suitable exaple in each case :

(i) Clemmensen reduction

(ii) Hell-Volhard-Zelinsky reaction.

(b) How are the following conversions carried out ?

(i) Ethylcyanide to ethanoic acid

(ii) Butanol to Butanoic acid

(iii) Benzoic acid to m-bromobenzoic acid

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288. (a) Illustrate the following reactions giving a suitable example for each.

(i) Cross aldol condensation

(ii) Decarboxylation

(b) Give simple tests to distinguish between the following pairs of compound

(i) Pentan-2-one and pentan-3-one

(ii) Benzaldehyde and Acetophenone

(ii) Phenol and Benzoic acid

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289. Write the equation showing the relationship between equivalent and concentrate of a storng electrolyte.

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290. What is meant by 'shape selective catalysis'?

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291. Differentiate between a mineral and an ore.

Watch Video Solution

292. What is meant by 'lanthanoid contraction'?

Watch Video Solution

293. Write the IUPAC name of the following compound :

$CH_2 = CHCH_2Br$

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294. Draw the structure of 4-choloropentan-2-one.

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295. How will you convert ethanol to ethene? Write chemical equation

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296. Rerrange the following in an increasing order of their basic strengths:

$C_6H_5NH_2$, $C_6H_5N\left(CH_3\right)_2$, $\left(C_6H_5\right)_2$ NH and CH_3NH_2.

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297. Name the parameters that characterized a unit cell.

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298. Assuming that atoms are touching each other, calculate the packing efficiency in case of a crystal of simple cubic metal.

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299. Calculate the mole fraction of benzene in solution containing 30% by mass in carbon tetrachloride.

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300. What do you understand by the rate law and rate constant of a reaction? Identify the order of a reaction if the units of its rate constant are :

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301. The thermal decomposition of formic acid (HCOOH) is a first order reaction with the rate constant of $2.4 \times 10^{-3} s^{-1}$ at a certain temperature.Calculate how long will it take for three-fourth of initial quantity of HCOOH to decompose.

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302. Describe the principle controlling each of the following processes:

(i) Vapour phase refining of titanium metal.

(ii) Froth floatation method of concetration of a sulphide ore

Watch Video Solution

303. How would you account for the following :

(i) Cr^{2+} is reducing in nature while with the same d-orbital configuration $\left(d^4\right)$, Mn^{2+} is oxidising in nature.

(ii) In the transition series of metals, the metal which exhibits the greatest number of oxidation states occurs in the middle of the series.

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304. Complete the following chemical reaction equations :

(i) $MnO_4^-(aq) + C_2O_4^{2-}(aq) + H^+(aq) \rightarrow$

(ii) $Cr_2O_7^{2-}(aq) + Fe^{2+}(aq) + H^+(aq) \rightarrow$

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305. State the reason for the following :

(i) Cu (I) ion is not stable in an aqueous solution.

(ii) Unlike $Cr^{3+}, Mn^{2+}, Fe^{3+}$ and the subsequent other M^{2+} ions of the 3d series, the 4d and 5d series metals generally do not form stable oxidation states.

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306. Give the prepartion and uses of PVC (Polyvinyl Chloride)

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307. Write the main structural difference between DNA and RNA. Of the four bases, common to both DNA and RNA.

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308. A solution prepared by dissolving 8.95 mg of a given fragment in 35.0 mL of has an osmotic pressure of 0.335 torr at $25^{\circ}C$. Assuming that the given fragment is non-electolyty. Calculate its molar mass.

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309. Classify colloids where dispersion medium is water. State their characterstics and write one example of each of these classes.

Watch Video Solution

310. Depict the galvanic in whiCHM the reaction :

$Zn(s) + 2Ag^{\oplus}(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ takes place.

Further show :

a. WhiCHM of the electrode is negatively CHMarged ?

b. The carriers of the current in the cell.

c. Individual reaction at eaCHM electrode.

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311. State true or Fasle:

H_2S is acidic thanH_2O.

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312. Explain the following terms giving suitable examples in each case

(i) Ambidentate ligand

(ii) Denticity of a ligand

(iii) Crystal field splitting in an octahedral field.

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313. Rearrange the compounds of each of the following sets in order of reactivity towards $S_{N_3^2}$ displacement :

(i) 2- Bromo-2-methylbutane,

1-Bromopentane, 2- Bromopentaure.

(ii) 1- Bromo-3-methylbutance, 2-Bromo-2-methylbutance,3-Bromo-2-methybutane.

(iii) 1- Bromobutane, 1- Bromo-2,

2-dimethylbutane

1-Bromo -2- methylbutane.

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314. How would you obtain the following :

(i) Benzoquione from phenol

(ii) 2-Methylpropan-2-ol from methylmagnesium bromide

(iii) Propan-2-ol from propene

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315. Name the reagents used in the following reactions:

(i) Oxidation of a primary alcohol to carboxylic acid.

(ii) Oxidation of a primary alcohol to aldehyde.

(iii) Bromination of phenol to 2,4,6-tribromophenol.

(iv) Benzyl alcohol to benzoic acid.

(v) Dehydration of propan-2-ol to propene.

(vi) Butan-2-one to butan-2-ol.

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316. Draw the structures of the monomers of the following polymers:

(i) Polythene

(ii) PVC

(iii) Teflon

Watch Video Solution

317. Explain the term, target molecules or durg targets as used in midecinal chemistry.

Watch Video Solution

318. What type of a battery is lead storage battery? Write the anode and cathode reactions and the overall cell reaction occurring in the operation of a lead storage battery.

(b) Calucluate the potential for half-cell containing.

0.10 M $K_2Cr_2O_7(aq)$, $0.20MCr^{3+}(aq)$ and $1.0 \times 10^{-4}MH^+(aq)$

The half -cell reaction is

$$Cr_2O_7^{2-}(aq) + 4H^+(aq) + 6e^- \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$$

and the standard electron potential is given as $E^o = 1.33V$.

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319. (a) How many mole of mercury will be produced by electrolysing 1.0 MHg $\left(NO_3\right)_2$ solution with a current of 2.00 A for 3 hours? [Hg

$\left(NO_3\right)_2 = 200.6 gmol^{-1}$].

(b) A voltaic cell is set up at $25^\circ C$ with the following half-cells Alk^{3+} (0.001M) and Ni^{2+} (0.50M). Write an equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

(Given : $E^2_{Ni^{2+}/Ni} = -0.25V, E^\circ_{Al^{3+}/Al} = -1.66V$)

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320. Complete the following chemical equations :

(i) $HgCl_2 + PH_3 \rightarrow$

(ii) $SO_3 + H_2SO_4 \rightarrow$

(iii) $XeF_4 + H_2O \rightarrow$

(b) Darw the structure of

(i) $\left(HPO_3\right)_3$

(ii) BrF_3

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321. (a) what happens when

(i) Chlorine gas is passed though a hot concentrated solution of NaOH?

(ii) sulphure dioxide gas is passed through an aqueses solution of Fe (III) salt?

(b) Answer the following :

(i) what is the basicity of H_3PO_3 and why?.

(ii) why does fluorine not pay the role of a central atom in interhalogen compounds ?

(iii) Why do noble gases have very low boiling points ?

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322. (a) Illustrate the following name reactions:

(i) Cannizzaro's reaction.

(ii) Clemmensen reduction

(b) How would you obtain the following:

(i) But-2-enal from ethanal.

(ii) Butanoic acid from butanol.

(iii) Benzoic acid from ethylbenzene.

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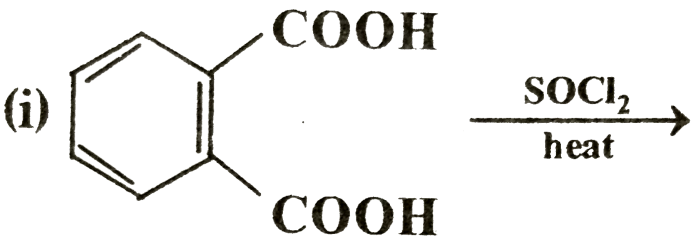
323. (a) Given chemical tests to distinguish between the following :

(i) Benzoic acid and ethyl benzoate.

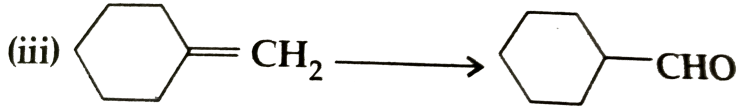
(ii) Benzaldehyde and acetophenone.

(b) Complete each synthesis by giving missing regents or products in following.

(i) 

(i)

(ii) $C_6H_3CHO \xrightarrow{H_2NCONHNH_2}$

(iii) 

(iii)

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SET-II

1. Write the structure of 2-aminotoluene.

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2. Which aerosol depletes ozone layer?

Watch Video Solution

3. Ethanal is soluble in water. Why?

Watch Video Solution

4. Write the IUPAC name of the following compound:

$CH_3 - C(Br)H - CH_2 - C(Cl)H - CH_3$

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5. Write the name of linkage joining two amino acids.

Watch Video Solution

6. Give one example of a condensation polymer.

Watch Video Solution

7. (a) Why does presence of excess of lithium makes Li Cl crystals pink?

(b) A solid with cubic crystal is made of two elements P and Q. Atoms of Q are at the comers of the cube and Pat the body-centre. What is the formula of the compound?

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8. Draw the structures of the following molecules :

(i) XeF_6

(ii) $H_2S_2O_7$

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9. Outline the principles of refining of metals by the following methods :

(a) Electrolytic refining

(b) Zone refining

(c) Vapour phase refining

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10. Define the following terms giving an example of each:

(i) Associated colloids (ii) Lyophilic sol

(iii) Adsorption

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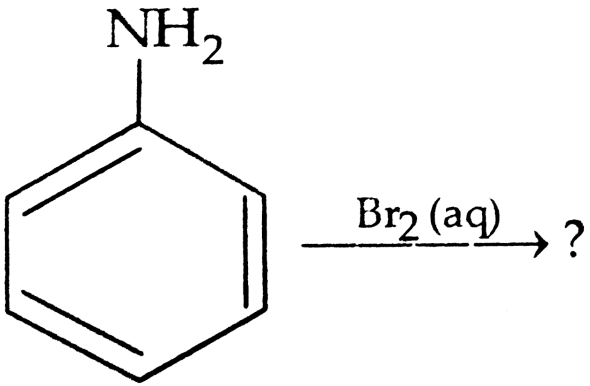
11. Write the main products of the following reactions:

(i) $C_6H_5N_2^+Cl^- \xrightarrow{H_3PO_2+H_2O} ?$



(ii)

(iii) $CH_3 - C(=O) - NH_2 \xrightarrow{Br_2 + NaOH} ?$

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12. Give reasons for the following:

(i) Oxygen is a gas but sulpher is a solid.

(ii) O_3 acts as a powerful oxidising agent.

(iii) BiH_3 is the strongest reducing agent amongst all the hydrides of Groups 15 elements.

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13. What type of colloid is formed when a solid is dispersed in a liquid? Give an example.

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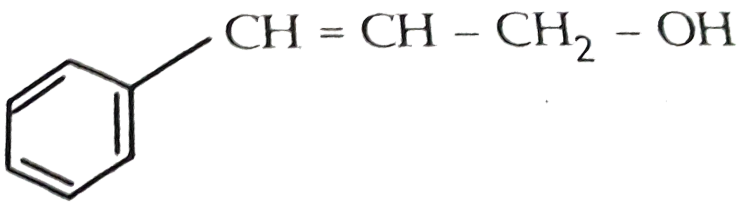
14. Write the IUPAC name of the following compound:



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15. Write the formula of the compound of sulphur which is obtained when conc. HNO_3 oxidises S_8.

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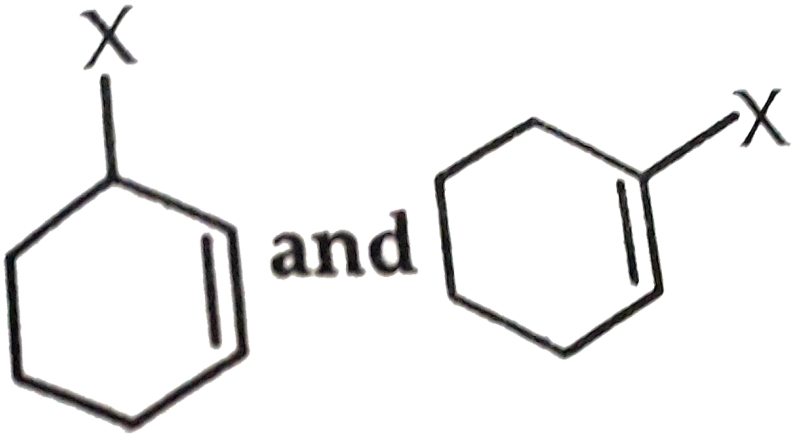
16. 

Out of which is an example of vinylic halide?

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17. Unit IUPAC norms write the formulae for the following:

(a) Tris (ethane-1,2-diamine) chromium (III) chloride

(b) Potassium tetrahydroxozincate (II).

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18. Draw the structures of the following:

(a) $H_2S_2O_8$

(b) ClF_3

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19. Write the name of the cell which is generally used in inverters. Write the reactions taking place at the anode and the cathode of this cell.

Watch Video Solution

20. (a) Write the principle of vapour phase refining.

(b) Write the role of dilute $NaCN$ in the extraction of silver.

(c) What is the role of collectors in the froth floatation process? Give an example of a collector.

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21. Define the following:

(a) Anionic detergents

(b) Narrow spectrum antibiotics

(c) Antacids.

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22. Write the structures of the monomers used for getting the following polymers:

(a) Polyvinyl chloride (PVC)

(b) Melamine-formaldehyde polymer

(c) Buna-N

Watch Video Solution

23. (a) Based on the nature of the intermolecular foces, classify solids benzene and silver.

(b) AgCl shows frenkel defect while NaCl does not. Give reason.

(c) What type of semi-conductor is formed when Ge is doped with Al ?

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24. Write a point of distinction between a metallic solid and an ionic solid than metallic lustre.

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25. Describe a comspicuous change observed when

(i) a solution of $NaCl$ is added to a sol of hydrated ferric oxide.

(ii) a beam of light is passed through a solution of NaCl and then through a sol.

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26. Describe the following : - (i) The role of cryolite in electro metallurgy of aluminium.

(ii) The role of carbon monoxide in the refining of crude nickel.

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27. What is meant by

(i) peptide linkage

(ii) biocatalysts ?

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28. Write the main structural difference between DNA and RNA. Of the two bases, thymine and uracil, which one is present in DNA ?

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29. A solution of glycerol $\left(C\text{ - }(3)H_8O_3\right.$, molar mass = 92 g mol^{-1} iin water was prepared by dissolving some glycero 500 g of water. This solution has a boiling point of $100.42\ ^\circ C$. What mass of glycerol was dissolved to make this solution ? K_b for water=$0.512 kkgmol^{-1}$.

Watch Video Solution

30. How would you account for the following ?

(i) With the same d-orbital configuration $\left(d^4\right)Cr^{2+}$ is reducting agent while Mn^{3+} is an oxidizing agent.

(ii) The actionoids exhibits a larger numbe of oxidation states than the corresponding members in the lanthanoid series.

(iii) Most of the transition metal ions exhibit characteristic in colours in aqueous solutions.

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31. (a) Give a possible explaination for each one of the following : -

(i) There are two - NH_2 groups in semicarbazide. However, only one such group is involvedin the formation of semicarbazones.

(ii) Cyclohexanone forms cyanohydrin in good yield but $2, 4, 6$-trimethylcyclohexanone does not.

(b) An organic compound with molecular formula$C_9H_{10}O$ forms, $2, 4$- DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation it gives 1,2-benzene-di-carboxylic acid. Identify the compound.

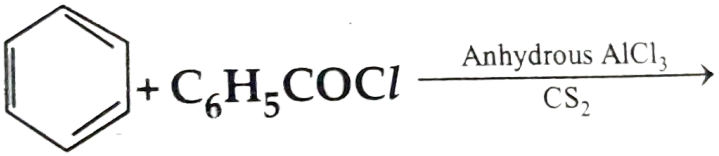
Watch Video Solution

32. (a) Give chemical tests to distinguish between

(i) Phenol and Benzoic acid

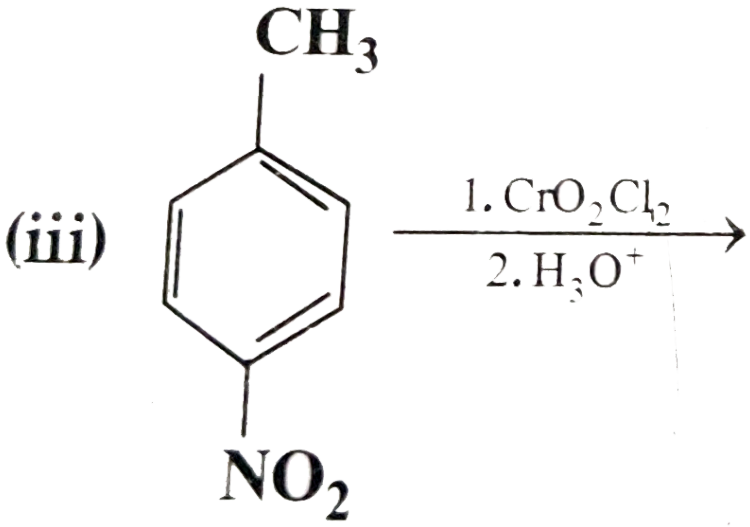
(ii) Benzophenone and Acetophenone

(b) Write the strucutre of the main products of following reactions :

(i) 

(i)

(ii) $H_3C - C \equiv C - H \xrightarrow[]{Hg^{2+}, H_2SO_4}$

(iii) 

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SET-III

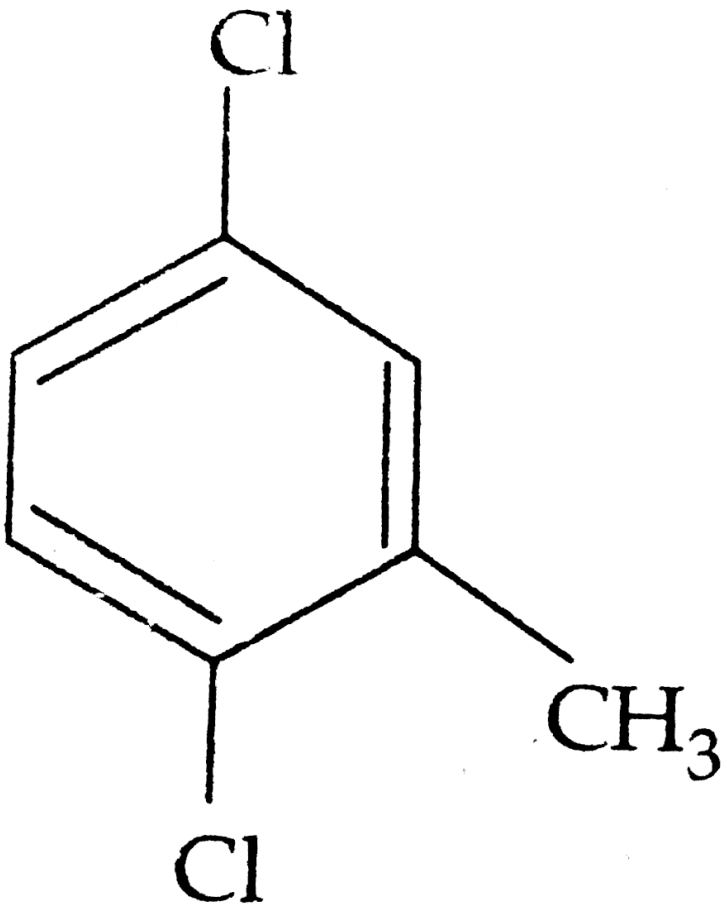
1. What is especially observed when a beam of light is passed through a colloidal solution?

Watch Video Solution

2. What is the basicity of H_3PO_3 ?

Watch Video Solution

3. Write the IUPAC name of the following compound:



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4. What are the products of hydrolysis of lactose?

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5. Is $\left(CH_2 - CH\right)_n$ a homopolymer or a copolymer?

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6. Write the structure of prop-2-en-1-amine.

Watch Video Solution

7. Draw the structures of the following molecules :

(i) N_2O_5

(ii) XeF_2

Watch Video Solution

8. (a) What change occurs when AgCl is doped with $CdCl_2$?

(b) What type of semiconductor is produced when silicon is doped with

boron?

Watch Video Solution

9. Name the principal ore of aluminium. Explain the significance of leaching in the extraction of aluminium.

Watch Video Solution

10. Define the following terms with an example in each case:

(i) Macromolecular sol

(ii) Peptization

(iii) Emulsion

Watch Video Solution

11. Give reasons for the following :

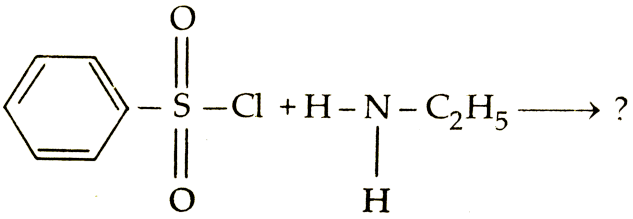
(i) Though nitrogen exhibits + 5 oxidation state, it does not fonn

pentahalide. (ii) Electron gain enthalpy with negative sign of fluorine is less than that of chlorine. (iii) The two oxygen-oxygen bond lengths in ozone molecule are identical.

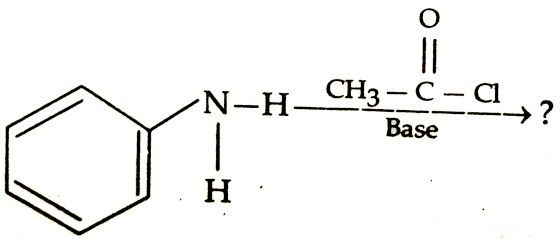
Watch Video Solution

12. Write the main products of the following reactions:

(ii)



(iii)



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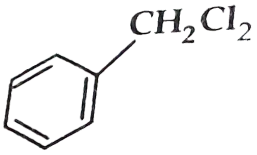
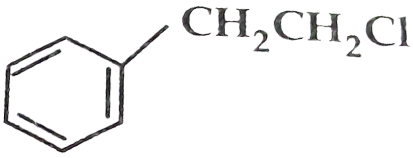
13. 

and 

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Out of which is an example of a benzylic halide?

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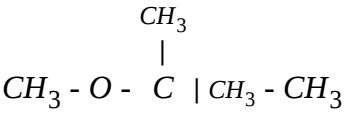
14. Write the formula of the compound of iodine which is obtained when conc. HNO_3 oxidises I_2.

Watch Video Solution

15. What type of colloid is formed when a gas is dispersed in a liquid? Give an example.

Watch Video Solution

16. Write the IUPAC name of the following compound:



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17. Draw the structure of the following:

(a) XeF_4

(b) BrF_5

Watch Video Solution

18. Write the name of the cell which is generally used in transistors. Write the reactions taking place at the anode and the cathode of this cell.

Watch Video Solution

19. Using IUPAC norms write the formulae for the following:

(a) Potassium trioxalatoaluminate (III)

(b) Dichloridobis (ethane-1,2-diamine)cobalt(III)

Watch Video Solution

20. (a) What type of isomerism is shown by the complex $\left[Co\left(NH_3\right)_5(SCN)\right]^{2+}$?

(b) why is $\left[NiCl_4\right]^{2-}$ paramagnetic while $\left[Ni(CN)_4\right]^{2-}$ is diamagnetic ? (Atomic number of Ni=28)

(c) Why are low spin tetrahedral complexes rarely observed?

Watch Video Solution

21. (a) Based on the nature of intermolecular forces, classify the following solids:

Sodium sulphate, Hydrogen

(b) What happens when $CdCl_2$ is doped with $AgCl$?

(c) why do ferrimagnetic substances show better magnetism than antiferromagnetic substances?

Watch Video Solution

22. (a) Write the principle of electrolytic refining.

(b) Why does copper obtained in the extraction from copper pyrites have a blistered appearance?

(c) What is the role of depressants in the froth floatation process?

Watch Video Solution

23. Define the following:

(a) Cationic detergents

(b) Broad spectrum antibiotics

(c) Tranquilizers

Watch Video Solution

24. Write the structures of the monomers used for getting the following polymers:

(a) Teflon

(b) Melamine-formaldehyde polymer

(c) Neoprene

Watch Video Solution

25. What is meant by reverse osmosis?.

Watch Video Solution

26. What type of ores can be concentrated by magnetic separation method ?

Watch Video Solution

27. Describle the principal controlling each of the following processes:

(i) Preparation of cast iron from pig iron.

(ii) Preparation of pure alumina $\left(Al_2O_3\right)$ form bauxite ore.

Watch Video Solution

28. Explain giving reason:

(i) Treansition metals and their compounds generally exhibit a paramagnetic behave .

(ii) The chemistry of actinoids is not so smooth as that of lanthanoids.

Watch Video Solution

29. Explain the following giving an exmaple in each case:

(i) Linkage isomersion.

(ii) An outer orbital complex .

. (iii) A bidentate ligand.

Watch Video Solution

Watch Video Solution

30. Write the state of hybridization, the shape and the magnetic behaviour of the following complex entities:

(i) $\left[Cr\left(NH_3\right)_4Cl_2\right]Cl$

(ii) $\left[CoFe_6\right]^{3-}$

(iii) $K_2\left[Ni(CH)_4\right]$

Watch Video Solution

31. Write the names and structure of the monomers of the following polymers:

(i) Buna-S

(ii) Dacron

(iii) Neoprene.

Watch Video Solution

CHEMISTRY (THEORY)

1. Write the structure of an isomer of compound C_4H_9Br which is most reactive towards S_N1 reaction.

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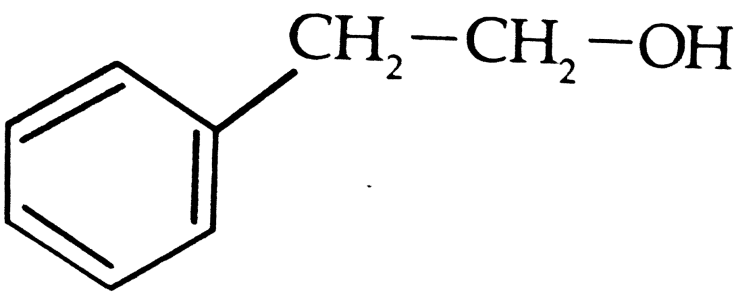
2. $Pb\left(NO_3\right)_2$ on heating gives a brown gas which undergoes dimerization on cooling? Identify the gas.

Watch Video Solution

3. Give an example each of a molecular solid and an ionic solid.

Watch Video Solution

4. Write the IUPAC name of the given compound :



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5. What is the reason for the stability of colloidal sols?

Watch Video Solution

6. (i) Gas A is more soluble in water than Gas (B) at the same temperature. Which one of the two gases will have the higher value of K_H (Henry's constant) and why?

(ii) In non-ideal solution, what type of deviation shows the formation of maximum boiling azeotropes ?

Watch Video Solution

7. Write the structure of the following :

(i) BrF_3 (ii) XeF_4

Watch Video Solution

8. What happens when :

(i) SO_2 gas is passed through an aqueous solution Fe^{3+} salt?

(ii) XeF_4 reacts with SbF_5?

Watch Video Solution

9. When a coordination compound $CoCI_3.6NH_3$ is mixed with $AgNO_3$, 3 moles of AgCI are precipitated per mole of the compound. Write

(i) Structural formula of the complex

(ii) IUPAC name of the complex

Watch Video Solution

10. For a reaction : $H_2 + CI_2 \xrightarrow{h\nu} 2HCI$

Rate = k

(i) Write the order and molecularity of this reaction.

(ii) Write the unit of k.

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11. Write the chemical equations involved in the following reactions:

(i) Hoffmann-bromamide degradation reaction

(ii) Carbylamine reaction

Watch Video Solution

12. An element crystallizes in b.c.c. lattice with cell edge of 500 pm. The density elements is 7.5g/ml. How many atoms are present in 300 g of the element ?

Watch Video Solution

13. For the first order thermal decomposition reaction, the following data were obained :

$C_2H_5Cl(g) \rightarrow C_2H_4(g) + HCl(g)$

Time/sec	Total pressure/atm
0	0.30
300	0.50

Calculate the rate constant

(Given : log 2= 0.301, log 3 = 0.4771, log 4=0.6021)

Watch Video Solution

14. Define the following terms :

(i) Associated colloids

(ii) Lyophilic Sol

(iii) Adsorption

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15. (i) Name the method of refining of nickel.

(ii) What is the role of cryolite in the extraction of aluminium ?

(iii) What is the role of limestone in the extraction of iron from its oxides ?

View Text Solution

16. Calculate the boiling point of solution when 4g of Mg $SO_4\left(M = 120 g \text{mol}^{-1}\right)$ was dissolved in 100g of water, assuming $MgSO_4$ undergoes complete ionization

$\left(K_b \text{ for water } = 0.52 K \text{ kg mol}^{-1}\right)$

Watch Video Solution

17. Give reasons : (i) SO_2 is reducing while TeO_2 is an oxidizing agent.

(ii) Nitrogen does not form pentahalide.

(iii) ICl is more reactive than I_2.

Watch Video Solution

18. Write the final product(s) in each of the following reactions :

(a) $CH_3 - \overset{\overset{CH_3}{|}}{\underset{|}{C}}CH_3 - O - CH_3 + HI \rightarrow$

(b) $CH_3 - CH_2 - \underset{|}{\overset{|}{C}}HOH - CH_3 \xrightarrow{Cu/573K}$

(c) $C_6H_5 - OH \xrightarrow[(ii)H^+]{(i)CHCl_3+aq.NaOH}$

Watch Video Solution

19. Account for the following

(i)Primary amines $\left(R - NH_2\right)$ have higher boiling point than tertiary amines $\left(R_3N\right)$

(ii) Aniline does not undergo Friedel - crafts reaction

(iii) $\left(CH_3\right)_2$ NH is more basic than $\left(CH_3\right)_3N$ in an aqueous solution

Watch Video Solution

20. How do you convert:

1. Chlorobenzene to biphenyl

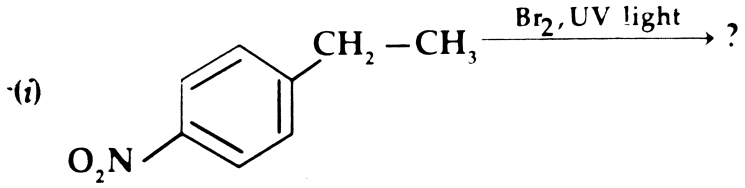
(ii). Propene to 1-iodopropane

(iii). 2-bromobuane to but-2-ene.

Watch Video Solution

21. Write the major product(s) in the following :

(i)



(i)

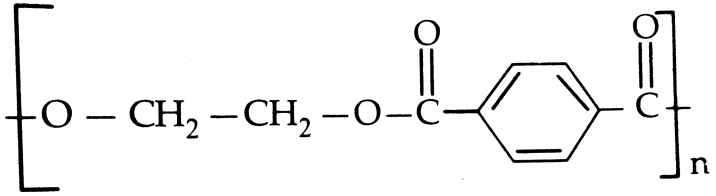
(ii) $2CH_3 - \underset{|}{CH}CH_3 - CH_3 \xrightarrow[\text{dry ether}]{Na}$

(iii) $CH_3 - CH_2 - Br \xrightarrow{AgCN}$

View Text Solution

22. (i) What is the role of Sulphur in the vulcanization of rubber ?

(ii) Identify the monomers in the following polymer :



(ii) Arrange the following polymers in the increasing order of their intermolecular forces : Terylene, Polyethene, Neoprene.

Watch Video Solution

23. (i) Write the structural difference between starch and cellulose.

(ii) What type of linkage is present in Nucleic acids ?

(iii) Give one example each for fibrous protein and globular protein.

Watch Video Solution

24. (a) For the complex $\left[Fe\left(H_2O\right)_6\right]^{3+}$, write the hybridization, magnetic character and spin of the complex. (At. Number : $Fe = 26$)

(b) Draw one of the geometrical isomers of the complex $\left[Pt(en)_2Cl_2\right]^{2+}$ which is optically inactive.

Watch Video Solution

25. Due to hectic and busy schedule, Mr. Singh started taking junk food in the lunch break and slowly become habitual of eating food irregularly to excel in his field. One day during meeting he felt severe chest pain and fell down. Mr. Khanna, a close friend of Mr. Singh. took him to doctor immediately. The doctor diagnosed that Mr. Singh was suffering from acidity and prescribed some medicines. Mr. Khanna advised him to eat home made food and change his lifestyle by doing yoga, meditation and some physical exercise. Mr Singh followed his friend's advice and after few days he started felling better.

After reading the above passage, answer the following :

(i) What are the values (at least two) displayed by Mr. Khanna?

(ii) What are antacids ? Give one example.

(iii) Would it be advisable to take antacids for a long period of time ? Give reason.

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26. Calculate E°_{cell} for the following reaction at 298 K:

$2Al(s) + 3Cu^{2+}(0.01M) \rightarrow 2Al^{3+}(0.01M) + 3Cu(s)$

Given: $E_{cell} = 1.98V$

(b) Using the E° values A and B, predict which is better for coating the surface of iron

$\left[E^{\circ}\left(Fe^{2+}/Fe\right) = -0.44V\right]$ to prevent corrosion and why?

Given: $E^{\circ}\left(A^{2+}/A\right) = 2.37V : E^{\circ}\left(B^{2+}/B\right) = 0.14V$

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27. The conductivity of 0.001 $molL^{-1}$ solution of CH_3COOH is $3.905 \times 10^{-5} Scm^{-1}$. Calculate its molar conductivity and

degree of dissociation (α).

`"Given" lambda^(@) (H^(+)) = 349.6 "S" cm^(2) "mol"^(-1) " and

" lambda^(0) (CH_(3)COO^(-)) = 40.9 "S" cm^(2) per mol)

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28. (a) Account for the following :

(i) Mn shows the highest oxidation state of +7 with oxygen but with fluorine it shows the highest oxidation state of +4.

(ii) Cr^{2+} is a strong reducing agent.

(iii) Cu^{2+} salts are coloured while Zn^{2+} salts are white.

(b) Complete the following equations :

(i) $2MnO_2 + 4KOH + O_2 \xrightarrow{\Delta}$

(ii) $Cr_2O_7^{2-} + 14H^+ 6I^- \rightarrow$

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29. The elements of 3d transition series are given as :

Sc Ti V Cr Mn Fe Co Ni Cu Zn

Answer the following :

(i) Write the element which shows maximum number of oxidation states. Give reason.

(ii) Which elements has the highest m.p?

(iii) Which element is a strong oxidizing agent in +3 oxidation state and why ?

Watch Video Solution

30. (a) Write the structures of A and B in the following reactions :

(i) $CH_3COCl \xrightarrow{H_2, Pd\text{-}BaSO_4} A \xrightarrow{H_2N\text{-}OH} B$

(ii) $CH_3MgBr \xrightarrow[2.H_3O^+]{1.CO_2} A \xrightarrow{PCl_5} B$

(b) Distinguish between :

(i) C_6H_5 - $COCH_3$ and C_6H_5 - CHO

(ii) CH_3COOH and $HCOOH$

(c) Arrange the following in the increasing order of their boiling points :

(i) $CH_3CHO, CH_3COOH, CH_3CH_2OH$

Watch Video Solution

31. (a) Write the chemical reaction involved in Wolf-Kishner reduction.

(b) Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction :

$C_6H_5COCH_3, CH_3 - CHO, CH_3COCH_3$

(c) Why carboxylic acid does not give reactions of carbonyl group ?

(d) Write the product in the following reaction.

$$CH_3CH_2CH = CH - CH_2CN \xrightarrow[2.H_2O]{1.(i\text{-}Bu)_2AlH}$$

(e) A and B are two functional isomers of compound C_3H_6O. On heating with NaOH and I_2, isomer B forms yellow precipitate of iodoform whereas isomer A does not form any precipitate. Write the formulae of A and B.

Watch Video Solution

1. Body centered cubic lattice has Z=2

Watch Video Solution

2. What is the difference between lyophobic sol and lyophilic sol?

Watch Video Solution

3. Draw the structure of XeF_2 molecule.

Watch Video Solution

4. State the role of silica in the metallurgy of copper.

Watch Video Solution

5. Draw the structure of 2 bromopentane

Watch Video Solution

6. Write the IUPAC name of the following compound:

CH_3 - $|\ CH_3CH$ - CHO

Watch Video Solution

7. Out of CH_3 - NH_2 and $\left(CH_3\right)_3N$ which one has higher boiling point?

Watch Video Solution

8. How is the vapour pressure of a solvent affected when a non volatile solute is dissolved in it?

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9. (a) For a reaction ,$A + B \rightarrow Product$ the rate law is given rate $=k[A]^1[B]^2$ .What is the order of the reaction ?

(b) write the unit of rate constant k for the first order reaction

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10. Define the following terms:

(i) Roasting

(ii) Calcination

Watch Video Solution

11. Draw the structure of each of the following

(i) H_2SO_4

(ii) solid PCl_5

Watch Video Solution

12. Assign a reason for each of the following observation :

(i) The transition metals are hard and have high melting and boiling points

(ii) The ionisation enthalpies (first and second) in the first series of the transition elements are found to vary irregularly

Watch Video Solution

13. What is lanthanoid contraction? What are the consequences of lanthanoid contraction?

Watch Video Solution

14. How would you account for the following?

The oxidising power of the following three oxo ions in the series follows the order :

$VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

Watch Video Solution

15. How are the following conversions carried out?

(i)Propene to propan-2-ol

(ii) Ethyl chloride to Ethanal

Watch Video Solution

16. Answer the following questions:

(i) Why are vitamin A and vitamin C essential for us?

(ii) What is the difference between a nucleoside and a nucleotide?

Watch Video Solution

17. The density of copper is 8.95 g cm^{-3} .It has a face centred cubic structure .What is the radius of copper atom?

Atomic mass Cu =63.5 $gmol^{-1} N_A = 6.02 \times 10^{23} mol^{-1}$

Watch Video Solution

18. Some ethylene glycol $HOCH_2CH_2OH$ is added to your car cooling system along with 5 kg of water .If the freezing point of water glycol solution is $-15.0\,^{\circ}C$ what is the boiling point of the solution ? $\left(k_b = 0.52 kgmol^{-1}\right.$ and $k_f = 1.86 kgmol^{-1}$ for water)

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19. Hydrogen peroxide H_2O_2 (aq) decomposes to H_2O(l) and O_2(g) in a reaction that is first order in H_2O_2 and has a rate constant $k = 1.06 \times 10^3 \text{ min}^{-1}$

(i) How long will it takes for 15% of a sample of H_2O_2 to decompose?

(ii) How long will it take for 87.5% of the sample to decompose?

Watch Video Solution

20. Define the following terms?

(i) Peptization

(ii) Reversible Sol

Watch Video Solution

21. Write down the IUPAC name for each of the following complex :

$K_3\left[Fe(CN)_5NO\right]$

Watch Video Solution

22. Draw the structure of optical isomers of each of the following complex ion :

$\left[Cr\left(C_2O_4\right)_3\right]^{3-}$

Watch Video Solution

23. Which compound in the following pairs will react faster in S_N^2 reaction?

(a). CH_3Br or CH_3I

(b). $\left(CH_3\right)_3CCl$ or CH_3Cl

Watch Video Solution

24. Write the product of the following reaction :

(i) CH_3 - $Cl + KCN \rightarrow$?

(ii)

Watch Video Solution

25. Account for the following :

Aniline does not give friedel crafts reaction

Watch Video Solution

26. write the names of the monomers of the following polymers:

(i) Polythene

(ii) Polyvinyl chloride

(iii) Bakelite

Watch Video Solution

27. Explain the following terms with a suitable example for each:

(i) Disinfectants

(ii) Food preservatives

Watch Video Solution

28. (a) Define the terms conductivity and molar conductivity for the solution of an electrolyte.

Comment on their variation with temperature

(b) The measured resistance of a conductance cell was 100 ohms. Calculate (i) the specific conductance and (ii) the molar conductance of

the solution

$\left(KCl = 74.5 gmol^{-1}\right.$ and cell constant =1.25 $\left.cm^{-1}\right)$

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29. (a) Predict the products of electrolysis in each of the following :

(i) An aqueous solution of $AgNO_3$ with platinum electrodes

(ii) An aqueous solution of H_2SO_4 with platinum electrodes

Watch Video Solution

30. Estimate the minimum potential difference needed to reduce AI_2O_3 at $500^\circ C$ The gibbs energy change for the decomposition reaction $\frac{2}{3}AI_2O_3 \rightarrow \frac{4}{3}AI + O_2$ is 960 kJ (F=96500 C $\left.mol^{-1}\right)$

Watch Video Solution

31. Complete the following chemical equation :

(i) $P_4 + NaOH + H_2O \rightarrow$

(ii)$XeF_4 + O_2F_2 \rightarrow$

Watch Video Solution

32. (b) How would you strength account for the following situations?

(i) The acidic strengths of these compound increase in the following order:

$PH_3 < H_2S < HCI$

(ii)The oxidisting power of oxoacids of chlorine follows the order :

$HCIO_4 < HCIO_3 < HCIO_2 < HCIO$

(iii) In vapour state sulphur exhibits paramagnetic behaviou.

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33. using VSEPR theory predict the probable structure of the following :

BrF_3

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34. Arrange the following groups of substances in the order of the property indicated against each group:

(i) $NH_3PH_3AsH_3SbH_3$ increasing order of boiling points

(ii)O,S,Se,To increasing order of electron gain enthalphy with negative sign

Watch Video Solution

35. Q. Describe a chemical test to distinguish between

(i) Ethanol and propanal

(ii) Propanal and Propanone

Watch Video Solution

36. (a) Draw the structures of the following compounds

(i) 4 Chloropentan 2 one

(ii) But 2 en 1 al

Watch Video Solution

37. (Q) Write the prodcuts (s) in the following:

(i) $CH_3 - COOH \xrightarrow{Br_2/P} ?$

(ii) $CH_3 - CHO \xrightarrow{LiAlH_4} ?$

(iii) $CH_3 - C(=O) - CH_3 \xrightarrow[concHCl]{Zn-Hg} ?$

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DELHI BOARD SET II

1. What type of stoichiometric defect is shown by NaCl ? Explain.

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2. Define Emulsions

Watch Video Solution

3. What role is played by CO_2 in getting pure alumina $\left(Al_2O_3\right)$ in the extraction of aluminium ?

Watch Video Solution

4. Draw the structure of 2 bromopentane

Watch Video Solution

5. Assign reason for each of the following :

Transition elements exhibit paramagnetic behaviour .

Watch Video Solution

6. Define the following terms:

(i) Tyndall effect

(ii) Electrophoresis

Watch Video Solution

7. What are following ? Give one example of each

(i) Sweetening agents

(ii) Food preservatives

(iii) Antibiotics

Watch Video Solution

8. Give names of the monomers of the following polymers:

(i) Neoprene

(ii) Polystyrene

(iii) Polypropene

Watch Video Solution

Set -I

1. How many atoms constitute one unit cell of a face-centered cubic crystal ?

Watch Video Solution

2. Name the method used for the refining of Nickel metal.

Watch Video Solution

3. What is the covalency of nitrogen in N_2O_5?

Watch Video Solution

4. Write the IUPAC name of CH_3 - CH_2 - CH_2 - $CH = CH_2$

Watch Video Solution

5. What happens when CH_3 - Br is treated with KCN?

Watch Video Solution

6. Write the structure of 3-methyl butanal.

Watch Video Solution

7. Arrange the following in increasing order of their basic strength:

$CH_3.\ NH_2,\ \left(CH_3\right)_3N,\ \left(CH_3\right)_2NH$

Watch Video Solution

8. What are the three types of RNA molecules which perform different functions ?

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9. $18g$ of glucose $\left(C_6H_{12}O_6\right)$ is dissolved in $1kg$ of water in a saucepan. At what temperature will the water boil (at 1 atm) ? K_b for water is $0.52Kkgmol^{-1}$.

Watch Video Solution

10. The conductivity of 0.20 M solution of KCl at 298 K is 0.0248 S cm^{-1} . Calculate its molar conductivity.

Watch Video Solution

11. Write the dispersed phase and dispersion medium in the colloidal systems (i) Smoke (ii) Milk.

Watch Video Solution

12. Out of Lyophilic and Lyophobic sols, which can be easily coagulated on the addition of a small amount of electrolyte ?

Watch Video Solution

13. Write the differences between physisorption and chemisorption with respect to the following :

(i) Specificity (ii) Temperature dependence

(iii) Reversibility and (iv) Enthalpy change

Watch Video Solution

14. (a) Which solution is used for the leaching of silver metal in the presence of air in the metallurgy of silver ?

(b) Out of C and CO, which is a better reducing agent at the lower temperature rangein the blast furnace to extract iron form the oxide ore ?

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15. What happens when :

(i) PCl_5, is heated (ii) H_3PO_3 is heated

Watch Video Solution

16. (a) Which metal in the first transition series (3d series) exhibits +1 oxidation state most frequently and why?

(b) Which of the following cations are coloured in aqueous solutions and why?

$Sc^{3+}, V^{3+}, Ti^{4+}, Mn^{2+}$ (At. no. $Sc = 21, V = 23, Ti = 22, Mn = 25$)

Watch Video Solution

17. Chlorobenzene is extremely less reactive towards nucleophilic substitution reaction. Give two reasons for the same.

Watch Video Solution

18. Explain the mechanism of the reaction is given below :

$$2CH_3 - CH_2 - OH \xrightarrow{H^+} {}_{413K}CH_3CH_2 - O - CH_2 - CH_3 + H_2O$$

Watch Video Solution

19. How will you convert

(i) Propene to Propan-2-ol?

(ii) Phenol to 2,4,6-trinitrophenol ?

Watch Video Solution

20. (a) What type of semiconductor is obtained when silicon is doped with boron ?

(b) What type of magnetism is shown in the following alignment of magnetic moments?

↑ ↑ ↑ ↑ ↑ ↑

(c) What type of point defect is produced when AgCl is doped with $CdCl_2$?

Watch Video Solution

21. Determine the osmotic pressure of a solution prepared by dissolving $2.5 \times 10^{-2} g$ of K_2SO_4 in 2L of water at $25^\circ C$, assuming that it is completely dissociated.

(R = 0.0821 Latm $K^{-1} mol^{-1}$,Molar mass of K_2SO_4=174 g mol^{-1}

Watch Video Solution

22. Calculate the emf of the following cell at $298K$:

$Fe(s)\left|Fe^{2+}(0.001M)\right|\left|H^{+}(1M)\right|H_2(g)(1\text{bar}), Pt(s)$ ($Give\ E^{\circ}_{\text{Cell}}$=+ 0.44$V$)

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23. How would you account for the following?

(I) Transition metals exhibit variable oxidation states.

(ii) Zr (Z = 40) and Hf (Z = 72) have almost identical radii.

Watch Video Solution

24. Complete the following chemical equations :

(i) $Cr_2O_6^{2-} + 6Fe^{2+} + 14H^+ \rightarrow$

(ii) $2CrO_4^{2-} + 2H^+ \rightarrow$

(iii) $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow$

Watch Video Solution

25. Specify the oxidation number of the metals in the following coordination entities $\left[Co\left(H_2O\right)(CN)(en)_2\right]^{2+}$

Watch Video Solution

26. Given the stuctures of A,B and C in the following reactions-

(i) $C_6H_5N_2^+Cl^- \xrightarrow{CuCN} A \xrightarrow{H_2O/H^+} B \xrightarrow{H_2O/H^+} \underset{\Delta}{C}$

(ii) $C_6H_5NO_2 \xrightarrow{Sn+HCl} A \xrightarrow{NaNO_2+HCl} \underset{273K}{B} \xrightarrow{H_2O/H^+} \underset{\Delta}{C}$

Watch Video Solution

27. Write the names and structures of the monomers of the following polymers:

(i) Buna-S (ii) Neoprene (iii) Nylon-6, 6

Watch Video Solution

28. After watching a programme on TV about the adverse effects of junk food and soft drinks on the health of school children, Sonali, a student of Class XII, discussed the issue with the school principal. Principal immediately instructed the canteen contrator to replace the fast food with the fibre and vitamins rich food like sprouts, salad, fruits etc. This decision was welcomed by the parents and the students.

After reading the above passage, answer the following questions :

(a) What values are expressed by SonaJi and the Principal of the school?

(b) Give two examples of water-soluble vitamins.

Watch Video Solution

29. (a) Which one of the folJowing is a food preservative?

Equanil, Morphine, Sodium benzoate

(b) Why is bithional added to soap?

(c) Which class of drugs is used in sleeping pills?

Watch Video Solution

30. A reaction is second order in A and first order in B .

(i) Write the differential rate equation.

(ii) How is rate affected when the concentration of B is tripled?

Watch Video Solution

31. For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.

Watch Video Solution

32. (a) Given reasons for the following :

(i) Bond enthalpy of F_2 is lower than that of Cl_2.

(ii) PH_3 has lower boiling point than NH_3.

(b) Draw the structures of the following molecules :

(i) BrF_3 (ii) $\left(HPO_3\right)_3$

(iii) XeF_4

Watch Video Solution

33. Account for the following :

(i) Helium is used in diving apparatus.

(ii) Fluorine does not exhibit positive oxidation state.

Watch Video Solution

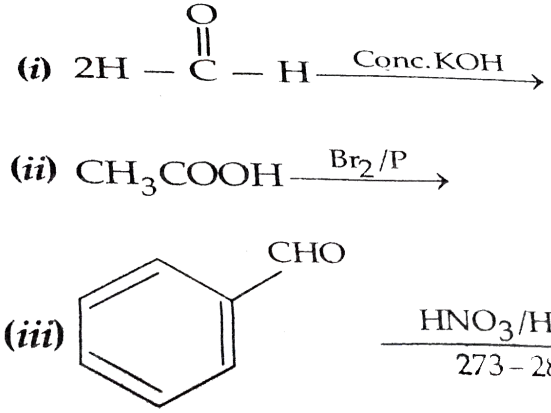
34. How will you bring about the following conversions?

(1) Propanone to propane

(2) Benzyl chloride to benzaldehyde

Watch Video Solution

35. Complete the following reactions :



(b) Give simple chemical tests to distinguish between the following pairs of compounds :

(i) Ethanal and Propanal

(ii) Benzoic acid and Phenol

Watch Video Solution

Set -II

1. What type of stoichiometric defect is shown by AgCl ?

Watch Video Solution

2. Write the IUPAC name of

$$CH_3CH = CH - \underset{|}{\overset{CH_3}{C}} | Br - CH_3$$

Watch Video Solution

3. What type of bonding helps in stabilising the α - *helix* structure of proteins?

Watch Video Solution

4. What inspired N. Bartlett for carrying out reaction between Xe and PtF_6?

Watch Video Solution

5. What happens when ethyl chloride is treated with aqueous KOH?

Watch Video Solution

6. Write the structure of 4 chloropentan 2 one

Watch Video Solution

7. How will you convert the following?

(i) Propan - 2 - ol to propanone.

(ii) Phenol to 2, 4, 6-tribromophenol.

Watch Video Solution

8. What is the difference between oil/water (O/W) type and water/oil (W/O) type emulsions? Give an example of each type.

Watch Video Solution

9. (a) Which of the following ores can be concentrated by froth floatation method and why?

$Fe_2O_3, ZnS,$ and Al_2O_3

(b) What is the role of silica in the metallurgy of Copper?

Watch Video Solution

10. (a) Why does p-dichlorobenzene have a higher m.p than its o-and m-isomers?

(b) Why is ($\pm$) - Butan -2 - ol of is optically inactive?

Watch Video Solution

11. Write the names and structures of the monomers of the following polymers :

(i) Polystyrene, (ii) Dacron, (iii) Teflon

Watch Video Solution

Set -III

1. What type of substances would make better permanent magnets, ferromagnetic or ferrimagnetic? Justify your answer.

Watch Video Solution

2. What is the composition of 'Copper matte'?

Watch Video Solution

3. What do you understand by the term glycosidic linkage?

Watch Video Solution

4. Write the IUPAC name of $\left(CH_3\right)_2 CH.\, CH(Cl)CH_3$.

Watch Video Solution

5. Which compound in the following pair undergoes faster S_N1 reaction?

Watch Video Solution

6. Write the structure of p-Methylbenzaldehyde molecule.

Watch Video Solution

7. Write two differences between multimolecular colloids and macromolecular colloids ?

Watch Video Solution

8. (a) Give an example of zone refining of metals.

(b) What is the role of cryolite in the metallurgy of aluminium?

Watch Video Solution

9. Account for the following:

(a) The C-Cl bond length in chloro-benzene is shorter than that in CH_3 - Cl.

(b) Chloroform is stored in closed dark brown bottles.

Watch Video Solution

10. How will you convert :

(a) Propene to Propan-1-ol ?

(b) Ethanal to Propan-2-ol ?

Watch Video Solution

11. Write the names and structures of the monomers of the following polymers :

(i) Bakelite

(ii) Nylon-6

(iii) Polythene

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C.B.S.E. CLASS - XII

1. Define rate of reaction.

Watch Video Solution

2. Why is adsorption always exothermic ?

Watch Video Solution

3. Write IUPAC name of the following complex : $\left[Co\left(NH_3\right)_6\right]^{3+}$

Watch Video Solution

4. Write equation of the nitration of anisole.

Watch Video Solution

5. Draw the structure of 2-methylbutanal.

Watch Video Solution

6. Define the following terms "

(i) n-type semiconductor.

(ii) Ferrimagnetism.

Watch Video Solution

7. What is osmotic pressure ? Why it is a colligative property ?

Watch Video Solution

8. Draw the structural formulae of molecules of following compounds :

(i)BrF_3 and (ii)$XeOF_4$

Watch Video Solution

9. Give reason:

(i) Transition metals show variable oxidation states.

(ii) Actinoids show wide range of oxidation states.

Watch Video Solution

10. What are ambident nucleophiles ? Give an example.

Watch Video Solution

11. If $NaCl$ is doped with 10^{-3} mol% of $SrCl_2$, what is the concentration of cation vacancies?

Watch Video Solution

12. Calculate the mass of a non-volatile solute (molecular mass 40) which should be dissolved in $114g$ octane to reduce its vapour pressure to $80\ \%$.

Watch Video Solution

13. If the half-life period of a first order reaction in A is 2 minutes, how long will it take [A] to reach $25\ \%$ of its initial concentration ?

Watch Video Solution

14. What are emulsions ? What are their different types ? Give an example of each type ?

Watch Video Solution

15. Describe the following:

(i) Role of depressant in forth floatation process.

(ii) Role of silica in the metallurgy of copper.

Watch Video Solution

16. In the 3d series (Sc = 21 to Zn = 30) :

(i) Which elements shows maximum number of oxidation states ?

(ii) Which elements shows only $+3$ oxidation state ?

(iii) Which elements has the lowest enthalpy of atomization?

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17. Write the hybridization and magnetic character of the following complexes:

$\left[Fe(CN)_6\right]^{3-}$

Watch Video Solution

18. In the following pairs of the halogen compounds which compounds undergoes faster $S_{M_+(3)^1}$ reaction.

(i) $CH_3 - CH_2 - CH_2 - CH_2 - Cl$ and $CH_3 - \underset{\displaystyle CH_3 - Cl}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}$

(ii) $CH_3 - CH_2 - Br$ and $CH_3 - CH_2 - I$

Watch Video Solution

19. How are the following conversions carried out ?

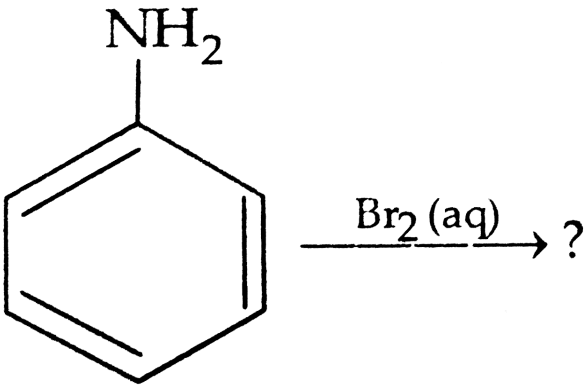
i. Propene → Propan-2-ol

ii. Benzyl chloride → Benzyl alcohol

Watch Video Solution

20. Write the main products of the following reactions:

(i) $C_6H_5N_2^+Cl^- \xrightarrow{H_3PO_2+H_2O}$?



(iii) $CH_3 - C(=O) - NH_2 \xrightarrow{Br_2+NaOH}$?

Watch Video Solution

21. Describe a method for the identification of primary , secondary and tertiary amines . Also write the chemical equations fo the reactions involed .

Watch Video Solution

22. Write two uses of each of the following polymers.

(i) Polypropylene (ii) PVC (iii) Nylon - 66

Watch Video Solution

23. Defines the following as related to proteins:

(i)Peptide linkage

(ii)Primary structure

Watch Video Solution

24. Ms. Kirti was pursuing her studies in medicine at Bangalore. When she visited her family during holidays, she noticed that their maid was always complaining of stomach ache and some burning sensation. Kirti took her maid to the doctor where she was diagnosed for early stage of ulcers due to excessive use of a Antacids.

Answer the following :

(i) What are the values displayed by Kirti ?

(ii) What are antacids ? Give two examples.

(iii) Why prolong use of antacids is harmful?

Watch Video Solution

25. Define the following :

(i) Molar conductivity

(ii) Fuel cell

Watch Video Solution

26. Define the following terms.

(i) Primary batteries

(ii) Corrosion

Watch Video Solution

27. What happens when :

(i) HCl reacts with finely powdered iron.

(ii) Cl_2 reacts with hot concentrated solution of NaOH.

Watch Video Solution

28. Complete the following equations :

(i) $PCl_5 \xrightarrow{\text{heat}}$

(ii) $C + \text{Conc.}H_2SO_4 \rightarrow$

Watch Video Solution

29. Give simple tests to distinguish the following pairs of compounds :

(i) Propanal and Propanone

(ii) Acetophenone and Benzophenone

Watch Video Solution

30. Give reasons :

(i) CH_3 - CHO is more reactive than CH_3COCH_3 towards HCN.

(ii) 4-nitrobenzoic acid is more acidic than benzoic acid.

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Outside Delhi : SET-I

1. What is the effect of temeperture on chemisorption?

Watch Video Solution

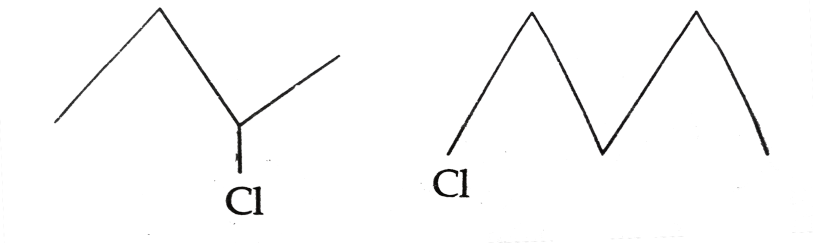
2. What is the role of zinc metal in the extraction of silver?

Watch Video Solution

3. What is the basicity of H_3PO_3 ?

Watch Video Solution

4. Identify the chiral molecule in the following pair:



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5. Which out of Buna-S, protein and PVC is a natural polymer ?

Watch Video Solution

6. The conversion of primary aromtatic amines in to diazonium salts is known as

Watch Video Solution

7. What are the hydrolysis products of sucrose ?

Watch Video Solution

8. Write the structure of p-Methylbenzaldehyde molecule.

Watch Video Solution

9. An element with density 2.8 cm^3 forms a f.c.c unit cell with edge length 4×10^{-8} cm. calculate the molar mass of the element. Given: $\left(N_A = 6.022 \times 10^{23}\right) mol^{-1}$

Watch Video Solution

10. (i) What type of non stichiometirc point defect is responsible for the pink colour of LiCI?

(ii)What type of stochiometric defects is shown by NaCI?

Watch Video Solution

11. How will you distinguish between the following pairs of terms:

(i) Tetrahedral and octahedral voids

(ii) Crystal lattice and unit cell

Watch Video Solution

12. State kohlraush law of independent migration ions. Why does the conductivity of a solution decrease with dilution?

Watch Video Solution

13. For chemical reaction $R \rightarrow P$ the variation in the concentration (R) vs .Time (t) plot given as

(i) predict the order of the reaction

(ii) what is he slope of the curve?

Watch Video Solution

14. Explain the principle of the method electrolytic refining of metal. Given one example.

Watch Video Solution

15. Complete the following equations:

View Text Solution

16. Draw the structure of the following :

(i) XeF_2

(ii) BrF_3

Watch Video Solution

17. Write the equation involved in the following reaction :

(i) Reimer -Tiemann reaction

(ii) Williamson synthesis

Watch Video Solution

18. Write mechanism of the following reaction:

$$CH_3CH_2OH \xrightarrow{HBr} CH_3CH_2Br + H_2O$$

Watch Video Solution

19. Write the name of the monomers used for getting the following polymer (i) Bakelite (ii) Neoprene

Watch Video Solution

20. (a) Calculate $\Delta_r G^\circ$ for the reaction

$Mg(s) + Cu^2(aq) \rightarrow Mg^{2+}(aq) + Cu(s)$

Given : $E^\circ cell = +2.71V, 1F = 96500 C mol^{-1}$

(b) Name the type of cell which was used Apollo space progromme for providing electrical, power

Watch Video Solution

21. What are emulsions ? What are their different types ? Give an example of each type.

Watch Video Solution

22. Give reasons for the following

(i) $\left(CH_3\right)_3$ P=0 exists but $\left(CH_3\right)_3$ N=0 does not exists.

(ii) Oxygen has less electron gain enthalpy with negative sign than sulphur

(iii) H_3PO_2 is a strong reducing agent than H_3PO_3

View Text Solution

23. (i) Write the IUPAC name of the complex $\left[Cr\left(NH_3\right)_4Cl_2Cl\right.$

What type of isomerism is exhibited by the complex $\left[Co\left(en_3\right)^{3+}\right]$?

(en = ethane-1,2 diamine)

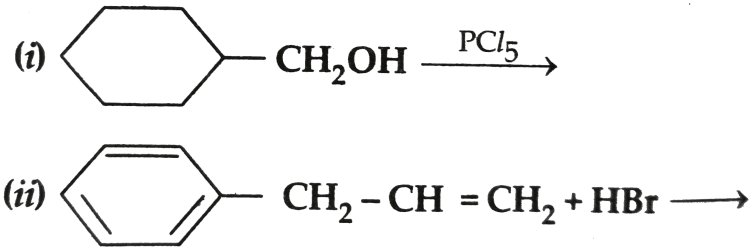
(ii) Why is $\left[NiCl_4\right]^{2-}$ paramagnetic but $\left[Ni(CO)_4\right]$ is diamagnetic?

(At no: Cr =24, Co =27, Ni =28)

View Text Solution

24. (a) Draw the structures of major monohola prodcuts in each of the following reactions : 3

(i)



(b) Which halogen compound in each following pairs will react faster in S_N2 reaction

(i) CH_3Br or CH_3I

(ii) CH_3C - CI or CH_3 - CI

View Text Solution

25. Account for the following

(i)Primary amines $\left(R - NH_2\right)$ have higher boiling point than tertiary amines $\left(R_3N\right)$

(ii) Aniline does not undergo friedel - crafts reaction

(iii) $\left(CH_3\right)_2$ NH is more basic than $\left(CH_3\right)_3N$ in an aquaous solution

View Text Solution

26. Give the structers of A,B and C in the following reaction :

(i) $C_6H_5NO_2 \xrightarrow{Sn+HCI} A \xrightarrow[273K]{NaNO_2+HCI} B \xrightarrow{H_2O} C$

(ii) $CH_3CN \xrightarrow{H_2O/H^+} A \xrightarrow{\Delta} B \xrightarrow{NH_3} \xrightarrow{Br_2+KOH} C$

View Text Solution

27. Defines the following as related to proteins:

(i)Peptide linkage

(ii)Primary structure

Watch Video Solution

28. Dr . Rajiv Mishra is working against the post of a senior doctor in a government hospital . He does not discriminate between the rich and poor while treating his patients medically . When he returns home from the hospital , he attends to the poor patients at home free of cost between 6 pm to 8 pm. Besides , he gives them the information about the employment opportunities . He advises many young people to go into the

fields of advertising and transportation . They went into these fields and remarkably succeeded there.

(i) What type of activites does Dr. Rajiv Mishra perform in the hospital and home ?

(ii) Explain the auxiliaries to trade mentioned in the above para.

Watch Video Solution

29. (a) Define the following terms:

(i) Molarity

(ii) Molal elevation constant $\left(k_b\right)$

(b) A solution containing 15 g (molar mass=60 g mol^{-1}) per litre of solution water has the same osmotic pressure (isotonic) as a solution of glucose (molar mass =180g mol^{-1}) in water calculate the mass of glucose present in one litre of its solution.

Watch Video Solution

30. (a) What type of deviation is shown by a mixture of ethanol and acetone? Give reason

(b) A solution of glucose (molar mass =180 $gmol^{-1}$) in water is labelled as 10% (by mass) what would be the molality and molarity of the solution ? (Density of solution =1.2 gL^{-1})

Watch Video Solution

31. Complete the following equation :

(i) $Cr2O_7^{2-} + 2OH^- \rightarrow$

(ii) $MnO_4^- + 4H^+ + 3e^- \rightarrow$

Watch Video Solution

32. (i)with reference to structural variability and chemical reactivity write the differences between lanthanoids and actinoids

(ii) Name a member of the lanthanoid series which is well known to exhibit +4 oxidation state

Watch Video Solution

33. (a) write the products formed when CH_3CHO reacts with the following reaction:

(i) HCN

(ii) H_2N - OH

(iii) CH_3CHO in the presence of dilute NaOH

(b) Give simple chemical test to distinguish between the following pairs of compound

(i) Benzoic acid and phenol

(ii) Propanal and propanone

Watch Video Solution

34. Out of CH_3CH_2 - CO - CH_2 - CH_3 and CH_3CH_2 - CH_2 - CO - CH_3 which gives iodoform test?

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Outside Delhi : SET-II

1. Why is adsorption always exothermic ?

Watch Video Solution

2. Name the method used for the refining of Nickel metal.

Watch Video Solution

3. Why does NO_2 dimerise ?

Watch Video Solution

4. Based on molecular forces what type of polymer is neoprene?

Watch Video Solution

5. What are the products of hydrolysis of maltose?

Watch Video Solution

6. Write the structure of 4 chloropentan 2 one

Watch Video Solution

7. Write the names and structures of the monomers of the following polymers :

(i) Polystyrene (ii) Nylon-6, 6 (iii) Terylene

Watch Video Solution

8. Explain the role of each of the following :

(i) $NaCN$ in the extraction of silver.

(ii) SiO_2 in the extraction of copper.

Watch Video Solution

9. Complete the following equation

(i) $Ag + PCl_5 \rightarrow$

(ii)$CaF_2 + H_2SO_4 \rightarrow$

Watch Video Solution

10. Draw the structures of the following :

(i) XeF_4

(ii) $HClO_4$

Watch Video Solution

11. (i) Write the type of magnetism observed when the magnetism observed when the magnetic moments are aligned in parallel and anti parallel direction in unequal number . ltbnrgt (ii) Which stoichiometric defect decreases the density of the crytal?

Watch Video Solution

12. Define the following terms :

(i) Fuel cell ,

(ii)Limiting molar conductivity

Watch Video Solution

13. Define the following terms:

(i) Glycosidic linkage

(ii) Invert sugar

(iii) Oligosaccharides

Watch Video Solution

Outside Delhi : SET-III

1. What are the dispersed phase and dispersion medium in milk

Watch Video Solution

2. Name the method used for refining of copper metal

Watch Video Solution

3. Why does NH_3 acts as a Lewise base?

Watch Video Solution

4. The conversion of primary aromatic amines into diazonium salts is known as

Watch Video Solution

5. What are the expected products of hydrolysis of lactose ?

Watch Video Solution

6. Write the structure of 2hydroxybenzoic acid.

Watch Video Solution

7. complete the following equation :

(i) c+conc.H_2SO_4 $\rightarrow$

(ii) $XeF_2 + H_2O$ $\rightarrow$

Watch Video Solution

8. Draw the structures of the following :

(i)XeO_3

(ii)H_2SO_4

Watch Video Solution

9. Write the name of monomers used for getting the following polymers :

(i)Teflon

(ii) Buna-N

Watch Video Solution

10. (i) Write the type of magnetism observed when the magnetism observed when the magnetic moments are aligned in parallel and anti parallel direction in unequal number . ltbnrgt (ii) Which stoichiometric defect decreases the density of the crytal?

Watch Video Solution

11. Define the following terms:

(i) Molar conductivity

(ii) Secondary batteries

Watch Video Solution

12. What is the role of collectors in Froth Floatation process ?

Watch Video Solution

13. Define the following terms:

(i) Nucleotide

(ii) Essential amino acids

Watch Video Solution

Set - 1 Comptt.

1. What is the no. of atoms per unit cell (z) in a body -centred cubic strcuture ?

Watch Video Solution

2. In reference to surface chemistry, define dialysis.

Watch Video Solution

3. What is the IUPAC name of complex $\left[Ni\left(NH_3\right)_6\right]Cl_2$?

Watch Video Solution

4. Draw the structure of 3-methyl-pentanal.

Watch Video Solution

5. Complete the following reaction equation :

$C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow \ldots.$

Watch Video Solution

6. Define osmotic pressure of a solution. How is the osmotic pressure orelated to the concentration of a solute in a solution ?

Watch Video Solution

7. Define the following terms :

(i) Half- life of a reaction $\left(t_{1/2}\right)$

(ii) Rate constant (k).

Watch Video Solution

8. Draw the structure of the following :

(i) H_2SO_4

(ii) XeF_2

Watch Video Solution

9. What is meant by 'disproportionation'? Give an example of disproportionation reaction in aqueous solution.

Watch Video Solution

10. Explain the mechanism of dehydration steps of ethanol:

$$CH_3CH_2OH \xrightarrow[443K]{H+} CH_2 = CH_2 + H_2O$$

Watch Video Solution

11. Explain the following terms with suitable example:

a. Schottky defect b. Frenkel defect

c. Interstitials

Watch Video Solution

12. $45g$ of ethylene glycol $C_2H_4O_2$ is mixed with $600g$ of water. Calculate (a) the freezing point depression and (b) the freezing point of solution. Given $K_f = 1.86 Kkgmol^{-1}$.

Watch Video Solution

13. The rate constant of a reaction at $500K$ and $700K$ are $0.02s^{-1}$, respectively. Calculate the values of E_a and A at $500K$.

Watch Video Solution

14. Define the following terms :

(i) Electrophoresis

(ii) Adsorption

(iii) Shape selective catalysis

Watch Video Solution

15. Outline the principles of refining of metals by the following methods :

(i) Distillation

(ii) Zone refining

(iii) Electrolysis.

Watch Video Solution

16. Write down the reactions taking place in different zones in the blast furnace during the extraction of iron.

Watch Video Solution

17. Indicate the types of isomerism exhibited by the following complexes :

(i) $\left[Co\left(NH_3\right)_5\left(NO_2\right)\right]^{2+}$

(ii) $\left[Co(en)_3\right]Cl_3$ (en= ethylene diamine)

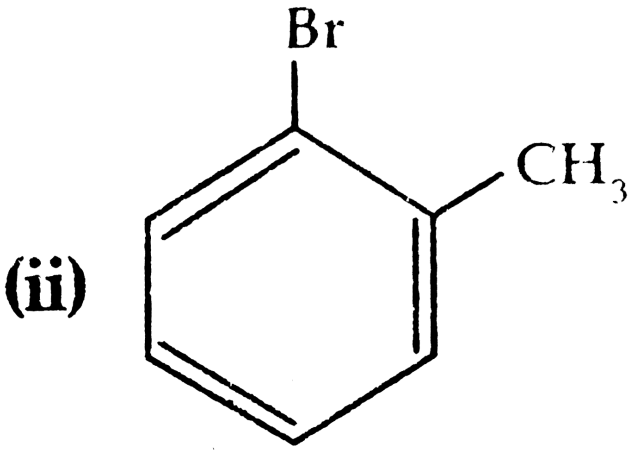
(iii) $\left[Pt\left(NH_3\right)_2Cl_2\right]$

Watch Video Solution

18. Name the following according to IUPAC systems :

(i) $CH_3 - C(OH)H - CH_2 - CH_3$

(ii)



(ii)

(iii) $CH_3 - C(CH_3) - CH_2 - Cl$

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19. How are the following conversions carried out ?

(i) Propene to propane -2-ol

(ii) Benzyl chloride to Benzyl alcohol

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20. An aromatic compound (A) on treatment with aqueous ammonia and heating forms compound (B) which on heating with Br_2 and KOH forms a compound (C) of the molecular formula C_6H_7N. Write the structures and $IUPAC$ names of compounds (A) . (B) and (C).

Watch Video Solution

21. How are vitamins classified? Name the vitamin responsible for the coagulation of blood.

Watch Video Solution

22. Write the names and structures of the monomers of the following polyers :

(i) Buna -S

(ii) Neoprene

(iii) Teflon

Watch Video Solution

23. Ramesh went to a department store to purchase groceties. On one of shelves he notcied. Sugar-free tablets. He decided to buy them for his grandfather who was a diabetic. There were three types of sugar-free tablets. Ramesh decided to buy sucrolose which was good for his grandfather's health.

(i) Name another sugar-free tablet which Ramesh did not buy.

(ii) Was it right to purchase such medicines without dcotor's prescription ?

(iii) What quality of Ramesh is reflected above ?

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24. Define the following terms :

(i) Molar conductivity $\left(\wedge_m \right)$

(ii) Secondary batteries

(iii) Fuel cell

(b) State the following laws :

(i) Faraday first law of electrolysis

(ii) Kohlrausch's law of independent migration of ions.

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25. Define the term degree of dissociation. Write an expression that relates the molar conductivity of a weak electrolyte to its degree of dissociation.

(b) For the cell reaction

$Ni(s)\left|Ni^{2+}(aq)||Ag^{+}(aq)\right|Ag(s)$

Calculate the equilibrium constant at $25^{\circ}C$. How maximum work would be obtained by operation of this cell ?

$E^{\circ}\left(_{Ni^{2+}/Ni}\right) = -0.25V$ and $E^{\circ}\left(_{Ag^{+}/Ag}\right) = 0.80V$

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26. (a) Complete the followingh chemical reaction equations :

(i) $Cu + HNO_{3\,(dilute)} \rightarrow$

(ii) $P_4 + NaOH + H_2O \rightarrow$

(b) (i) why does $R_3P = O$ exist but $R_3N = O$ does not ? (R=alkyl group)

(ii) why is dioxygen a gas but sulphur a solid ?

(iii) why are halogens coloured ?

Watch Video Solution

27. (a) Write balanced equations for the following reactions :

(i) Chlorine reacts with dry slacked lime.

(ii) Carbon reacts with concentrated H_2SO_4.

(b) Describe the contact process for the manufacture of sulphuric acid with special referecen to the reaction conditions, catalysts used and the yields in the process.

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28. How will you bring about the following conversions ?

(i) Benzoic acid to Benzaldehyde

(ii) Benzene to m-Nitroacetophenone

(iii) Ethanol to 3-Hydroxybutanal.

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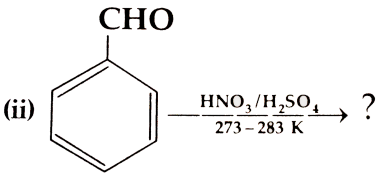
29. Write the main production in the following equations :

(i) $CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{LiAlH_4} ?$

(ii) 

(iii) $CH_3-COOH \xrightarrow{PCl_5} ?$

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General Instrucations

1. Why is adsorption always exothermic ?

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2. Predict the major product formed when sodium ethoxide reacts with tert.Butyl chloride ?

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3. An aromatic organic compound 'A' with formula C_8H_8O gives positive DNP and iodofrom tests. It neither reduces Tollens' reagent nor does it decolourise bromine water. Write the structure of 'A'. 1

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4. For the reaction $A \rightarrow B$, the rate of reaction becomes three times when the concentration of A is increased by nine times. What is the order of

reaction ?

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5. Write the coordination isomer of $\left[Cu\left(NH_3\right)_4\right]\left[PtCl_4\right]$.

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6. A current of 1.50 A was passed through an electrolytic cell containing $AgNO_3$ solution with inert electrodes. The weight of silver deposited was $1.50g$. How long did the current flow ? (Molar mass of $Ag = 108g \text{ mol}^{-1}, 1F = 96500C \text{ mol}^{-1}$).

Watch Video Solution

7. The conductivity of a 0.01 M solution of acetic acid at 298 k is $1.65 \times 10^{-4} Scm^{-1}$. Calculate molar conductivity $\left(\wedge_m\right)$ of the solution.

Watch Video Solution

8. Draw the structure of the following :

(i) XeF_2

(ii) BrF_5

Watch Video Solution

9. Which one of the following compounds is more reactive towards S_N2 reaction and why ? $CH_3CH(Cl)CH_2CH_3$ or $CH_3CH_2CH_2Cl$

Watch Video Solution

10. Identify the following :

(i) Transition metal of 3d series that exhibits the maximum number of oxidation states.

(ii) An alloy considering of approximately $95\ \%$ lanthanoid metal used to produce bullet , shell and lighter flint.

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11. Why a mixture of carbon disulphide and acetone shows positive deviation from Raoult's law ? What type of azeotrope is formed by this mixture?

Watch Video Solution

12. Consider the following reaction :

$Cu(s) + 2Ag^{+}(aq) \rightarrow 2Ag(s) + Cu^{2+}(aq)$

(i) Depict the galvanic cell in which the given reaction takes place.

(ii) Give the direction of flow of current.

(iii) Write the half-cell reactions taking place at cathode and anode.

Watch Video Solution

13. Write the role of :

(i) NaCn in the extraction of gold from its ore.

(ii) Cryolite in the extraction of aluminium from pure alumina.

(iii) Co in the purification of Nickel.

Watch Video Solution

14. Complete the following equations :

(a) $2MnO_4^- + 5SO_3^{2-} + 6H^+ \rightarrow$

(b) $Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow$

Watch Video Solution

15. Write the preparation of following :

(i) $KMnO_4$ from K_2MnO_4

(ii) Na_2CrO_4 from $FeCr_2O_4$

(iii) $Cr_2O_7^{2-}$ from $Cr_2O_4^{2-}$

Watch Video Solution

16. Do as directed :

(i) Arrange the following compounds in the increasing order of their basic strength in aqueous solution:

CH_3NH_2, $\left(CH_3\right)_3N$, $\left(CH_3\right)_2NH$.

(ii) Identify 'A' and 'B'

(iii) Write equation of carbonylamine reaction.

Watch Video Solution

17. Give the formula of monomers involved in the formation of the following polymers :

(i) Buna-N

(ii) Nylon-6

(iii) Dacron

Watch Video Solution

18. Write IUPAC name for each of the following complexes :

(i) $\left[Ni\left(NH_3\right)_6\right]Cl_2$

(ii) $K_3\left[Fe(CN)_6\right]$

(iii) $\left[Co(en)_3\right]^{3+}$

Watch Video Solution

19. (i) Complete the following reaction and suggest a suitable mechanism for the reaction : $CH_3CH_2OH \xrightarrow{H^+, 443K} \rightarrow$

(ii) Why ortho-Nitrophenil is steam volatile while para-Nitrophenil is less volatile ?

Watch Video Solution

20. Explain the following :

(i) Amino acids behave like salts rather than simple amines or carboxylic

acids.

(ii) The two strands of DNA are complementary to each other.

Watch Video Solution

21. Write the product(s) formed when

(i) 2-Bromopropane undergoes dehydrohalogenation reaction.

(ii) Chlorobenzene undergoes nitration reaction.

(iii) Methylbromide is treated with KCN.

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22. A reaction is first order in A and second order in B

(i) Write the differential rate equation.

(ii) How is the rate affected on increasing the concentation of B three times ?

(iii) How is the rate affected when the concentration of both A and B are doubled ?

Watch Video Solution

23. Give reason for the following observations :

(i) When Silver nitrate solution is added to Potassium iodide soltuion , a negatively charge colloidal solution is formed.

(ii) Finely divided substance is more effective as an adsorbent.

(iii) Lyophilic colloid are also called reversible sols.

Watch Video Solution

24. Calculate the freezing point of an aqueous solution containing $10.5g$ of Magnesium bromide in 200 g of water, assuming complete dissociation of Magnesium bromide.

(Molar mass of magnesium bromide $= 184gmol^{-1}$, for water $= 1.86Kkgmol^{-}$).

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25. Mathew works in a multinational company where the working conditions are tough. He started taking sleeping pills without consulting a doctor. When his friend Amit came to know about it he was distrubeed and advised mathew not to do so. He suggested that Mathew should instead practice yoga to be stress free Mathew is now relaxed and happy after practicing yoga.

After reading the above passages, answer the following questions :

(a) Pick out the odd chemical compound on the basis of its different medicinal property: luminal, Secondal, Phenacetin and Equanil.

(b) List at least two qulities of Amit that helped Mathew to be happy.

(c) Why is it advisable not to take the dose of sleeping pill without consulting a doctor ?

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26. Give simple chemical tests to distinguish between the following pairs of compounds :

(a) Ethanal and Propanal

(b) benzoic acid and phenol

Watch Video Solution

27. (i) Write structure of the product(s) formed :

(a) $CH_3 - CH_2COOH \xrightarrow{Cl_2, \text{red phosphorus}}$

(b) $C_6H_5COCl \xrightarrow{H_2, Pd - BaSO_4}$

(c) $2HCHO \xrightarrow{Conc. KOH}$

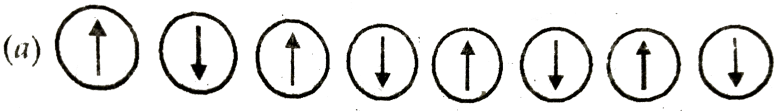
(ii) How will you bring the following conversions in not more than two steps:

(a) Propanone to propene.

(b) Benzyl chloride to phenyl ethanoic acid.

Watch Video Solution

28. (i) (a) Following is the schematic alignment of magnetic moments :



What type of magnetism is shown by this substance ?

(b) What type of stoichiometric defect is shown by (i) KCI (ii) AgCl ?

(ii) An element with density $11.2gcm^{-3}$ forms a fcc lattice with length of $4 \times d10^{-8}$ cm. Calculate the atomic mass of the element. $\left(N_A = 6.02 \times 10^{23} mol^{-1}\right)$.

Watch Video Solution

29. Silver metal crystallises with a face centred cubic lattice. The length of the unit cell is found to be 3.0×10^{-8}cm. Calculate atomic radius and density of silver.

Molar mass of Ag $= 108gmol^{-1}$, $N_A = 6.02 \times 10^{23} mol^{-1}$).

Watch Video Solution

30. What happens when

(a) Chlorine gas reacts with cold and dilute solution of NaOH?

(b) XeF_2 undergoes hydrolysis ?

Watch Video Solution

31. Complete the following reactiosn:

(a) $Cu + HNO_3(\text{dilute}) \rightarrow$

(b) $Fe^{3+} + SO_2 + H_2O \rightarrow$

(c) $XeF_4 + O_2F_2 \rightarrow$

Watch Video Solution

Questions

1. Analyses shows that FeO has a non-stoichiometric composition with formula $Fe_{0.95}O_{1.00}$. Give reason.

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2. CO(g) and $H_2(g)$ react to give different products in the presence of different catalysts. Which ability of the catalyst is shown by these reactions ?

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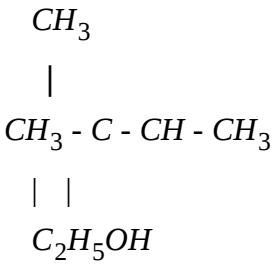
3. Write the co-ordination number and oxidation state of platinum in the complex $\left[Pt(en)_2Cl_2\right]$

Watch Video Solution

4. Out of chlorobenzene and benzyl chloride , which one gets easily hydrolysed by aqueous NaOH and why ?

Watch Video Solution

5. Write the IUPAC name of the following :



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6. Calculate the freezing point of a solution containing 60 g glucose (Molar mass = 180 g mol^{-1}) in 250 g of water . (K_f of water = $1.86 K kg mol^{-1}$)

Watch Video Solution

7. For the reaction $2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$, the rate of formation of $NO_2(g)$ is $2.8 \times 10^{-3} Ms^{-1}$. Calculate the rate of disapperance of $N_2O_5(g)$.

Watch Video Solution

8. Amoung the hydrides of Group - 15 elements , which have the :

(a) lowest boiling point ? (ii) maximum basic character ?

(iii) highest bond angle ?

Watch Video Solution

9. How do you convert the following ?

(a) Ethanal to Propanone (b) Toluene to Benzoic acid

Watch Video Solution

10. Account for the following :

(a) Aromatic carboxylic acids do not undergo Friedel-Crafts reaction.

(b) pK_a value of 4-nitrobenzoic acid is lower than that of benzoic acid .

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11. Complete and balance the following chemical equations :

(a) $Fe^{2+} + MnO_4^- + H^+ \rightarrow$ (b) $MnO_4^- + H_2O + I^- \rightarrow$

Watch Video Solution

12. Give reasons for the following :

(a) Measurement of osmotic pressure method is preferred for the determination of molar masses of macromolecules such as proteins and polymers .

(b) Aquatic animals are more comfortable in cold water than in warm water.

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13. An element 'X' (At. Mass = 40 g mol^{-1}) having f.c.c structure has unit cell edge length of 400 pm . Calculate the density of 'X' and the number of unit cells in 4 g of 'X' .

$\left(N_A = 6.022 \times 10^{23} mol^{-1}\right)$.

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14. A first order reaction is 50% completed in 40 minutes at 300 K and in 20 minutes at 320 K.

Calculate the activation energy of the reaction . (Given : log 2 = 0.3010 , log 4 = 0.6021 , R = $8.314 JK^{-1} mol^{-1}$) .

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15. What happens when :

(a) freshly prepared precipitate of $Fe(OH)_3$ is shaken with a small amount of $FeCl_3$ solution

(a) persistent dialysis of a colloidal solution is carried out

(c) an emulsion centrifuges ?

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16. Write the chemical reaction involved in the extraction of gold by cyanide process. Also give the role of zinc in the extraction.

Watch Video Solution

17. Give reason for the folloiwng :

(a) E°_{value} for Mn^{3+}/Mn^{2+} couple is much more positive than that of Fe^{3+}/Fe^{2+} couple.

(b) Sc^{3+} is colourless in aqueous solution whereas Ti^{3+} is coloured.

Watch Video Solution

18. (a) Identify the chiral molecule in the following pair :

(b) Write the structure of the product when chlorobenzene is treated

with methyl chloride in the presence of sodium metal and dry ether .

(c) Write the structure of the alkene formed by dehydrohalogenation of 1-bromo-1-methylcyclohexane with alcoholic KOH.

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19. (A), (B) and (C) are three non-cylic funtional isomers of a carbonyl compound with molecular formula C_4H_8O. Isomers (A) and (C) give positive Tollen's test whereas isomer (B) does not give Tollens' test but gives positive iodoform test. Isomers (A) and (B) on reduction with $Zn(Mg)$ | conc. HCl give the same product (D).

(a) Write the structures of (A), (B) ,(C) and (D).

(b) Out of (A), (B) and (C) isomers, which one is least reactive towards addition of HCN ?

Watch Video Solution

20. (a) Why is bithional added to soap ?

(b) What is tincture of iodine ? Write its one use.

(c) Among the following , which one acts as a food preservative ?

Aspartame , Aspirin , Sodium Benzoate , Paracetamol

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21. Define the following with an example of each :

(a) Polysaccharides

(b) Denatured protein

(c) Essential amino acids

Watch Video Solution

22. (a) Write the product when D-glucose reacts with conc. HNO_3.

(b) Amino acids shown amphoteric behaviour. Why ?

(c) Write one difference between α-helix and β-pleated structures of proteins.

Watch Video Solution

23. Write the formula of the following coordination compound : Iron (III) hexacyanoferrate (II)

Watch Video Solution

24. Shyam went to a grocery shop to purchase some food items. The shopkeeper packed all the items in polythene bags and gave them to Shyam . But Shyam refused to accept the polythene bags and asked the shopkeepers to pack the items in paper bags . He informed the shopkeeper about the heavy penalty imposed by the government for using polythene bags . The shopkeeper promised that he would use paper bags in future in place of polythene bags.

Answer the following :

(a) Write the values (at least two) shown by Shyam.

(b) Write one structural difference between low-density polythene and high-density polythene .

(c) Why did Shyam refuse to accept the items in polythene bags ?

Watch Video Solution

25. (a) Give reasons :

(i) H_3PO_3 undergoes disproportionation reaction but H_3PO_4 does not .

(ii) When Cl_2 reacts with excess of F_2, ClF_3 is formed and not FCl_3.

(iii) Dioxygen is a gas while Sulphur is a solid at room temperature .

(b) Draw the structure of the following :

(i) XeF_4 $(ii)HClO_3$

Watch Video Solution

26. (a) When concentrated sulphuric acid was added to an unknown salt present in a test tube a brown gas (A) was evolved . This gas intensified when copper turnings were added to this test tube . On cooling, the gas (A) changed into a colourless solid (B) .

(i) Identify (A) and (B).

(ii) Write the structures of (A) and (B).

(iii) Why does gas (A) change to solid on cooling ?

(b) Arrange the following in the decreasing order of their reducing character :

HF , HCl , HBr , HI

(c) Complete the following reaction :

$XeF_4 + SbF_5 \rightarrow$

Watch Video Solution

27. Write the cell reaction and calculate the e.m.f. of the following cell at 298 K :

Sn(s) $\left|Sn^{2+}(0.004M)\right|\left|H^+(0.020M)\right|H_2(g)$ (1 bar)| Pt(s)

(Given $E^{\circ}_{Sn^{2+}/Sn} = -0.14V$).

Watch Video Solution

28. (a)For the reaction :

$2AgCl(s) + H_2(g)$ (1 atm)

$\rightarrow 2Ag(s) + 2H^+(0.1M) + 2Cl^-(0.1M), \Delta G^{\circ} = -43600J$ at 25° C.

Calculate the e.m.f. of the cell . [log $10^{-n} = -n$].

(b) Define fuel cell and write its two advantages.

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29. (a) Write the reactions involved in the following :

(i) Hofmann bromamide degradation reaction.

(ii) Diazotisation .

(iii) Gabriel phthalimide synthesis

(b) Give reasons :

(i) $\left(CH_3\right)_2NH$ is more basic than $\left(CH_3\right)_3N$ in an aqueous solution.

(ii) Aromatic diazonium salts are more stable than aliphatic diazonium salts .

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OUTSIDE DELHI (SET-I)

1. What is the total number of atoms per unit cell in a face centred cubic (fcc) structure ?

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2. Express the relation among cell constant , resistance of the solution in the cell and conductivity of the solution . How is molar conductivity of a solution related to its conductivity ?

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3. Of physisorption and chemisorption which type of adsorption has a higher enthalphy of adsorption ?

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4. Why is the bond angle in PH_3 molecule lesser than that in NH_3 molecule?

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5. Write the IUPAC name of the following compound:

$CH_3 - O - CH_2 - CH \mid CH_3 - CH_3$

Watch Video Solution

6. Draw the structure of he compound whose IUPAC name is 4-chloropentan2-one

Watch Video Solution

7. Write two main functions of carbohydrates in plants.

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8. Define the term polymersation.

Watch Video Solution

9. State Raoult's law for solution containing volatile liquid components. Taking a sutiable example, explan the meaning of positive deviation from Raoult's law .

Watch Video Solution

10. Define the term ' osmotic pressure' . Descibe how the molecular mass of a substance can be determined on the basis of pressrure measurement.

Watch Video Solution

11. Consider the reaction

$Cr_2O_7^{2-} + 14H^+ 6e^- \rightarrow 2Cr^{3+} + 8H_2O$

What is the quantity of electricity in coulombs needed to reduce 1 mole of $Cr_2O_7^{2-}$?

Watch Video Solution

12. The resistance of conductivity cell containing 0.001 M KCl solution at 298 K is 1500 ohm. What is the cell constant if the conductivity of 0.001 M KCl solution at 298 K is $0.146 \times 10^{-3} Scm^{-1}$

Watch Video Solution

13. Answer the following :

(i) Which neutral molecule would be isoelectronic with ClO^-?

(ii) Of Bi (V) and Sb (V) which may be a stronger oxidising agent and why?

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14. Write complete chemical equation for :

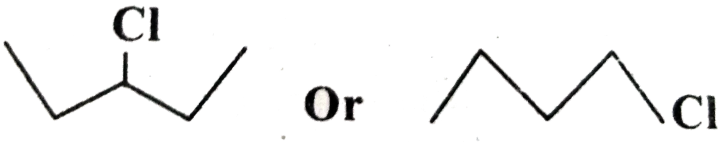
(i) Oxidation of Fe^{2+} by $Cr_2O_7^{2-}$ in acid medium

(ii) Oxidation of $S_2O_3^{2-}$ by MnO_4^- in neutral aqueous medium

Watch Video Solution

15. (i) Why are haloalkanes more reactive towards nucleophilic substitution reaction than haloarenes ?

(ii) Which one of the following two substance undergoes S_N1 reaction faster and why ?



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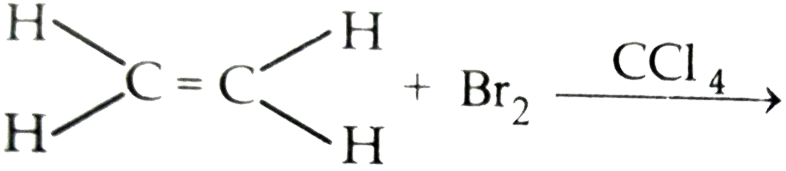
16. Complete following reaction equation:

(i) $C_6H_5N_2Cl + KI \rightarrow$ ..... .



Ethene

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17. Write chemical reaction each to illustrate the following :

(i) Hofmann's bromamide reaction

(ii) Gabriel phthalimide synthesis

Watch Video Solution

18. Arrange the following in an incrasing order of absic strength in water :

$C_6H_5NH_2$, $\left(C_2H_5\right)NH$, $\left(C_2H_5\right)N$ and NH_3

(ii) Arrange the following in increasing order of baisc strength is gas phase:

Watch Video Solution

19. (i) What are thermosetting polymers ? Give one example

(ii) Give chemical name of teflon

Watch Video Solution

20. Silver crystallises in a fcc lattice. The edge length of its unit is $4.077 \times 10^{-8} cm$ and its density is $10.5 gcm^{-3}$. Claculate on this basis of the atomic mass of silver $\left(N_A = 6.02 \times 10^{23} \text{mol}^{-1}\right)$

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21. A solution containing 8 g of substances in 100 g of diethyl ether bolis at $36.86^\circ C$, whereas pure ether boils at $35.60^\circ C$. Determine the molecular mass of the solute. (For ether $K_b 2.02 Kg\text{mol}^{-1}$)

Watch Video Solution

22. Calcualte the temperature at which a solution containing 54g of glucose, $C_6H_{12}O_6$ in 250 g of water will freez.e $\left[K_f\right.$ for water = $1.86 K\text{mol}^{-1}$)

Watch Video Solution

23. Explain what is observed when

(i) KCl, an electrolyte, is added to hydrated ferric oxide sol,

(ii) an electric current is passed through a colloidal solution,

(iii) a beam of lights is passed through a colloidal solution.

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24. What chemcial principal is involved in choosing a reducing agent for getting the metal from its oxide ore? Consider the metal oxides Al_2O_3 and Fe_2O_3 and justify and choice of reducing agent in each case.

Watch Video Solution

25. Describe the oxidising action of potassium dichromate and write the ionic equations of reaction with:

(i). Iodide

(ii). Iron (II) solution and

(III). H_2S

Watch Video Solution

26. (a) What is the basis of formation of the spectro-chemical series?

(b) Draw the structures of geometrical isomers of the following coordination complexs: $\left[Co\left(NH_3\right)_3Cl\right]$ and $\left[CoCl_2(en)_2\right]^+$

(en= ethylenediamine and atomic number of Co is 27)

Watch Video Solution

27. (a) Name the reagents and write the chemical equations for the preparation of the following compounds by Williamson's synthesis :

(i) Ethoxybenzene

(ii) 2-Methyl-2-methoxpyropane

(b)Why do phenols not give the protonation reaction readily?

Watch Video Solution

28. What happenes when D - glucose is treated with the following reagents?

(i). HI

(ii).Bromine water

(iii). HNO_3

Watch Video Solution

29. Mention one use each of the following drugs :

(i) Ranitidine

(ii) Paracetamol

(iii) Tincture of iodine

Watch Video Solution

30. Define the following :

(i) Order of reaction

(ii) Activation energy of reaction

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31. The half life for radioactive decay of $.^{14}C$ is 5730 years. An archaeological artifact containing wood had only $80\,\%$ of the $.^{14}C$ found in a living tree. Estimat the age of the sample.

Watch Video Solution

32. Assign reasons for the following

(i) Sulphur vapour is paramagnetic,

(ii) Ammonia $\left(NH_3\right)$ has greater affinity for protons than phosphine $\left(PH_3\right)$.

(iii) Of the gases only xenon is know the form well-established chemical compounds

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33. Describe the favourable conditions for the manufacture of (i) ammonia by Haber's process, and (ii) sulphuric acid by contact process.

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34. Giving a chemical equation for each, illustrate the following processes :

(i) Acetlyation

(ii) Decarboxylation

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35. An organic compound A contains 69.77% carbon, 11.63% hydrogen and the rest is oxygen. The molecular mass of the compounds is 86. It does not reduce Tollen's reagent but forms an addition product with sodium hydrogen sulphite and gives positive idoform test. On vigorous oxidation it gives ethanoic and propanoic acids. Write the possible structure of the compound A

(b) Write the chemical tests to distinguish between the following pairs of compounds :

(i) Acetophenone and Benzophenone

(ii) Ethanal and Propanal

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Set I

1. Write the formula of an oxo-anion of Manganese (Mn) in which it shows the oxidation state equal to its group number

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2. Write IUPAC name of the following compound

$\left(CH_3CH_2\right)_2NCH_3$

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3. For a reaction $R \rightarrow P$, half -life $\left(t_{1/2}\right)$ is observed to be independent of the initial concentration of reactants. What is the order of reaction ?

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4. Write the structure of 1-Bromo-4-chlorobut-2-ene

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5. Write one similarity between physisorption and chemisorption.

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6. Complete the following reaction :

(i) $NH_3 + 3Cl_2(\text{excess}) \rightarrow$ (ii) $XeF_6 + 2H_2O \rightarrow$

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7. What happens when

(i) $\left(NH_4\right)_2Cr_2O_7$ is heated ? (ii) H_3PO_3 is heated ?

Write the equation

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8. Define the following terms:

(i) Colligative properties (ii) Molality (m)

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9. Drawn the structure of the following

(i) $H_2S_2O_7$ (ii) XeF_6

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10. Calculate the degree of dissociation (α) of acetic acid if its molar conductivity $\left(\wedge_m\right)$ is 39.05 Scm^2mol^{-1}

Given $\lambda^{\circ}\left(H^{+}\right) = 349.6 cm^{2} mol^{-1}$ and $\lambda^{2}\left(CH_{3}COO^{-}\right) = 40.9 Scm^{2} mol^{-1}$

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11. Write the equation involved in the following reactions :

(i) Wolff-Kishner reductin (ii) Etard reaction

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12. A 10% solution (by mass) of sucrose in water has freezing point of 269.15 K. Calculate freezing point of 10% glucose in water, if freezing point of pure is 273.15 K (Given molar mass of sucrose= 342 g mol^{-1}, Molar mass of glucose =180 g mol^{-1}).

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13. (a) Calculate the mass of Ag deposited at cathode when a current of 2 amperes was passed through a solution of $AgNO_3$ for 15 minutes

(Given : Molar mass of $Ag = 108 gmol^{-1} 1F = 96500 Cmol^{-1}$)

(b) Define fuel cell

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14. (i) What type of isomerism is shown by the complex $\left[Co\left(NH_3\right)_6\right]\left[Cr(CN)_6\right]$?

(ii) Why a solution of $\left[Ni\left(H_2O\right)_6^{2+}\right.$ is given while a solution of $\left[No(CN)_4\right]^{2-}$ colourless ? (At. No. of Ni = 28)

(iii) Write the IUPAC name of the following complex : $\left[Co\left(NH_3\right)_5\left(CO_3\right)\right]Cl$

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15. Write one difference in each of the following:

(i) Lyophobic sol and Lyophilic sol

(ii) Solution and Colloid

(iii) Homogenous catalysis and Heterogeneous catalysis

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16. Following data are obtained for the reaction:

$$N_2O_5 \rightarrow 2NO_2 + .^{1/2}O_2$$

t/s	0	300	600
$\left[N_2O_5\right]/molL^{-1}$	1.6×10^{-2}	0.8×10^{-2}	0.4×10^{-2}

(a) Show that it follows first order reaction

(b) Calculate the half-life

(Given log 2 = 0.3010 log 4 = 0.6021]

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17. Following compounds are given to you :

2-Bromopentane, 2-Bromo-2-methylbutane, 1-Bromopentane

(i) Write the compound which is most reactive towards S_N2 reaction

(ii) Write the compound which is optically active

(iii) Write the compound which is most reactive towards β-elimination reaction

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18. (a) Write the principle of method used for the refining of germanium

(b) Out of PbS and $PbCO_3$ (ores of lead), which one is concentrated by froth floatation process preferably ?

(c) What is the significance of leaching in the extraction of aluminium ?

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19. Write structures of compounds A,B and C in each of the following reactions:

(i) $C_6H_5Br \xrightarrow{\text{Mg/dry ether}} A \xrightarrow[(a)\,CO_2(g)]{} \xrightarrow[(b)\,H_3O^+]{} B \xrightarrow{PCl_5} C$

(ii) $CH_3CN \xrightarrow[(a)\,SnCl_2/HCl]{} \xrightarrow[(b)\,H_3O^+]{} A \xrightarrow{\text{dil.}NaOH} B \xrightarrow{\Delta} C$

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20. Do the following conversions in not more than two steps:

(i) Benzoic acid to be to benzaldehyde

(ii) Ethyl benzene to Benzoic acid

(iii) Prapanone to Propene

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21. Write the structure of the monomers used for getting the following polymers:

(i) Dacron

(ii) Melamine-formaldehyde polymer

(iii) Buna-N

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22. Define the following :

(i) Anionic detergents

(ii) Broad spectrum antibiotics

(iii) Antiseptic

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23. Given reasion:

(i) Thermal stability decreases from H_2O to H_2Te

(ii) Fluoride ion has higher hydration enthalpy than chloride ion

(iii) Nitrogen does not form pentahalide

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24. Give reasons for the following

(a) Acetylation of aniline reduces its activation effect.

(b) CH_3NH_2 is more basiic than $C_6H_5NH_2$.

(c) Although $-NH_2$ is o/p directing group, yet aniline on nitration gives a significant amount of m-nitroaniline.

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25. After watching a programme on TV about the presence of carcinogens (cancer causing agents) Potassium bromate and Potassium iodate in bread and other bakery products, Rupali a class XII student decided to make other aware about the adverse effects of these carcinogens in food. she consulted the school principle and requested him to instruct the canteen contractor to stop selling sandwiches, pizzas, burgers and other bakery products to the students. The principal took an immediate action ad instructed the canteen contractor to replace the bakery products with some protein and vitamin rich food like fruits, salads, sprouts, etc. The decision was welcomed by the parents and the students.

After reading the above passage, answer the following questions:

(a) What are the values (at least two) displayed by Rupali?

(b) Which polysaccharide component of carbohydrates is commonly present in bread?

(c) Write the two types of secondary structures of proteins?

(d) Give two examples of water soluble vitamin.

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26. (a) Account for the following :

(i) Transition metals form large number of complex compounds

(ii) The lowest oxide of transition metal is basic whereas the highest oxide is amphoteric or acidic

(iii) E° value for the Mn^{3+}/Mn^{2+} couple is highly positive $(+1.57V)$ as compare to Cr^{3+}/Cr^{2+}

(b) Write one similarity and one difference between the chemistry of lanthanoid and actinoid elements.

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27. (a) (i) How is the variability in oxidation states of transition metals different from that of the p-block elements ?

(ii) Out of Cu^+ and Cu^{2+}, which ion is unstable in aqueous solution and why ?

(iii) Orange colour of $Cr_2O_7^{2-}$ ion changes to yellow when treated with an alkali. Why ?

(b) Chemistry of actinoids is complicated as compared to lanthanoids. Give two reasons.

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28. (a) An element has atomic mass $93 gmol^{-1}$ and density $11.5 gcm^{-3}$. If the edge length of its unit cell is 300 pm, identify the type of unit cell.

(b) Write any two differences between amorphous solids and crystalline solids.

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29. (a) Calculate the number of unit cells in 8.1g of aluminium if it crystallizes in a f.c.c., structure. (Atomic mass of Al $= 27 gmol^{-1}$)

(b) Given reasons:

(i) In stoichiometric defects, NaCl exhibits Schottky defect and not Frenkel defect.

(ii) Silicon on droping with Phosphorus forms n-type semiconductor.

(iii) Ferrimagnetic substances show better magnetism than antiferromagnetic substances.

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30. Given simple chemical tests to distinguish between the following pairs of compounds:

(i) Ehtanol and Phenol

(ii) Propanol and 2-methylpropan-2-ol

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31. Write the formula of reagents used in the following reactions:

(i) Bromination of phenol to 2, 4,6-tribromophenol

(ii) Hydroboration of propene and then oxidation to propanol.

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Set II

1. Write the structure of 2.4-dinitrochlorobenzene.

Watch Video Solution

2. Write IUPAC name of the following compound : $CH_3NHCH\left(CH_3\right)_2$

Watch Video Solution

3. Drawn the structure of the following:

(i) H_3PO_2

(ii) XeF_4

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4. Define the following terms:

(i) Ideal solution

(ii) Molarity (M)

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5. Complete the following reaction:

(i) $Cl_2 + H_2O \rightarrow$

(ii) $XeF_6 + 3H_2O \rightarrow$

Watch Video Solution

6. What happens when:

(i) conc. H_2SO_4 is added to Cu ?

(ii) SO_3 is passed through water ?

Write the equations

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7. Write the reactions involved in the following:

(i) Hell-Volhard Zelinsky reaction

(ii) Decarboxylation reaction

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8. Write the principles of the following methods:

(i) Vapour phase refining

(ii) Zone refining

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9. Define the following

(i) Cationic detergents

(ii) Narrow spectrum antibiotics

(iii) Disinfectants

Watch Video Solution

10. Write the structures of the monomers used for getting the following polymers:

(i) Neoprene

(ii) Melamine-formaldehyde polymer

(iii) Buna-S

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Set III

1. What is the effect of catalyst on:

(i) Gibbs energy (ΔG) and

(ii) activation energy of a rection ?

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2. Write the structure of 3-Bromo-2-methylprop-1-ene

Watch Video Solution

3. Write IUPAC name of the following compound

$\left(CH_3\right)_2N$ - CH_2CH_3

Watch Video Solution

4. Write the reactions involved in the following reactions:

(i) Clemmensen reduction

(ii) Cannizzaro reaction

Watch Video Solution

5. Draw the structures of the following :

(i) $H_4P_2O_7$

(ii) $XeOF_4$

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6. Define the following terms:

(i) Abnormal molar mass (ii) Van't Hoff factor (i)

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7. Complete the following chemical equation

(i) $F_2 + 2Cl^- \rightarrow$

(ii) $2XeF_2 + 2H_2O \rightarrow$

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8. What happens when

(i) HCl is added to MnO_2? (ii) PCl_5 is heated ?

Write the equation involved

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9. Define the following

(i) Anionic detergents

(ii) Limited spectrum antibiotics

(iii) Tranquilizers

Watch Video Solution

10. Write the structure of the monomers used for getting the following polymers:

(i) Nylon-6 (ii) Melamine-fomaldehyde polymer

(iii) Teflon

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11. Write one difference between each of the following:

(i) Multimolecular colloid and Macromolecular colloid

(ii) Sol and Gel

(iii) O/W emulsion and W/O emulsion

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12. (i) What type of isomerism is shown by complex $\left[Co(en)_3\right]Cl_3$?

(ii) Write the hybridisation and magnetic character of $\left[Co\left(C_2O_4\right)_3\right]^{3-}$.

(At.no. of Co = 27)

(iii) Write IUPAC name of the following Complex $\left[Cr\left(NH_3\right)_3Cl_3\right]$

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13. Of PH_3 and H_2S which is more acidic and why ?

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14. Draw the structure of hex-1-en-3-ol compound.

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15. Explain the following terms giving one example for each :

(i) Miscellus

(ii) Aerosol

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16. $15.0g$ of an unknown molecular material was dissolved in $450g$ of water. The reusulting solution was found to freeze at -$0.34.^{\circ}C$. What is the the molar mass of this material. (K_f for water $= 1.86Kkgmol^{-1}$)

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17. Explain the following observations giving an appropriate reason for each.

(i) The enthalpies of atomization of transmition elements are quite high.

(ii) There occurs much more frequent matal-matal bonding in compounds of heavy transition metals (i.e, 3rd series).

(iii) Mn^{2+} is much more resistant then Fe^{2+} toawards oxidation.

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18. Write the name, the structure and the magnetic behaviour of each one of the following complexes :

(i) $\left[Pt\left(NH_3\right)_2Cl\left(NO_2\right)\right]$

(ii) $\left[Co\left(NH_3\right)_4Cl_2\right]Cl$

(iii) $Ni(CO)_4$ (Al nos, $Co = 27, Ni = 28, Pt = 78$)

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19. Explain the following terms giving one example of each type .

(i) Antacids,

(ii) Disinfectants,

Enzymes.

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20. (a) Draw the molecular structure of following compounds :

(i) XeF_6

(ii) $H_2S_2O_8$

(b) Explain the following observations :

(i) The molecules NH_3 and NF_3 have dipole moments which are of opposite direction.

(ii) All the bonds in PCl_5 molecule are not equivalent.

(iii) Sulphur in vapour state exhibits paramagnetism.

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21. (a) Complete the following chemical equations .

(i) $XeF_4 + SbF_5 \rightarrow$, (ii) $Cl_2 + F_2(\text{excess}) \rightarrow$

(b) explain each of the following :

(i) Nitrogen is much less reactive than phosphorus.

(ii) The stability of $+5$ oxidation state decreases down group 15.

(iii) The bond angles $(O\text{ - }N\text{ - }O)$ are not of the value in NO_2^- and NO_2^+ .

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Delhi Board : Set - II

1. What is the difference between multimolecular and macromolecular collids ? Give one example of each . How are associated colloids different from these two types of colloids ?

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2. Explain the following observations :

(i) Fluorine does not exhibit any positive oxidation state.

(ii) The majority of known noble gas compounds are those of Xenon.

(iii) Phosphorus is much more reactive than nitrogen.

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3. How do antiseptics differ from disinfectants ? Give one example of each type .

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4. (a) Complete the following chemical reaction equations :

(i) $Fe^{2+}_{(aq)} + MnO^{-}_{4(aq)} + H^{+}_{(aq)} \rightarrow$

(ii) $Cr_2O^{2-}_{7(aq)} + I^{-}_{(aq)} + H^{+}_{(aq)} \rightarrow$

(b) Explain the following observations :

(i) Transition elements are known to form many interstitial compounds .

(ii) With the same d^4 d-orbital configuration Cr^{2+} ion is reducing while Mn^{3+} ion is oxidising .

(iii) The enthalpies of atomisation of the transition elements are quite high.

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5. Explain the following terms :

(a) Chemistry of all Lanthanoids is so identical .

(b) Silver atom has completely filled d- orbitals $\left(4d^{10}\right)$ in its ground state . How can you say that is a transition elements ?

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6. (a) What type of a cell is the lead storage battery ? Write the anode and the cathode reactions and the overall reaction occuring in a lead storage battery while operating .

(b) A voltaic cell is set up at $25^{\circ}C$ with the half-cells , $Al \mid Al^{3+}(0.001M)$ and $Ni \mid Ni^{2+}(0.50M)$. Write the equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

(Given : $E^{\circ}_{Ni^{2+} \mid Ni} = -0.25V, E^{\circ}_{Al^{3+} \mid Al} = -1.66V$).

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7. Express the relationship amongst cell constant , resistance of the solution in the cell and conductivity of the solution . How is molar conductivity of a solute related to conductivity of its solution ?

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Delhi Board : Set - III

1. What does the part'6,6' mean in the name nylon-6,6 ?

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2. Calculate the freezing point depression expected for 0.0711 m aqueous solution of Na_2SO_4 . If this solution actually freezes at $-0.320\,^{\circ}C$, what would be the value of Van't Hoff factor ?

(K_f for water is $1.86\,^{\circ}Cmol^{-1}$) .

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3. Compare the following complexes with respect to their shape , magnetic behaviour and the hybrid orbitals involved :

(i) $\left[CoF_4\right]^{2-}$ $(ii)\left[Cr\left(H_2O\right)_2\left(C_2O_4\right)_2\right]^{-}$ $(iii)\left[Ni(CO)_4\right]$

(Atomic number : Co = 27 , Cr = 24 , Ni = 28)

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4. What are the following substances ? Give one example of each type .

(i) Antacid

(ii) Nonionic detergents

(iii) Antiseptics

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5. (a) What is meant by the term lanthanoid contraction ? What is it due to and what consequences does it have on the chemistry of elements following lanthanoids in the periodic table ?

(b) Explain the following observations :

(i) Cu^{+} ion is unstable in aqueous solutions .

(ii) Although Co^{2+} ion appears to be stable , it is easily oxidised to Co^{3+} ion in the presence of a strong ligand.

(iii) The $E^{\circ}_{Mn^{2+}/Mn}$ value for manganese is much more than expected from the trend for other elements in the series.

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6. One half-cell in a voltaic cell is constructed from a silver wire dipped in silver nitrate solution of unknown concentration . Its other half-cell consists of a zinc electrode dipping in 1.0M solution of $Zn\left(NO_3\right)_2$. A voltage of 1.48 V is measured for this cell . Use this information to calculate the concentration of silver nitrate solution used. $\left(E^{\circ}_{Zn^{2+}\,|\,Zn} = -0.76V, E^{\circ}_{Ag^{+}\,|\,Ag} = +0.80V\right)$.

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7. (a) Corrosion is essentially an electrochemical phenomenon. Explain the reactions occurring during corrosion of iron kept in an open atmosphere.

(b) Calculate the equilibrium constant for the equilibrium reaction

$Fe_{(s)} + Cd^{2+}_{(aq)} \Leftrightarrow Fe^{2+}_{(aq)} + Cd_{(s)}$

(Given : $E^{\circ}_{Cd^{2+}\,|\,Cd} = -0.40V, E^{\circ}_{Fe^{2+}\,|\,Fe} = -0.44V$).

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[SET-1]

1. Write a feature which will distinguish a metallic solid from an ionic solid.

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2. Define 'order of a reaction'.

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3. What is an emulsion?

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4. What are the different oxidation states exhibited by the lanthanoids?

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5. Give an example of linkage isomerism.

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6. Which type of stoichiometric defect is shown by ZnS ?

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7. What are emulsions? Give an example.

Watch Video Solution

8. Write IUPAC name of the complex : $\left[CoCl_2(en)_2\right]^+$.

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9. What happens when phenol is oxidized by $Na_2Cr_2O_7/H_2SO_4$?

Watch Video Solution

10. Write IUPAC name of the following compound :

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11. Following reactions can occur at cathode during the electrolysis of aqueous silver nitrate solution using Pt electrodes :

$$Ag^+_{(aq)} + e^- \rightarrow Ag_{(s)}, E^\circ = 0.80V$$

$$H^+_{(aq)} + e^- \rightarrow \frac{1}{2}H_{2(g)}, E^\circ = 0.00V$$

On the basis of theri standars electrode protential values, which reaction is feasible at cathode and why ?

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12. Orthophosphoric acid $\left(H_3PO_4\right)$ is not a reducing agent wheres hypophosphorus acid $\left(H_3PO_2\right)$ is a strong reducing agent "Explain and justify the above statement with the help of a suitable example.

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13. (a) Explain why H_2 and O_2 do not react at room temperature.

(b) Writen the rate equation for the reaction

$A_2 + 3B_2 \rightarrow 2C,$ if the overall order of the reaction is zero.

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14. Derive integrated rated equation for rate constant of a first order reaction.

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15. Explain the following observations :

(i) Copper atom has completely field d orbitals $\left(3d^{10}\right)$ in its ground state, it is regarded as a transition element.

(ii) Cr^{2+} is a stronger reducing agent than Fe^{2+} in aqueous solutions.

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16. How will you carry out the following conversions :

(i) 2-Bromopropane to 1-bromopropane

(ii) Benzene to p-chloronitrobenzene

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17. An element exists in bcc lattice with a cell edge of 288 pm. Calculate its molar density is $7.2g/cm^3$

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18. Calculate $\Delta_r G^\circ$ and log K_c for the following reaction at 298 K.

$$2Cr_{(s)} + Cd^{3+}_{(aq)} + 33Cd_{(s)} \left\{Given: E^\circ_{Cell} = +0.34V, IF = 96500 C mol^{-1}\right]$$

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19. For a first order reaction, show that the time required for 99% completion is twice the time required for the completion of 90% of reaction.

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20. Define the following terms:

(i) Tyndall effect

(ii) Electrophoresis

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21. (a) Write the principle involved in the following :

(*i*)Zone refining of metals (*ii*)Electrolytic refining

(b) Name the metal refined by each of the following processes:

(*i*)Mond Process (*ii*)van Arkel Method

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22. A mixed oxide of iron and chromium is fused with sodium carbonate in free access of air to from a yellow, coloured compound (A). On acidification the compounf (A) froms an orange coloured compound (B), which is a strong oxidizing agent. Identify compound (A) and (B). Write chemical reactions involved.

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23. (a) Give reasons for the following :

(i) Compounds of transition elements are generally coloured.

(ii) MnO is basic while Mn_2O_7 acidic.

(b) Calculate the magnetic moment of a divalent ion squeous medium of its atomic number is 26.

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24. For the complex ion $\left[F(en)_2CI_2\right]^+$ write the hybridization type and magnetic behavior. Draw one of the geometrical isomer of the complex ion which is optically active. [A tomic No, :Fe=26]

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25. Rearrange the compounds of each of the following sets in order of reactivity towards SN_2 displacement:

2-Bromo-2-methyl butane, 1-Bromo-pentane, 2-Bromopentane.

Watch Video Solution

26. (a) Why phenol is more acidic than than ethanol ?

(b) Write the mechanism of acid dhydration of ethanol to tield ether:

$$2CH_3CH_2OH \xrightarrow{H^+} {}_{413K}CH_3CH_2OCH_2CH_3$$

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27. Identify A, B and C in the following reactions :

(i) $CH_3CH_2Cl \xrightarrow{\text{Ethanolic}} {}_{\text{NaCN}}A \xrightarrow{H_2/Ni} B \xrightarrow{CH_3COCl/\text{Base}} C$

(ii) $C_6H_5N_2^+Cl^- \xrightarrow{HBF_4} A \xrightarrow[\Delta]{NaNO_2/Cu} B \xrightarrow{Sn/HCl} C$

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28. (a) Why water soluble vitamins must be supplied regularly in the dite ?

Give one example of it.

(b) Differentiate between the following :

(i) Essential and non-essential amino acids.

(ii) Fibrous and globular proteins.

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29. (i) Name a substance which can be used as an antiseptic as well as disinfectant.

(ii) name an artificial sweetener whose use in limited to cold foods and drinks.

(iii) What are cationic detergents ?

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30. Once there was heavy downpour for about 3 hours in the early morning. Irfan and his family were finding it difficulat to carry out their daily morning chores as the sewer water was flowing back into the toilits, th road in front of their house was flooded with water and they could not move out. On this very serious problem Irfan called a meeting of all the residents. In the meeting Irfan discussed th problem and said that we as using too much polythene bags and other plastic items which we throw here and there. All these move into the drains and sewer lines which get

choked and do not allow flow of water. As these are non-biodegradable, they remain as such for a long time. So to overcome this problem, we should use bags made up of cloth or jute which are biodegradable.

(i) Answer the following questions :

(i) Name a polymer which is biodegradable. Write the sturctures of monomers and the repeating unit.

(ii) Write two uses of this polymer.

(iii) Write any two values shown by Irfan.

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31. (a) Explain why on addition of 1 mole glucose to 1 litre water the boiling point of water increases .

(b) Henry's law constant for CO_2 in water is $1.67 \times 10^8 Paat 298K$. Calculate the number of moles of CO_2 in 500 ml of soda water when packed under 2.53×10^5 Pa at same temperature.

Watch Video Solution

32. (a) Define the following terms :

(*i*)Ideal solution (*ii*)Osmotic pressure

(b) Calculate the boiling point elevation for a solution prepared by adding 10g $CaCl_2$ to 200g of water, assuming that $CaCl_2$is completely dissociated.

$\left(K_b\text{for water} = 0.512 Kgmol^{-1}\text{, Mole mass of CaCl\_(2)=111g mol\^(-1))`}\right.$

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33. (a) When concentrated sulphuric acid was added to an unknown salt present in a test tube a brown gas (A) was evolved . This gas intensified when copper turnings were added to this test tube . On cooling, the gas (A) changed into a colourless solid (B) .

(i) Identify (A) and (B).

(ii) Write the structures of (A) and (B).

(iii) Why does gas (A) change to solid on cooling ?

(b) Arrange the following in the decreasing order of their reducing character :

HF , HCl , HBr , HI

(c) Complete the following reaction :

$XeF_4 + SbF_5 \rightarrow$

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34. (a)Account for the following

(i) Reducing character decreases from SO_2 to TeO_2.

(ii) $HClO_3$ is a stronger acid than HClO.

(iii) Xenon forms compounds with fluorine and oxygen only.

(b) Complete the following equations :

(i) $4NaCl + MnO_2 + 4H_2SO_4 \rightarrow$

(ii) $6XeF_4 + 12H_2O \rightarrow$

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35. (a) Account for the following :

(i) Propanal is more reactive than propanone towards nucleophilic reagents.

(ii) Electrophilic substitution in benzoic acid taken place at meta position.

(iii) Carboxylic acids do not distinguish between the following pairs of compounds :

(b) Give simple chemical test to distinguish between the following pairs of compounds :

(i) Acetophenone and benzaldehyde (ii) Benzoic acid and ethylbenzoate.

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36. Write structure of A, B C and D in the following eactin sequence :

$$CH_3COCl \xrightarrow{H_2/Pd\text{-}BaSO_4} A \xrightarrow{\text{dil. NaOH}} B \xrightarrow{\Delta} C$$

$$\downarrow CH_3MgBr/H_3O^+$$

$$D$$

(b) Arrange the following compounds in the increasing order of their boiling points :

$CH_3CHO, CH_3CH_2OH, CH_3OCH_3, CH_3COOH$

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[SET-I]

1. A solution of aqueous of KOH hydrolysis $CH_3CHClCH_2CH_3$ and $CH_3CH_2CH_2CH_2Cl$. Which one of these is more easily hydrolysed.?

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2. Draw the structural formula of 1-phenyl Propan-1-one molecule.

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3. Give the IUPAC name of $H_2N - CH_2 - CH_2 - CH = CH_2$.

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4. Non - ideal solutions exhibit either positive or negative deviations from Raoult's law. What are these deviations and why are they caused? Explain with one example for each type.

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5. A reaction is of first order in reactant A and of second order in reactant B. How is the rate of this reaction affected when (i) the concentration of B alone is increased to three times (ii) the concentrations of A as well as B are doubled?

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6. For a first order reaction, time taken for half of the reaction to complete is t_1 and $\frac{3}{4}$ of the reaction to complete is t_2. How are `t_(1)and t_(2) related?

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7. Draw the structures of white phosphorus and red phosphorus. Which one of these two types of phosphorus is more reactive and why?

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8. Explain the following observation:

(i) Generally there is an increase in density of elements from titanium ($Z = 22$)to copper ($Z = 29$) in the first series of transition elements.

(ii) Transition elements and their compounds are generally found to be catalysts in chemical reactions.

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9. Give the IUPAC names of the following compounds :

(i) $\left[Co\left(NH_3\right)_4\left(H_2O\right)Cl\right]CL_2$

(ii) $\left[CrCl_2(en)_2\right]Cl$

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10. Write the equation involved in the following reaction :

(i) Williamson ether synthesis

(ii)Kolbe's reaction

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11. How are the follwing conversinos carried out?

(i) Benzyl chloride to benzyl alchol,

(ii) Methyl magnesium bromide to 2-methylpropan-2-01.

Watch Video Solution

12. Explain the following terms :

(i) Invert sugar

(ii) Polypeptides.

Watch Video Solution

13. While antiacids and antiallergic drugs interfere with the function of hisatamines but why do these not interfere with the functions of each

other?

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14. The well know mineral flourite is chemically calcium fluoride. It is a well known fact that in one unit cell of this mineral, there are four Ca^{2+} ions and eight F^- ions and Ca^{2+} ions are arranged in f.c.c. lattice. The F^- ions fill all the tetrahedral holes in the face centred cubic lattice of Ca^{2+} ions. The edge length of the unit cell is 5.46×10^{-8} cm. The density of the solid is 3.18g cm^{-3}. Use this information to calculate Avogadro's number (Molar mass of $CaF_2 = 78.0 \text{g mol}^{-1}$)

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15. A solution prepared by dissolving $1.25g$ of oil of winter green (methyl sallicylate) in $99.0g$ of benzene has a boiling point of $80.31^\circ C$. Determine the molar mass of this compound. ($B.P.$ of pure benzene $= 80.10^\circ C$ and K_b for benzene $= 2.53^\circ Ckg\text{mol}.1$)

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16. What is the difference between multimolecular and macromolecular collids ? Give one example of each . How are associated colloids different from these two types of colloids ?

Watch Video Solution

17. Describe how the following changes are brought about:

(i)Pig iron into steel.

(ii)Zinc oxide into metallic zinc.

(iii)Impure titanium into pure titanium.

Watch Video Solution

18. How would you account for the following?

(i)The atomic radii of the metals of the third (5d) series of transition elements are virtually the same as those of the corresponding members

of the second (4d) series.

(ii)The E° value for the Mn^{3+}/Mn^{2+} couple is much more positive than that for Cr^{3+}/Cr^{2+} couple or Fe^{3+}/Fe^{2+} couple.

(iii)The highest oxidation state of a metal is exhibited in its oxide or fluoride.

Watch Video Solution

19. (i)State one use each of DDT and iodoform.

(ii) Which compound in the folloeing couples will react faster in `S_(N)2 displacement and why?

(a)1-Bromopentane or2-bromopentane

(b) 1-Bromo -2 methylbutane or 2-bromo-2-methylbutane.

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20. Arrange the following in the order of property indicated for each set:

Watch Video Solution

21. Giving one example of each of :

(i) addition polymers

(ii) condensation polymers

(iii) copolymers.

Watch Video Solution

22. What are analgesic medicines? How are they clasified and when are they commonly recommended for use?

Watch Video Solution

23. State Kohlrausch law of independent migration of ions. Write an expression for the molar conductivity of acetic acid at infinite dilution

according to Kohlrausch law.

(*b*) Calculate : $\wedge^{\circ}m$ for acetic acid.

Given that : $\wedge^{\circ}m(HCl) = 426\ \text{S}\ \text{cm}^2mol^{-1}$

$\wedge^{\circ}m(NaCl) = 126\ \text{S}\ cm^2mol^{-1}$

$\wedge^{\circ}m\left(CH_3COONa\right) = 91\ \text{S}\ cm^2mol^{-1}$

Watch Video Solution

24. A copper - silver cell is set up. The copper ion concentrations is 0.10 M. The concentration of silver ion is not known. The cell potential when measured was 0.422 V. Determine the concentration of silver ions in the cell.

Given $E^{\circ}Ag^{+}/Ag = +0.80V, E^{\circ}Cu^{2+}/Cu = +0.34V$

Watch Video Solution

25. (a) (i) Complete the following chemical equations :

(i) $NaOH_{(aq)} + Cl_{2(g)} \rightarrow$

(Hot and conc.)

(ii) $Xef_6(s) + H_2O(l) \rightarrow$

(b) How would you account for the following ?

(i) The value of electron gain enthalpy with negative sign for sulphur is higher than that for oxygen.

(ii) NF_3 is an exothermic compound but NCl_3 is endothermic compound.

(iii)ClF_3 molecule has a T-shaped structure and not a trigonal planar one.

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26. (a) Complete the following chemical reaction equations :

(i) $P_4 + SO_2Cl_2 \rightarrow$

(ii) $XeF_4 + H_2O \rightarrow$

(b) Explain the following observations giving appropriate reasons :

(i) The stability of + 5 oxidation state decreases down the group in group 15 of the periodic table.

(ii) Solid phosphorus pentachloride behaves as an ionic compound.

(iii) Halogens are strong oxidizing agents.

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27. (a) Explain the mechanism of a nucleophilic attack on the carbonyl group of an aldehyde or a ketone.

(b) An organic commpound (A) (molecular formula $C_8H_{16}O_2$) was hydrlysed with dilute sulphuric acid to give a carboxylic acid (B) and an alcohol (C). Oxidatin of (C) with chromic acid also produced (B). On dehydratin (C) gives but-1-ene. Write the equations for the reactions involved.

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28. Give chemical tests to distinguish between the follwing pairs of compounds :

(i) Ethanal and Propanal

(ii) Phenol and Benzoic acid

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29. How do metallic and ionic substances differ in conducting electricity ?

Watch Video Solution

30. What is coagulation process ?

Watch Video Solution

31. What is meant by the term ' pyrometallurgy' ?

Watch Video Solution

32. Why is red phosphorus less reactive than white phosphorus ?

Watch Video Solution

33. Give the IUPAC name of the compound : $CH_2 = CH - CH|_{OH} - CH_2 - CH_2 - CH_3$.

Watch Video Solution

34. Write the structural formula of 1- phenylpentan - 1 one.

Watch Video Solution

35. Arrange the following in the decreasing order of their basic strength in aqueous solutions :

CH_3CSNH_2, $\left(CH_3\right)_2NH$, $\left(CH_3\right)_3N$ and NH_3

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36. Two half cell reactions of an electrochemical cell are given below :

$MnO_4^-(aq) + 8H^+(aq) + 5e^-, \rightarrow Mn^{2+}(aq) + 4H_2O(l), E^\circ = +1.51V$

$Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + 2e^-, E^\circ = +0.51V$ Construct the redox equation from the two half cell reactions and predict if the reaction favours formation of reactant or product shown in the equation.

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37. A solution of $CuSO_4$ is electroysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode ?

(Molar mass of $Cu = 63.5g/mol$)

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38. Outline the principles of refining of metals by the following methods :

(a) Electrolytic refining

(b) Zone refining

(c) Vapour phase refining.

Watch Video Solution

39. Complete the following chemical reaction equations :

(i) $XeF_2 + H_2O \rightarrow$

(ii) $PH_3 + HgCl_2 \rightarrow$

Watch Video Solution

40. Complete the following chemical equations :

(i) $MnO_4^-(aq) + S_2O_3^{2-}(aq) + H_2O(l) \rightarrow 1$

(ii) $Cr_2O_7^{2-}(aq) + Fe^{2+}(aq) + H^+(aq) \rightarrow$

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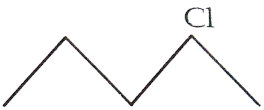
41. Which one in the following pairs undergoes S_N1 substitution reaction faster and why ?

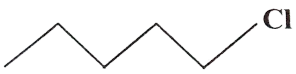
(i)

or



(ii)

or



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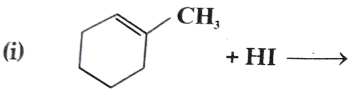
42. Complete the follwing reaction equations :

(i) 

(ii) $CH_3CH_2CH = CH_2 + HBr \rightarrow$

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43. Name the four bases present in DNA. Which one of these is not present in RNA ?

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44. Name two fat soluble vitamins, their sources and the diseases caused due to their deficiency.

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45. Differentiate between the molecular structures and behaviour of thermoplastic and thermosetting polymers. Give one example of each type

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46. A first order reaction has a rate constant of 0.0051 $\min^{-1}$. If we begin with 0.10 M concentration of the reactant, What concentration of reactant will remain in solution after 3 hours?

Watch Video Solution

47. Silver crystallises with face - centred cubic unit cells .each side of the unit cell has a length of 409 pm . What is the radius of an atom of silver ? (Assume that each face atom is touching the four corner atoms.)

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48. A copper-silver cell is set up. The copper ion concentration in it is 0.10 M. The concentration of silver ions is not known.The cell potential measured is 0.422 V. Determine the concentration of silver ions in the cell. [Given $E^{\circ}_{Ag^{+}/Ag} = 0.80, E^{\circ}_{Cu^{2+}/Cu} = +0.34V$]

Watch Video Solution

49. Whate happens in the following activities and why?

(i) An electrolyte is added to a hydrated ferric oxide sol in water.

(ii) A bean of light is passed through a colloidal solution.

(iii) An electric current is passed through a colloidal soluidal solution.

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50. Give a suitable example for each, explain the following :

(i) Crystal field splitting . (ii) Linkage isomerism.

(iii) Ambident ligand.

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51. Explain the following complexes with respect to structural shapes of units, magnetic behaviour and hybrid orbitals involved in the units :

$\left[Cr\left(NH_3\right)_6\right]^{3+}$, $\left[Ni(CO)_4\right]$

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52. Classify the following as primary ,secondary and tertiary alcohols :

CH_3
|
$CH_3 - CH_3 - C - CH_2OH$

(ii) $H_2C = CH - CH_2OH$

(iii) $CH_3 - CH_2 - CH_2 - OH$

Watch Video Solution

53. How would you account for the following : (i) The metallic radii of the third (5d) series of transition metals are virtually the same as those of the corresponding group members of the seconds (4d) series.

(ii) There is a greater range of oxidation states among the actinoids than among the lanthanoids.

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54. Complete the following reaction equations:

(i) $R - \overset{\overset{O}{\|}}{C} - NH_2 \xrightarrow[H_2O]{LiAlH_4}$

(ii) $C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

(iii) $C_6H_5NH_2 + Br_2(aq) \rightarrow$

Watch Video Solution

55. Describe the following substance with one suitable expample of each type :

(i) Non - ionic detergents

(ii) Food preservatives

(iii) Disinfecants

Watch Video Solution

56. (a) Define the following terms:

(i) Mole fraction (ii) Van't Hoff factor

(b) $100mg$ of a protein is dissolved in enough water to make $10.0mL$ of a solution. If this solution has an osmotic pressure of $13.3mmHg$ at $25^\circ C$, what is the molar mass of protein?

$\left(R = 0.821 L\text{atm mol}^{-1}K^{-1}\text{and}760mmHg = 1\text{ atm.}\right)$

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57. (a) What is meant by: (i) Colligative properties (ii)Molality of a solution

(b) What concentration of nitrogen should be present in a glass of water at room temperature? Assume a temperature of $25^\circ C$, a total pressure of 1 atmosphere and mole fraction of nitrogen in air of 0.678. [K_H for nitrogen $= 8.42 \times 10^{-7} M/mmHg$]

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58. Draw the structures of the following :

(i) $H_2S_2O_8$

(ii) $HClO_4$

(b) How would you account for the following :

(i) NH_3 is a stronger base than PH_3.

(ii) Sulphur has a greater tendency for catenation than oxygen.

(iii) F_2 is stronger oxidising agent than Cl_2.

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59. Explain the following observation :

In the structure of HNO_3 the N-O bond (121 pm) is shorter than the N-OH bond (140 pm).

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60. Write chemical equations to illustrate the following name bearing reactions: (i) Cannizzaro 's reaction

(ii) Hell - Volhard -Zelinsky reaction

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61. How will you bring about the following conversions :

(i) Ethanol to 3- hydroxybutanal

(ii) Benzaldehyde to Benzophenone

Watch Video Solution

62. Explain the following with an exampe in each :

(*i*)Kolbe's reaction. (*i*)Reimer-Tiemann reaction.

(*iii*)Williamson ether synthesis.

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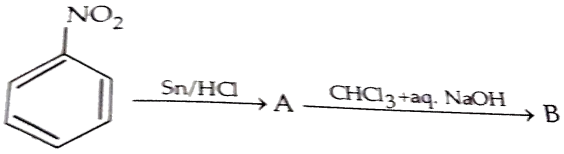
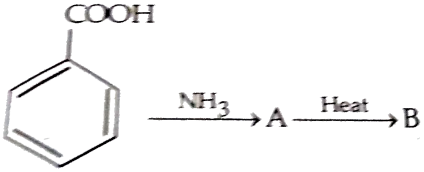
63. Write the products A and B in the following :

(i) 

(ii) 

(iii) $C_6H_5N_2^+Cl^- \xrightarrow{Cu/HCl} A \xrightarrow{Cl_2/FeCl_3} B$

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64. Write two uses of each of the following polymers.

(i) Polypropylene (ii) PVC (iii) Nylon - 66

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65. What are enzyme ? Describe their functions. Name two diseases which are caused due to deficiency of enzymes.

Watch Video Solution

66. Ankit's grandfather is not only obses but he is also a diabetic patient. Seeing this fondness for sweets, Ankit suggested him to replace sugar with artificial sweeteners. After frw days, Ankit observed a controlled leavel of sugar in his grandfather. Answer the following :

(i) What are artificial sweteners ?

(ii) What are articdicial sweetners ?

(iii) Give two examples of artificial sweeteners ?

(iv) Name an artificial sweetnener which is unstable at cooking temperature.

Watch Video Solution

67. (a) What are the two classifications of batteries ? What is the difference between them ?

(b) The resistance of 0.01 M NaCl solution at $25^\circ C$ is 200Ω. The cell

constant of the conductivity cell is unity. Calculate the molar conductivity of the solution.

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68. (a) What are fuel cells ? Give an example of a fuel cell.

(b) Calculate the equilibrium constant $\left(\log K_c\right)$ and $\Delta_r G^\circ$ for the following reaction at 298 K.

$Cu_{(s)} + 2Ag^+_{(aq)} \Leftrightarrow Cu^{2+}_{(aq)} + 2Ag(s)$

Given $E^\circ_{cell} = 0.46V$ and $IF = 96500 Cmol^{-1}$.

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69. Draw the structure of : $(i) BrF_3$ $(ii) XeOF_4$

(b) Explain giving reason in each case :

(i) Why H_2 Te is more acidic than H_2S?

(ii) Why are halogens strong oxidising agents ?

(iii) Why does nitrogen show catenation tendentcy less than phosphorus ?

Watch Video Solution

70. (a) (i) Why PCl_5 gives fumes in moisture ?

(ii) Why Interhalogens are more reactive than pure halogens ?

(b) Draw the structures of the following :

$(i)PCl_5 \quad (ii)H_2S_2O_8 \quad (iii)XeF_4$

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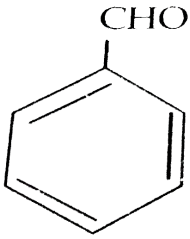
71. (a) What is meant by the following terms ? Give an example of the reaction in each case. (i)Aldol (ii)Semicarbazone

(b) Complete the following :

(i) $CH_3COCl \xrightarrow{H_2Pd\text{-}BaSo_4}$

$(ii) CH_3 - CH = CH - CN \xrightarrow{DIBAl - H} \rightarrow$

(iii) 

$\xrightarrow{\text{Conc. } HNO_3 + H_2SO_4}$

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[SET-II]

1. why is Frenkel defects not found in pure alkali metal halides ?

Watch Video Solution

2. What is the oxidation number of phosphorus in H_3PO_2 molecule ?

Watch Video Solution

3. Give an example of coordination isomerism.

Watch Video Solution

4. Draw the structural formulae of molecules of following compounds :

(i)BrF_3 and (ii)XeF_4

Watch Video Solution

5. Describe The shape and magnetic behaviour of following complexes :

(i)$\left[Co\left(NH_3\right)_6\right]^{3+}$

(ii)$\left[Ni(CN)_4\right]^{2-}$. $(At.\ N \odot Co = 27, Ni = 28)$

Watch Video Solution

6. Explain the following reactions withan example for each :

(i) Reimer-Tiemann reaction

(ii) Friedel - Crafts reaction.

Watch Video Solution

7. How is 1-propoxypropane synthesised from propan-1-ol? Write mechanism of this reaction.

Watch Video Solution

8. A solution of glycerol $C_3H_8O_3$, molar mass = 92 g mol^{-1} in water was prepared by dissolving some glycerol 500 g of water. This solution has a boiling point of $100.42^\circ C$. What mass of glycerol was dissolved to make this solution ? K_b for water=$0.512 Kkgmol^{-1}$.

Watch Video Solution

9. Complete the following chemical equations

(i)$C_6H_5N_2Cl + C_6H_5NH_2 \rightarrow$

(ii)$C_6H_5N_2Cl + CH_3CH_2OH \rightarrow$

(iii) $RNH_2 + CHCl_3 + KOH \rightarrow$

Watch Video Solution

10. Write the name and structure of the monomer of each of the following polymers :

(i)Neoprene

(ii) Buna-S

(iii) Teflon

Watch Video Solution

[SET-III]

1. Which point defect in crystals of a solid decreases the density of the solid?

Watch Video Solution

2. Define each of the following :

(i) Specific rate of a reaction.

(ii) Energy of activition of a reaction

Watch Video Solution

3. Give an example of 'shape-selective catalyst'.

Watch Video Solution

4. Draw the structure of O_3 molecule.

Watch Video Solution

5. Give an example of ionization isomerism.

Watch Video Solution

6. Explain the following observation :

(i) Transition elements generally form coloured compounds.

(ii) Zinc is not regaded as a transition element.

Watch Video Solution

7. The radius of $Na(+)$ is 95 pm and that of CI^- ions is 181 pm. Predict whethr the coordination number of Na^+ is 6 or4.

Watch Video Solution

8. How are the following colloids different with respect to dispersed phase and dispersion medium ? Give one example of each

(i) Aerosol (ii) Emulsion (iii) Hydrosol.

Watch Video Solution

9. Differentiate between the molecular structures and behaviour of thermoplastic and thermosetting polymers. Give one example of each type

Watch Video Solution

10. Explain the following terms with one suitable example in each case.

(i) Cationic detregents

(ii) Enzymes

(iii) Antifertility drugs

Watch Video Solution

Outside Delhi : SET-II

1. Which stoichiometric defect in crystals increses the density a solid?

Watch Video Solution

2. What is shape - selective catalysis ?

Watch Video Solution

3. What is the role of collectors in Froth Floatation process ?

Watch Video Solution

4. Write the IUPAC name of $PH - CH = CH - CHO$.

Watch Video Solution

5. Explain the cleaning action of soap . Why do soaps not work in hard water ?

Watch Video Solution

6. A Voltaic cell is set up at $25^{\circ} C$ with the following half cells ?

Watch Video Solution

7. Explain the following observations :

(i) Many of the transition elements are known to form interstitial compounds .

(ii) There is a general increase in density from titanium (Z =22) to copper (Z = 29).

(iii) The members of the actinoid series exhibit a larger number of oxidation states than the corresponding members of the lanthanoid series.

Watch Video Solution

8. Explain the following giving one suitable example in each case

(i) Elastomers (ii) Condensation polymers (iii) Addition polymers

Watch Video Solution

9. Explain the following observations :

(i) Nitrogen is much less reactive than phosphorus.

(ii) Despite having greater polarity, hydrogen fluoride boils at a lower temperature than water.

Watch Video Solution

10. (a) Draw the structures of the following molecules :

(i) N_2O_5

(ii) $HClO_4$

(b) Explain the following observations :

(i) H_2S is more acidic than H_2O.

(ii)Fluorine does not exhibit any positive oxidation state .

(iii) Helium forms no real chemical compound.

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Outside Delhi : SET-III

1. What are n-type semiconductors ?

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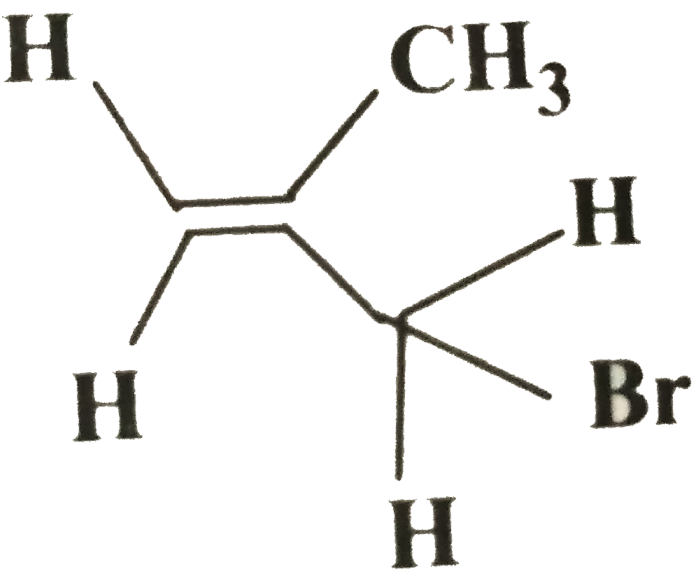
2. What is the basicity of H_3PO_2 acid and why ?

Watch Video Solution

3. Write the IUPAC name of the following :



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4. How do you explain the presence of all the six carbon atoms in glucose in a straight chain?

Watch Video Solution

5. What is the cause of a feeling of depression in human beings ? Name a drug which can be useful in treating this depression .

Watch Video Solution

6. Explain the role of each of the following :

(i) NaCN in the extraction of silver

(ii) SiO_2 in the extraction of copper

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7. Diffferentiate between disinfectants and antiseptics . Give one example of each group 3 .

Watch Video Solution

8. Write three distinct features of chemisorptions which are not found in physisorptions.

Watch Video Solution

9. How would you account for the following ?

(i) With the same d-orbital configuration $\left(d^4\right)Cr^{2+}$ is reducting agent while Mn^{3+} is an oxidizing agent.

(ii) The actionoids exhibits a larger numbe of oxidation states than the corresponding members in the lanthanoid series.

(iii) Most of the transition metal ions exhibit characteristic in colours in aqueous solutions.

Watch Video Solution

10. Name of following coordinatin entities and describe their structures :

(i) $\left[Fe(CN)_6\right]^{4-}$

(ii) $\left[Cr\left(NH_3\right)_4Cl_2\right]^{+}$

(iii) $\left[Ni(CN)_4\right]^{2-}$

[Atomic number Fe = 26 , Cr = 24 , Ni = 28]

Watch Video Solution

11. Define the following as related to proteins :

(i) Peptide linkage

(ii) Primary structure

(iii) Denaturation

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SECTION-A

1. Out of NaCl and AgCl, which one shows Frenkel defect and why ?

Watch Video Solution

2. Arrange the following in increasing order of boiling points :

$\left(CH_3\right)_3N, C_2H_5OH, C_2H_5NH_2$

Watch Video Solution

3. Why are medicines more effective in collidal state ?

Watch Video Solution

4. What is differnece between an emulsion and a gel ?

Watch Video Solution

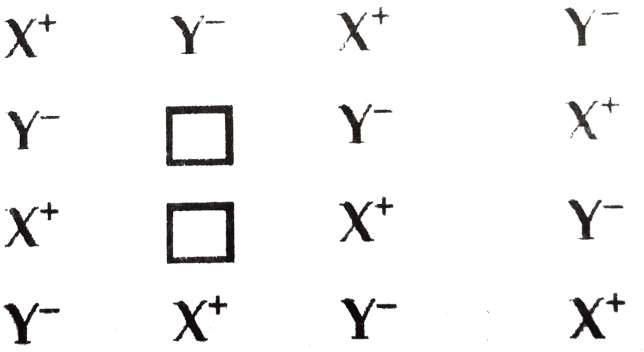
5. Define ambident nucleophile with an example.

Watch Video Solution

6. What is the basic structural difference between glucose and fructose ?

Watch Video Solution

7. Name the defect in the following crystal:



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8. When a coordination compound $CrCl_3.6H_2O$ is mixed with $AgNO_3$ two moles of AgCl are precipitated per mole of the compound .What is the structural formula of the coordination compound ?

Watch Video Solution

9. What is the difference between a complex and a double salt ?

Watch Video Solution

10. Define associated colloid with an example.

Watch Video Solution

11. Why is t- butyl bromide more reactive towards S_N1 reaction as compared to n- butyl bromide?

Watch Video Solution

12. Describe the following giving the relevant chemical equation in each case :

(i) Carbylamine reaction

(ii) Hofmann's bromamide reaction

Watch Video Solution

13. Propanamine and N,N-dimethanamine contain the same number of carbon atoms ,even though propanamine has higer boiling point than N,N- dimethymethanamine .Why?

Watch Video Solution

SECTION-B

1. What are the expected products of hydrolysis of lactose ?

Watch Video Solution

2. Write balanced chemical equations for the following processes:

(i) XeF_2, undergoes hydrolysis.

(ii) MnO_2, is heated with conc. HCI

Watch Video Solution

3. Arrange the following in order of property indicated for each set:

(*i*)H_2O, H_2S, H_2Se, H_2Te - Increasing acidic character

(ii) HF, HCl, HBr, HI - decreasing bond enthalpy

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4. State Raoult's law for a solution containing volatile components. Write two characteristics of the solution which obeys Raoult's law at all concentrations.

Watch Video Solution

5. For a reaction : $2H_2O_2 \xrightarrow[\text{alkaline medium}]{I^-} 2H_2O + O_2$

the proposed mechanismis as given below:

(1) $H_2O_2 + I^- \rightarrow H_2O + IO^-$ (slow)

(2) $H_2O_2 + IO^- \rightarrow H_2O + I^- + O_2$ (fast)

(i) Write rate law for the reaction.

(ii) Write the overall order of reaction.

(iii) Out of steps (1) and (2), which one is rate determining step ?

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6. When MnO_2, is fused with KOH in the presence of KNO_3 as an oxidizing agent, it gives a dark green compound (A). Compound (A) disproportionates in acidic solution to give purple compound (B). An alkaline solution of compound (B) oxidises Kl to compound (C)whereas an acidified solution of compound (B) oxidises KI to (D), Identity (A), (B), (C), and (D).

Watch Video Solution

7. Write IUPAC name of the complex [Pt(en)2CI2]. Draw structures of geometrical isomers for this complex.

Watch Video Solution

8. Using IUPAC norms write the formulae for the following:

(i) Hexaamminecobalt (III) sulphate.

(ii) Potassium trioralatochromate (III).

Watch Video Solution

9. Out of $\left[CoF_6\right]^{3-}$ and $\left[Co(en)_3\right]^{3+}$, which one complex is :

(i) Paramagnetic (ii) more stable

(iii) inner orbital complex and (iv) high spin complex

(Atomic no. of Co =27)

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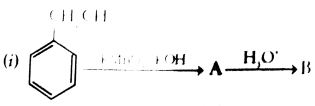
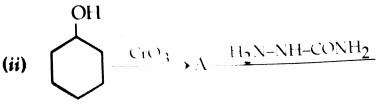
10. Write structures of compounds A andB in each of the following reactions:





Watch Video Solution

11. Give reasons for the following :

(A) Aquatic species are more comfortable in cold water than warm water.

(b) At higher altitude people suffer anoxia resulting in inability to think.

Watch Video Solution

12. What type of azeotropic mixture will be formed by a solution of acetone and chaloroform ? Justify on the bassis of strenght of intermolecular interactions that develop in the solution.

Watch Video Solution

13. Explain with a graph the variation of molar conductivity of a strong electrolyte with dilution.

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14. When dilute ferrous sulphate solution is added lto an aqueous solution containing nitrate ion followed by careful addition of concentrated sulphuric acid along the sides of test tube a ,brown ring is formed at the iterface between the solution and sulphuric acid layers .Which is anion is confined by the appearance of brown ring .What the conposition of the brown ring ?

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15. How can you prepare Cl_2 from HCl and HCI from Cl_2? Write reactions only.

Watch Video Solution

16. Use the data to answer the following and also justify giving rason:

	Cr	Mn	Fe	Co
$E^0_{M^{2+}/M}$	-0.91	-1.18	-0.44	-0.28
$E^0_{M^{3+}/M^{2+}}$	-0.41	+1.57	+0.77	+1.97

(a) Which is a stronger redusing agent in aqueous medium

Cr^{2+} or Fe^{2+} and why ?

(b) Which is the most stable ion in +2 oxidartion and why ?

Watch Video Solution

17. Define with equation

(a) Riemer - Tiemann Reaction (b) Williamson's Symthesis

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18. Give the stuctures of monomers of the following polymes :

(a) Nylon -6,6 (b) Buna -s

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19. Classify the follwing as additon and condensation polymers giving rason :

(a) Teflon (b) PHBV

Watch Video Solution

20. Chromium crystallises in bcc structure .If its edge length is 300 p m , find its density .Atomic mass of chromium is 52u . $\left[N_A = 6.022 \times 10^{23} cm, M = 52_u\right.$

Watch Video Solution

21. At 300K ,36g of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bars at the same temperature, what would be its concentration?

Watch Video Solution

22. Calculate Δ, G° and $\log K_c$ for the following reation:

$Cd^{+2}(aq) + Zn^{2+}(aq) + Cd(s)$

Given : $E^0_{cd^{2+}/cd} = 0.403V$

$E^0_{Zn^{2+}/Zn} = 0.763V$

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SECTION-C

1. The decomposition of NH, on platinum surface is zero order reaction. If rate constant (k) is $4 \times 10^{-3} Ms^{-1}$, how long will it take to reduce the initial concentration of NH_3 from 0.1 M to 0.064 M.

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2. (i) What is the role of activated charcoal in gas mask ?

(ii) How does chemisorption vary with temperature?

Watch Video Solution

3. An element crystallizes in fec lattice with a cell edge of 300 pm. The density of the element is 10.8 g cm^{-3}. Calculate the number of atoms in

108 g of the element.

Watch Video Solution

4. A 4% solution (w/w) of sucrose (M 342 g mol^{-1}) in water has a freezing point of 271.15K Calculate the freezing point of 5% glucose (M= 180 g mol^{-1}) in water.

(Given: Freezing point of pure water 273.15 K)

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5. (a) Name the method of refining which is

(i) used to obtain semiconductor of high purity

(ii) used to obtain low boiling metal.

(b) Write chemical reactions taking place in the extraction of copper from Cu_2S.

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6. Give reasons for the following:

(i) Transition elements and their compounds act as catalysts

(ii) E° value for $\left(Mn^{2+} \mid Mn\right)$ is negative whereas for $\left(Cu^{2+} \mid Cu\right)$ is positive.

(iii) Actinoids show irregularities in their electronic configuration.

Watch Video Solution

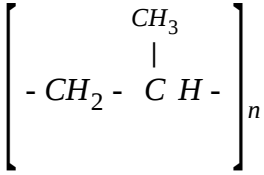
7. Write the structures of monomers used for getting the following polymers:

(i) Nylon-6,6

(ii) Glyptal

(iii) Buna-S

Watch Video Solution

8. (i)  a homopolymer or copolymer ?

(ii) What is the role of Sulphur in vulcanization of rubber?

Watch Video Solution

9. (i) What type of drug is used in sleeping pills?

(ii) What type of detergents are used in toothpastes?

(iii) Why the use of alitame as artificial sweetener is not recommended?

Watch Video Solution

10. Define the following terms with a suitable example in each:

(i) Broad-spectrum antibiotics.

(ii) Disinfectants

(iii) Cationic detergents.

Watch Video Solution

11. (i) Out of $\left(CH_3\right)_3$, C-Br and $\left(CH_3\right)_3$ C-I, which one is more reactive towards S_N1 and why?

(ii) Write the product formed when P-nitrochlorobenzene is heated with aqueous NaOH at 443K followed by acidification.

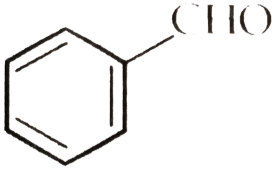
(iii) Why dextro and laevo-rotatory isomers of Butan-2-ol are difficult to separate by fractional distillation?

Watch Video Solution

12. An aromatic compound A on heating with Br, and KOH forms a compound B of molecular formula CHN which on reacting with CHCI and alcoholic KOH produces a foul smelling compound C. Write the structures and IUPAC names of compounds A, B and C.

Watch Video Solution

13. Complete the following reactions:

(i) 

(ii) $(C_6H_5CH_2)_2\,Cd + 2CH_3COCl \longrightarrow$

(iii) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-COOH \xrightarrow[(ii)\,H_2O]{(i)\,Br_2/RedP_4}$

(i)

(ii) $\left(C_6H_5CH_2\right)_2Cd + 2CH_3COC < o$

(iii) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - COOH \xrightarrow[(ii)\,H_2O]{(i)\,Br_2/RedP_4}$

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14. Write chemical equations for the following reactions:

(i) Propanone is treated with dilute $Ba(OH)_2$

(ii) Acetophenone is treated with Zn (Hg)/Conc. HCl

(iii) Benzoyl chloride is hydrogenated in presence of Pd/$BaSO_4$.

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15. Differentiate between the following:

(i) Amylose and Amylopectin.

(ii) Fibrous proteins and Globular proteins.

Watch Video Solution

16. Write chemical reaction to show that open structure of D-glucose contains the following:

(i) Straight chain

(ii) Five alcohol groups

(iii) Aldehyde as carbonyl group

Watch Video Solution

17. Chromium metal can be plated out from an acidic solution containing CrO_3 according to the following equation :

$$CrO_3(aq) + 6H^{\oplus} + 6H^{\oplus}(aq) + 6e^{-} \rightarrow Cr(s) + 3H_2O$$

a. How many grams of chromium will be plated out by $24000C$?

b. How long will take to plate out $1.5g$ of chromium by using $12.5A$ current ?

Watch Video Solution

18. Give reasons for the following :

(a) Leather gets hardened after tannig

(b) $FeCl_3$ is preferred over KCl in case of a cut leading to bleeding .

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19. What is the role of :

(i) Depressants in froth floatation ?

(b) Carbon monoxied in Mond's process ?

(c) Concentrated sodium hydroxide in leaching of alumina from bauxite ?

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20. Write chemical reactions taking place in the extraction of Aluminium from Bauxite ore .

Watch Video Solution

21. Explain the method of preparation of sodium dichromate from chromite ore . Give the equation representing oxidation of ferrous salts by dichromate ion.

Watch Video Solution

22. Complete the following reactions: $(a) MnO_2 + KOH + O_2 \rightarrow$

(b) $I^- + MnO_4^- + H^+ \rightarrow$

(c) $Cr_2O_7^{2-} + Sn^{2+} + H^+ \rightarrow$

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23. Write the hybridization and magnetic character of the following complexes:

(i) $\left[Fe\left(H_2O\right)_6\right]^{2+}$

(ii) $\left[Ni(CN)_4\right]^{2-}$

[Atomic number : Fe= 26,Ni = 28]

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24. Give reasons for the following

(a) The presence of $-NO_2$ group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution reactions .

(b) p-dichlorobenzene has higher melting point than of ortho or meta isomer .

(c) Thionyl chloride method is preferred for preparing alkyl chloride from alcohols.

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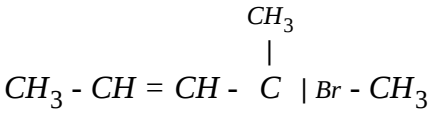
25. (i)Write equation for preparation of 1-iodobutane from 1-chlorobutane

(ii) Out of 2 - bromopentane 2- bromo-2 methylbutane and 1-bromopentane ,which compound is most reactive towards elimination and why ?

(iii) Give IUPAC name of



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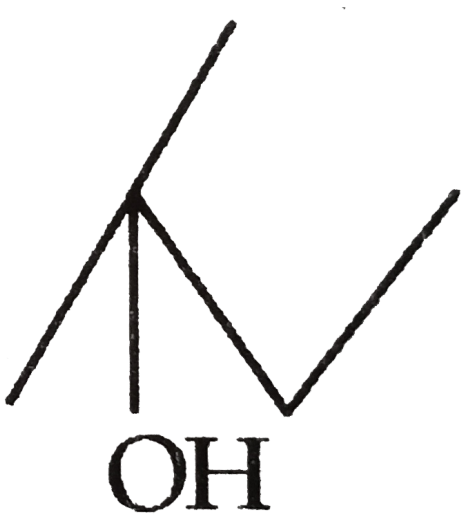
26. How will you synthesise the following alcohol from appropriate alkene:



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27. Give any one property of glucose that cannot be explained by the open chain stucture

(b) Compare amylase with amylopectin in terms of constituting stucture .

(c)Why do amino acids show amphoteric behaviour ?

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28. Define the following with suritable example of each

(a) Antiseptics

(b) Non-narocotic analgesics

(c) Cationic detegents

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SECTION-D

1. E_{cell}° for the given redox reaction is 2.71 V

$$Mg_{(s)} + Cu_{(0.01M)}^{2+} \rightarrow Mg_{(0.001M)}^{2+} + Cu_{(s)}$$

Calculate E_{cell} for the reaction. Write the direction of flow of current when an external opposite potential applied is

(i) less than 2.71 V and (ii) greater than 2.71 V.

Watch Video Solution

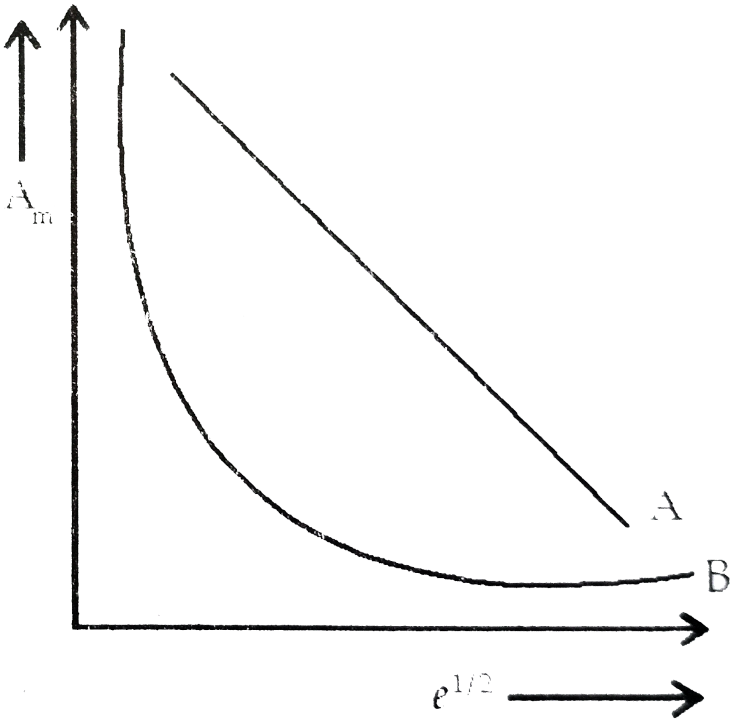
2. (a) A steady current of 2 amperes was passed through two electrolytic cells X and Y connected in series containing electrolytes $FeSO_4$ and $ZnSO_4$ until 2.8 g of Fe deposited at the cathode of cell X. How long did the current flow ? Calculate the mass of Zn deposited at the cathode of cell Y

(Molar mass : Fe= 56 g mol^{-1} Zn-65.3g mol^{-1}, 1F -96500 C mol^{-1})

(b) In the plot of molar conductivity $\left(\Lambda_m\right)$ vs Square root of concentration $\left(c^{1/2}\right)$, following curves are obtained for two electrolytes. A and B:

Answer the following : (i) Predict the nature of electrolytes A and B. (ii) What happens on extrapolation of Λ_m to concentration approaching

zero for electrolytes A and B ?



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3. (a) How do you convert the following:

(i) Phenol to Anisole (ii) Ethanol to Propan-2-ol

(b) Write mechanism of the following reaction:

$$C_2H_5Oh \xrightarrow[443K]{H_2SO_4} CH_2 = CH_2 + H_2O$$

(c) Why phenol undergoes electrophilic substitution more easily than benzene?

Watch Video Solution

4. (a)Write the reaction involved in the following:

(i) Reimer-Tiemann reaction

(ii) Friedal-Crafts Alkylation of Phenol

(b) Give simple chemical test to distinguish between Ethanol and Phenol.

Watch Video Solution

5. (a) Give reasons for the following:

(i) Sulphurin vapour state shows paramagnetic behaviour.

(ii) N-N bond is weaker than P-P bond.

(iii) Ozone is thermodynamically less stable than oxygen.

(b) Write the name of gas released when Cu is added to:

(i) dilute HNO_3 and,

(ii) conc. HNO_3

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6. Write the disproportionation reaction of H_3PO_3

Watch Video Solution

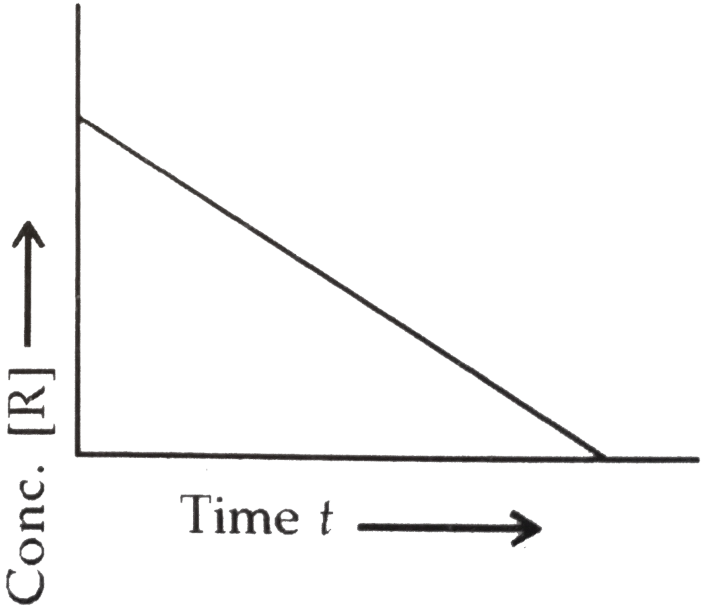
7. Consider the reaction $R \rightarrow P$ for which the change in concentration of R with time is shown by the following graph:

(i) Predict the order of reaction .

(iii) What does the slope of the curve indicate ?

(b) The rate of reaction quadruples when temperature chages from 293 K of 313 K .Calculate Ea assuming that it does not chage with time

$\left[R = 8.314 JK^{-1} mol^{-1}\right]$



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8. Draw the plot of In vs 1/T for a chemical reaction .What does the intercept represent ? What is the relation between slope and E_a ?

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9. Above 1000 K sulphur shows paramagnetism. Why?

Watch Video Solution

10. Complete the following reactions

(i) $O_2^{2-} + H_2O \rightarrow$ (ii) $O_2^{-} + H_2O \rightarrow$

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11. (a) Carry out the following conversions :

(i) pnitrotoluene to 2-bromobenzoic acid

(iii) Propanoic acid to acetic acid

(b)An alkene with molecular formula C_5H_{10} on ozonolysis gives a mixture of two compound B and C .Compound B gives positive Fehling test and also reacts with iodine and NaOH solution. Compound C does not give Fehling solution test but forms iodoform. Identify the compounds A, B and C.

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12. Carry out the following conversions :

(i) Benzoic acid to aniline .

(ii) Bromomethane to ethanol.

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CHEMISTRY (Theory) [SET - I]

1. What type of interactions hold together the molecules in a polar crystalline solid ?

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2. $2g$ each of two solutes A and B (molar mass of A is greater than that of B) are dissolved separately in $50g$ each of the same solvent. Which will show greater elevation in the boiling point?

Watch Video Solution

3. Explain the following observations :

(i) Fluorine does not exhibit any positive oxidation state.

(ii) The majority of known noble gas compounds are those of Xenon.

(iii) Phosphorus is much more reactive than nitrogen.

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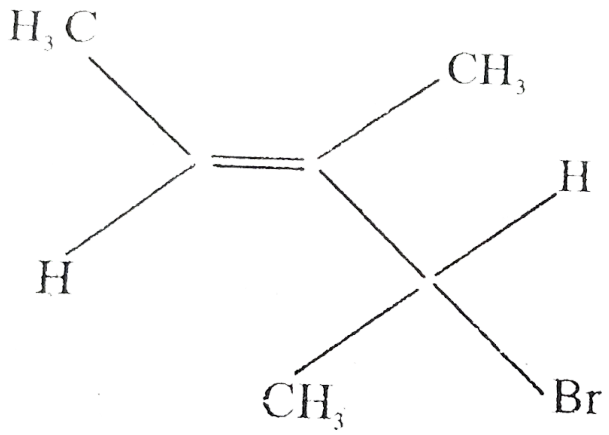
4. Give the IUPA name of the following compound :



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5. Write the structure of the molecule of compound whose IUPAC name is 1-phenylpropan - 2 - ol

Watch Video Solution

6. What is Tollen's reagent? Write one usefulness of this reagent.

Watch Video Solution

7. What are reducing and non-reducing sugars ? What is the structural feature characterising reducing sugars ? What is an invert sugar ?

Watch Video Solution

8. How can you describe the designation 6, 6, mean in the name nylon -6, 6?

Watch Video Solution

9. Define the terms, 'osmosis' and 'osmotic pressure'. What is the advantage of using osmotic pressure as compared to other colligative for the determination of molar masses of solutes in solutions?

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10. Express the relation among cell constant , resistance of the solution in the cell and conductivity of the solution . How is molar conductivity of a solution related to its conductivity ?

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11. Given that the standard electrode $\left(E^{\circ}\right)$ of metals are :

$K^{+}/K = -2.93V, Ag^{+}/Ag = 0.80V,$

$Mg^{2+}/Mg = -2.37V, Cr^{3+}/Cr = -0.74V, Hg^{2+}/Hg = 0.79V.$

Arrange these metals in an increasing order of their reducing power.

Watch Video Solution

12. Describe the following :

(i) Tyndall effect

(ii) Shape-selective catalysis

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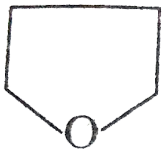
13. What is meant by coagulation of a colloidal solution? Name any method by which coagulation of lyophobic sols can be carried out.

Watch Video Solution

14. Complete the following reactions

(i) $C_2H_5OC_2H_5 + HCl \rightarrow$

(ii)  + 2HBr (excess) $\longrightarrow$

(ii) + 2HBr

(excess) →

Watch Video Solution

15. Draw the structural formulae of the following compounds :

(i) $H_4P_2O_5$

(ii) XeF_4

Watch Video Solution

16. Give the chemical tests to distinguish between the following pairs of compounds :

(i) Ethylamine and Aniline

(ii) Aniline and Benzlamine

Watch Video Solution

17. Identify A and B in each of the following processes :

(i) $CH_3CH_2 \xrightarrow{NaCN} A \xrightarrow{\text{reduction}} \underset{}{Ni/H_2}B$

(ii) $C_6H_5NH_2 \xrightarrow{NaNO_2} A \xrightarrow[OH^-]{C_6H_5NH_2} B$

Watch Video Solution

18. Draw the structures of the monomers of the following polymers:

(i) Polythene

(ii) PVC

(iii) Teflon

Watch Video Solution

19. The density of copper metal is $8.95\ g\ cm^{-3}$. If the redius of copper atom be 127.8 pm, is the copper unit cell simple cubic, body - centred or face- centred cubic ?

(Given : atomic mass of Cu = 63. 5 g/mol)

Watch Video Solution

20. What mass of $NaCl\left(\text{molar mass} = 58.5 g mol^{-1}\right)$ be dissolved in $65 g$ of water to lower the freezing point by $7.5^{\circ} C$? The freezing point depression constant K_f for water is $1.86 K kg mol^{-1}$. Assume van't Hoff factor for $NaCl$ is 1.87.

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21. Describe the role of the following :

(i) NaCN in the extraction of silver from a silver ore

(ii) Iodine in the refining of titanium

(iii) Cryolite in the metallurgy of aluminium

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22. Describe the principle involved in each of the following processes of metallurgy :

(i) Froth floatation method

(ii) Electrolytic refining of metals

(iii) Zone refining of metals

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23. Why is europium (II) more stable than cerium (II) ?

Watch Video Solution

24. Explain the mechanism of S_{N^1} and S_{N^2} reactions with examples.

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25. How would you convert Phenol to benzoquinone ?

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26. Explain the following :

(a) The electron gain enthalpy with negative sign for fluorine is less than for chlorine, still fluorine is a stronger oxidising agent than chlorine.

(b) XeF_2 is linear molecule without a bend.

(c) NCl_3 is an endothermic compound while NF_3 is an exothermic one.

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27. Anino acids may be acidic, alkaline or neutral, How does this happen? What are essential and non-essential amino acids? Name one of each type.

Watch Video Solution

28. Explain the following terms with one example in each case :

(i) Food preservatives

(ii) Enzymes

(iii) Detergents

Watch Video Solution

29. (a) Explain the following terms :

(i) Rate of a reaction

(ii) Activation energy of a reaction

(b) The decompositon of phosphine , PH3, proceeds according to the following equation :

$4PH_3(g) \rightarrow P_4(g) + 6H_2(g)$

It is found that the reaction follows the following rate equation :

Rate = k $[PH_3]$.

The half-life of PH_3 is 37.9 s at $120^\circ C$.

(i) How much time is required for $3/4^{th}$ of PH_3 to decompose ?

(ii) What fraction of the original sample of PH_3 remains behind after 1 minute ?

Watch Video Solution

30. (a) Explain the following terms :

(i) Order of a reaction

(ii) Molecularity of a reaction

(b) The rate of a reaction increases four times when the temperature changes from 300 K to 320 K. Calculate the energy of activation of the reaction, assuming that it does not change with temperature. $\left(R = 8.314 JK^{-1} mol^{-1}\right)$

Watch Video Solution

31. (a) Complete the following chemical equations:

(i) $Cr_2O_7^{2-}(aq) + H_2S(g) + H^+(aq) \rightarrow$

(ii) $Cu^{2+}(aq) + I^-(aq) \rightarrow$

(b) How would you account for the following :

(i) The oxidising power of oxoanions are in the order $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

(ii) The third ionization enthalpy of manganess (Z = 25) is exceptionally

high.

(iii) Cr^{2+} is a stronger reducing agent than Fe^{2+}.

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32. (a) Complete the following chemical equations :

(i) $MnO_4^-(aq) + S_2O_3^{2-}(aq) + H_2O(l) \rightarrow$

(ii) $Cr_2O_7^{2-}(aq) + Fe^{2+}(aq) + H^+(aq) \rightarrow$

(b) Explain the following observatons :

(i) $La^{3+}(Z = 57)$ and $Lu^{3+}(Z = 71)$ do not show any colour in solutions.

(ii) Among the divalent cations in the first series of transition elements, manganese exhibits the maximum paramagnetism.

(iii) Cu^+ ion is not known in aqueous solutions.

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33. (a) Illustrate the following name reactions giving a chemical equations in each case :

(i) Clemmensen reaction

(ii) Cannizzaro's reaction

(b) Describe how the following conversions can be brought about :

(i) Cyclohexanol to cyclohexan 1 - one

(ii) Ethylbenzene to benzoic acid

(iii) Bromobenzene to benzoic acid

Watch Video Solution

34. (a) Ilustrate the following name reactions :

(i) Hell - Volhard - Zelinsky reaction

(ii) Wolff - Kishner reduction reaction

(b) How are the following conversions carried out :

(i) Ethylcyanide to ethanoic acid

(ii) Butan - 1-ol to butanoic acid

(iii) Methylbezene to benzoic acid

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[OUTSIDE DELHI : SET - II]

1. What are the main difference of glass, made up SiO_4 tetrahedral ?

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2. Nitrogen is relatively inert as compared to phosphorus. Why ?

Watch Video Solution

3. What are monosaccharides?

Watch Video Solution

4. What is meant by 'copolymerisation' ?

Watch Video Solution

5. Define the following terms?

(i) Peptization

(ii) Reversible Sol

Watch Video Solution

6. Complete the following chemical reaction equations :

(i) $NaOH_{(\text{cold and dilute})} + Cl_2 \rightarrow$

(ii) $XeF_{6(\text{excess})} + H_2O \rightarrow$

Watch Video Solution

7. Given the chemical tests to distinguish between the following pairs of compounds :

(i) Methylamine and Dimethylamine

(ii) Aniline and N - Methylamine

Watch Video Solution

8. Draw the structures of the monomers of the following polymers :

(i) Bakelite

(ii) Nylon - 6

Watch Video Solution

9. The composition of a sample of Wustite is $Fe_{0.93}O_{1.00}$. What percentage of the iron is present in the form of $Fe(III)$?

Watch Video Solution

10. What mass of ethlene ethyelne glycol $\left(\text{molar mass} = 62 g mol^{-1}\right)$ must be dissolved in 5.5kg of water to lower the freezing point of from $0^{\circ} C \rightarrow -10^{\circ} C$? $\left(K_f\right)$ for water=1.86 K kg mol^{-1}).

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11. What are analgesic drugs ? How are they classified and when are they usually recommended for use ?

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[OUTSIDE DELHI : SET - III]

1. Write a distinguishing feature of metallic solids.

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2. Mole Fraction

Watch Video Solution

3. What are the hydrolysis products of sucrose ?

Watch Video Solution

4. Silver crystallizes in fcc lattic. If the edge length of the cell is $4.07 \times 10^{-8} cm$ and density is $10.5 g cm^{-3}$. Calculate the atomic mass of silver.

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5. $15.0 g$ of an unknown molecular material was dissolved in $450 g$ of water. The resulting solution was found to freeze at $-0.34^{\circ} C$. What is the the molar mass of this material. (K_f for water $= 1.86 K kg mol^{-1}$)

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6. How would you account for the following :

(i) The electron gain enthalpy with negative sign is less for oxygen than that for sulphur.

(ii) Phosphorus shows greater tandency for catenation than nitrogen.

(iii) Fluorine never acts as the central atom in polyatomic interhalogen compounds.

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7. Write the name, the state of hybridization, the shape and the magnetic behaviour of the following complexes :

$[CoCl_4]^{2-}, [Ni(CN_4]^{2-}, [Cr(H_2O)_2(C_2O_4)_2]^-$

(At.No. : $Co = 27, Ni = 28, Cr = 24$)

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8. Differentiate between fibrous proteins and globular proteins. What is meant by the denaturation of a protein ?

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9. Why detergents are better cleansing agents than soaps ? Explain.

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[OUTSIDE DELHI : SET -II]

1. Which point defect in crystals of a solid decreases the density of the solid?

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2. What is the primary structural feature necessary for a molecule to make it useful in a condensation polymerization reaction ?

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3. Iron has body centred cubic cell with a cell edge of 286.5 pm. The density of iron is 7.87 g cm^{-3}. Use this information to calculate Avogadro's number. (Atomic mass of Fe = 56 mol^{-3})

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4. For a decomposition reaction the values of rate constant k at two different temperatures are given below :

$K_1 = 2.15 \times 10^{-8} L mol^{-1} s^{-1} at\ 650K$

$K_2 = 2.39 \times 10^{-7} L mol^{-1} s^{-1} at\ 700K$

Calclate the value of activation energy for this reaction.

$\left(R = 8.314 JK^{-1} mol^{-1}\right)$

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5. Complete the following reaction equations :

(i) $C_6H_5N_2Cl + CH_3COCl \rightarrow$

(ii) $C_2H_5NH_2 + C_6SO_2Cl \rightarrow$

(iii) $C_2H_5NH_2 + HNO_2 \rightarrow$

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6. (a) Give chemical tests to distinguish between compounds in the following pairs of substances ,

(i) Ethanal and Propanal

(ii) Benzoic acid and Ethyl benzoate

(b) An organic compound contains $69.77\,\%$ carbon , $11.63\,\%$ hydrogen and rest oxygen . The molecular mass of the compound is 86. It does not reduce Tollen 's reagent but forms an addition compound with sodium hydrogen sulphite and gives positive iodoform test. On vigorous oxidation, it gives ethanoic and propanoic acids . Derive the structure of the compound.

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7. (a) Arrange the following in an increasing order of their indicated property.

(i) Benzoic acid ,4- Nitrobenzoc acid ,3,4 - Dinitrobenzoic acid, 4-Methoxybenzoic acid (acid strength)

(ii) $CH_3CH_2CH(Br)COOH, CH_3CH(Br)CH_2COOH,$

$\left(CH_3\right)_2CHCOOH, CH_3CH_2CH_2COOH$ (acid strength)

(b) How would you bring about the following conversions :

(i) Propanone to propene

(ii) Benzoic acid to Benzaldehyde

(iii) Bromobenzene to 1- phenylethanol

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8. Write down the electronic configuration of: ltBrgt (i) Cr^{3+}

(ii) Pm^{3+}

(iii)Cu^{+}

(iv) Ce^{4+}

Co^{2+}

(vi) Lu^{2+}

(vii) Mn^{2+}

(viii) Th^{4+}

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9. (a) Draw the structure of the following :

(i) N_2O_5

(ii) $XeOF_4$

(b) Explain the following observations :

(i) The electron gain enthalpy of sulphur atom has a greater negative value than that of oxygen atom.

(ii) Nitrogen does not form pentahalides.

(iii) In an aqueous solution, HI is a stronger acid than HCl.

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[OUTSIDE DELHI : SET -III]

1. How many atoms constitute one unit cell of a face-centred cubic crystal?

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2. Describe the role of the following :

(i) NaCN in the extraction of silver ore.

(ii) Cryolite in the extraction of aluminium from pure alumina.

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3. Define' activation energy of a reaction.

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4. Find the main difference between then :

(i) Thermoplastic polymers

(ii) Thermosetting polymer

Watch Video Solution

5. A voltaic cell is set up at $25^{\circ}C$ with the following half cells :

Al^{3+} (0.001 M) and Ni^{2+} (0.50 M)

Write the equation for the reaction when the cell generates the electric current. Also determine the cell potential (Given $E^{\circ}_{Ni^{2+}/Ni} = -0.25V, E^{\circ}_{Al^{3+}/Al} = -1.66V$).

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6. Explain the following :

(i) Low spin octahedral complexes of nickel are not known.

(ii) The π - complexes are known for transition elememts only.

(iii) CO is a stroger ligand than NH_3 for many metals.

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7. Compare the following complexes with respect to structural shapes of units , magnetic behaviour and hybrid orbitals involved in units

(i) $\left[Ni(CN)_4\right]^{2-}$

(ii) $\left[NiCl_4\right]^{2-}$

(iii) [At . Nos .: Ni =28 , Co =27]

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8. What are the following substances " Given one example of each of them.

(i) Cationic detergents

(ii) Enzymes

(iii) Sweetening agents

Watch Video Solution

9. (a) Draw the structures of the following :

(i) XeF_4

(ii) $H_2S_2O_7$

(iii) SO_3^{2-}

(b) Explain the following observations :

(i) Phosphorous has a greater tendency for catenation than nitrogen.

(ii) The negative value of electron gain enthalpy is less for fluorine than that for chlorine.

(iii) Hydrogen fluoride has a much higher boiling point than hydrogen chloride.

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10. (a) Draw the structures of the following :

(i) PCl_5(s)

(ii) SO_3^{2-}

Explain the following observations :

(i) Ammonia has a higher boiling point than phosphin.

(ii) Helium does not form any chemical compound.

(iii) Bi (V) is a stronger oxidising agent than Sb (V).

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SET-1

1. Define rate constant (k) ?

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2. Why is Tyndall effect shown by colloidal solutions ?

Watch Video Solution

3. Write the IUPAC name of the following coordination compound $\left[NiCl_4\right]^{2-}$.

Watch Video Solution

4. Out of CH_3OH and ` phenol (##SB_CHM_XII_OD_I_2016_E01_004_Q01.png" width="80%">, which one is more acidic ?

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5. What are Associated Colloids ? Given an example.

Watch Video Solution

6. Explain the following terms with subitable examples :

(i) Frenkel defect (ii) F-centres

Watch Video Solution

7. Define osmotic pressure of a solution. How is the osmotic pressure orelated to the concentration of a solute in a solution ?

Watch Video Solution

8. What happens when

(i) Concentrated H_2SO_4 is added to calcium fluoride.

(ii) SO_3 is passed through water ?

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9. Given reasons :

(i) Zn is not regarded as a transition element.

(ii) Cr^{2+} is a strong reducing agent.

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10. Write the equations for the preparation of 1-bromobutane from :

(i)1-butanol (ii)but -1-ene

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11. Which compound in the following pairs will react faster in S_N^2 reaction?

(a). CH_3Br or CH_3I

(b). $\left(CH_3\right)_3CCl$ or CH_3Cl

Watch Video Solution

12. Silver crystalilises in a fcc lattice. The edge length of its unit is $4.077 \times 10^{-8} \times cm$ and its density is $10.5 gcm^{-3}$. Claculate on this basis the atomic mass of silver $\left(N_A = 6.02 \times 10^{23} \text{mol}^{-1}\right)$

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13. An aqueous solution of 2 per cent $(wt./wt)$ non-volatile solute exerts a pressure of 1.004 bar at the boiling point of the solvent. What is the molecular mass of the solute?

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14. The rates of most reaction double when their temperature is raised from $298K$ to $308K$. Calculate their activation energy.

Watch Video Solution

15. Explain the following terms :

(*i*)Peptization (*ii*)Loyphobic colloids (*iii*)Dialysis

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16. Outline the principles of refining of metals by the following methods :

(a) Electrolytic refining

(b) Zone refining

(c) Vapour phase refining.

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17. Describe the preparation of potassium permanganate. How does the acidified permanganate solution react with oxalic acid? Write the ionic equation for the reaction.

OR

Describe the oxidising action of potassium dischromate and write the ionic equations for its reaction with (i) an iodide (ii) H_2S.

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18. What is lanthanoid contraction? What are the consequences of lanthanold contraction?

Watch Video Solution

19. Writen the hybridization, shape and magnetic character of $\left[Fe(CN)_6\right]^{4-}$

Watch Video Solution

20. What happpens when :

(i) CH_3 - CI is treated with aqueous KOH?

(ii) CH_3 - CI is treated with KCN ?

(iii) CH_3 - Br is treated with Mg in the presence of dry ether ?

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Outside Delhi: Set-II

1. What is meant by 'antiferro-magnetism'?

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2. Define dialysis.

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3. What is the role of CO_2 in the extractive metallurgy of aluminium from its ore ?

Watch Video Solution

4. Why is nitrogen gas very unreactive ?

Watch Video Solution

5. Definie conductivity and molar conductivity for the solution of an electrolyte. Discuss their variation with concentration.

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6. Define each of the following :

(i) Specific rate of a reaction.

(ii) Energy of activition of a reaction

Watch Video Solution

7. Complete the following chemical reaction equations :

(i) $KClO_3 \xrightarrow[MnO_2]{\text{Heat}}$

(ii) $XeF_4 + H_2O \rightarrow$

Watch Video Solution

8. Write the structure of the following organic halogen compounds :

(i) 4-tert-Butyl-3-iodoheptane

(ii) 4-Bromo-3-methylpent-2-ene

Watch Video Solution

9. Assign reasons for the following :

(i) Cu(I) ion is not known to exist in aqueous solutions.

(ii) Transition metals are much harder than the alkali metals.

(iii) From element to element, actinoid contraction is greater than the lanthanoid contraction.

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10. Giving one example in each of the following cases, discuss briefly the role of coordination compounds in

(i) extraction metallurgy of metals

(ii) analytical chemistry

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11. Answer the following questions :

(i) Why should medicines not be taken without consulting a doctor ?

(ii) What is meant by 'broad spectrum antibiotics' ?

(iii) What are the main constituents of Dettol ?

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Outside Delhi Board: Set-III

1. Write a distinguishing feature of a metallic solid compared to an ionic solid.

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2. What are enzymes ?

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3. Name the chief ores of aluminium and zinc.

Watch Video Solution

4. A reaction is of second order with respect to its reactant. How will its reaction rate be affected if the concentration of the reactant is (i) doubled (ii) reduced to half ?

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5. Complete the following chemical equations :

(i) $P_4 + SOCl_2 \rightarrow$

(ii) $F_2(\text{Excess}) + Cl_2 \xrightarrow{300^\circ C}$

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6. Assign reasons for the following :

(i) Transition metals and many fo their compounds act as good catalyst.

(ii) Transition metals generally from coloured compounds.

Watch Video Solution

7. Write the structure of the following organic halogen compounds:

(i) p-Bromochlorobenzene

(ii) 1-Chloro-4-ethylcyclohexane

Watch Video Solution

8. Write down the IUPAC names of the following complexes and also give stereochemistry and magnetic moment of the complexes :

(i) $\left[Co\left(NH_3\right)_5Cl\right]Cl_2$

(ii) $\left[CrCl_3(py)_3\right]$

(iii) $k_4\left[Mn(CN)_6\right]$

(At. Nos. Cr=24, Mn=25, Co=27, py=pyridine)

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9. How are the following conversions carried out ?

i. Propene → Propan-2-ol

ii. Benzyl chloride → Benzyl alcohol

iii. Ethyl magnesium chloride → Propan-1-ol

iv. Methyl magnesium bromide → 2-Methylpropan-2-ol

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10. Answer the following :

(i) Why is the use of aspartame limited to cold foods and drinks ?

(ii) How do antiseptics differ from disinfectants ?

(iii) Why do soaps not work in hard water ?

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QUESTION PAPER (SECTION-A)

1. ZnO crystal on heating acquires the formula $Zn_{1+x}O$. Give reason.

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2. There is an increase in conductivity when Silicon is doped with Phosphorous. Give reason.

Watch Video Solution

3. Based on the type of dispersed phase, what type of colloids are micelles ?

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4. On the basis of crystal field theory. Write the electronic confirguration of d^6 in terms of t_{2g} and e_g in an octahedral field when $D_0 < P$.

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5. Low spin configuration are rarely observed in tetrahedral coordination entity formation. Explain.

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6. Write the name of the biodegradable polymer used in orthopaedic devices.

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QUESTION PAPER (SECTION-B)

1. Calculate the freezing point of a solution containing 8.1 g of HBr in 100g of water, assuming the acid to be 90% ionized. [Given : Molar mass Br = 80 g/mol, K_f water = 1.86 K kg/mol].

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2. Calculate the molarity of a solution of ethanol in water, in which the mole fraction of ethanol is 0.040 (assume the density of water to be one).

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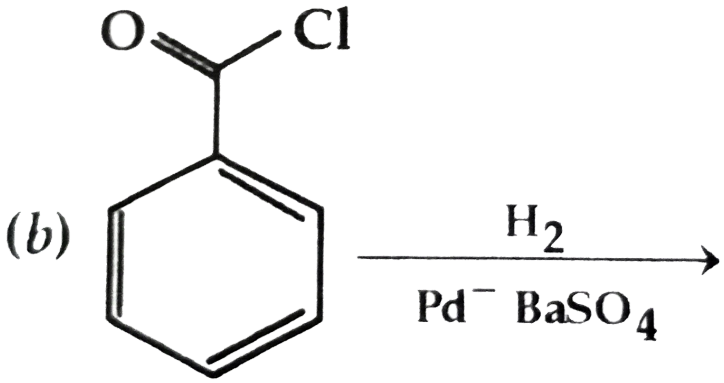
3. Identify the reaction and write the IUPAC name of the product formed :

(a) $CH_3 - CH_2 - COOH \xrightarrow{(i)\, Br_2 / \text{Red phosphorous}}$

(b)



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4. Write the structures of the cross-aldol products between ethanal and propanal.

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5. What is the role of tertiary-butyl peroxide in the polymerisation alkene ?

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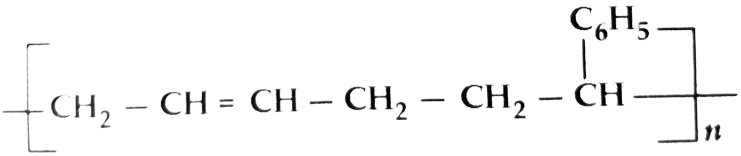
6. Write the structures of the monomers of the following polymers :



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7. Write the mechanism of hydration of ethene to yield ethanol.

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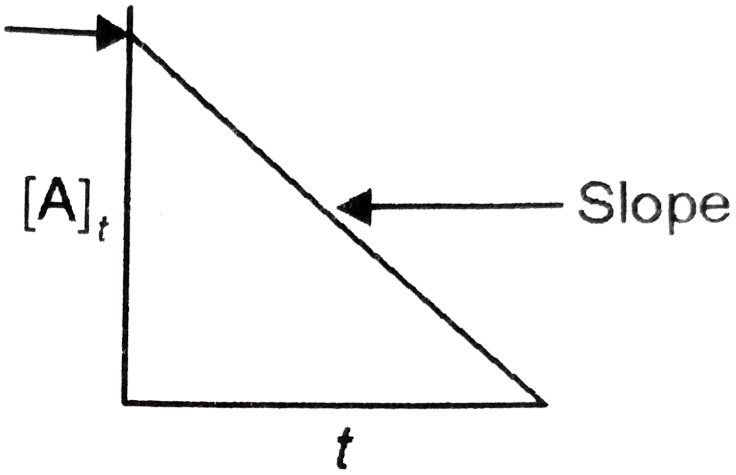

8.

For a certain chemical reaction variation in concentration [A] vs. time (s) plot is given below :

(i) Predict the order of the given reaction ?

(ii) What does the slope of the time and intercept indicate ?

(iii) What is the unit of rate constant k?

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9. Draw the molecular structures of the following :

(a) Noble gas species which is isostructural with BrO_3^-

(b) Dibasic oxoacid of phosphorus

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10. (i) On the basis of the standard electrode potential values stated for acid solutions, predict whether Ti^{4+} species may be used to oxidise Fe(II) to Fe(III)

$Ti^{4+} + e^- \rightarrow Ti^{3+} \quad E^\circ = +0.01V$

$Fe^{3+} + e^- \rightarrow Fe^{2+} \quad E^\circ = +0.77V$

(ii) Based on the data arrange Fe^{3+}, Mn^{2+} and Cr^{2+} in the increasing order of stability of +2 oxidation state. (Give a brief reason)

$E^\circ_{Cr^{3+}/Cr^{2+}} = -0.4V$

$E^\circ_{Mn^{3+}/Mn^{2+}} = +1.5V$

$E^\circ_{Fe^{3+}/Fe^{2+}} = +0.8V$

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QUESTION PAPER (SECTION-C)

1. Niobium crystallises in body-centred cubic structure. If the atomic radius is 143.1 pm, calculate the density of Niobium. (Atomic mass = 93u).

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2. Give reasons for the following :

(a) When 2g of benzoic acid is dissolved in 25 g of benzene, the experimentally determined molar mass is always greater than the true value.

(b) Mixture of ethanol and acetone shows positive deviation from Raoult's Law.

(c) The preservation of fruits by adding concentrated sugar solution protects against bacterial action.

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3. An alcohol [A] with molecules formula $\left(C_4H_{10}O\right)$ o oxidation with aciddified potassium dichromate gives acid [B] $\left(C_4H_8O_2\right)$. Compound [A] when dehydrated with conc. H_2SO_4 at $443K$ gives compound [C]. Treatment of [C] with aqueous H_2SO_4 gives compound [D] $\left(C_4H_{10}O\right)$ which is an isomer of [A]. compound [D] is resistant to oxidation but

compound [A]can be easily oxidised. Identify [A], [B], [C] and [D]. Name the type of isomerism exhibited by [A] and [D].

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4. Which one of the following compounds will undergo hydrolysis at a faster rate by SN1 mechanism? Justify.

or $CH_3CH_2CH_2Cl$

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5. A compound is formed by the substitution of two chlorine atoms for two hydrogen atoms in propane. Write the structures of the isomers possible.

Give the IUPAC name of the isomer which can exhibit enantiomerism.

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6. Give reasons for the following :

(i) Use of aspartame as an artificial sweetener is limited to cold foods.

(ii) Metal hydroxides are better alternatives than sodiumk hydrogen carbonate for treatment of acidity.

(iii) Aspirin is used in prevention of heart attacks.

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7. (a) Name the branched chain component of starch.

(b) Ribose in RNA and deoxyribose in DNA differ in the strucute around which carbon atom ?

(c) How many peptide linkages are present in a tripeptide ?

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8. Give three reactions of glucose which cannot be explained by its open chain structure.

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9. The following data were obtained during the first order thermal decomposition of N_2O_5 (g) at constant volume :

$2N_2O_5(g) \rightarrow 2N_2O_4(g) + O_2(g)$

S.No.	Time/s	Total Pressure/(atm)
1	0	0.5
2	100	0.512

Calculate the rate constant.

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10. Two reactions of the same order have equal pre exponential factors but their activation energies differ by 24.9kJ mol^{-1}. Calculate the ratio between the rate constants of these reactions at $27\,^{\circ}C$. (Gas constant R = 8.314 J $K^{-1}\text{mol}^{-1}$)

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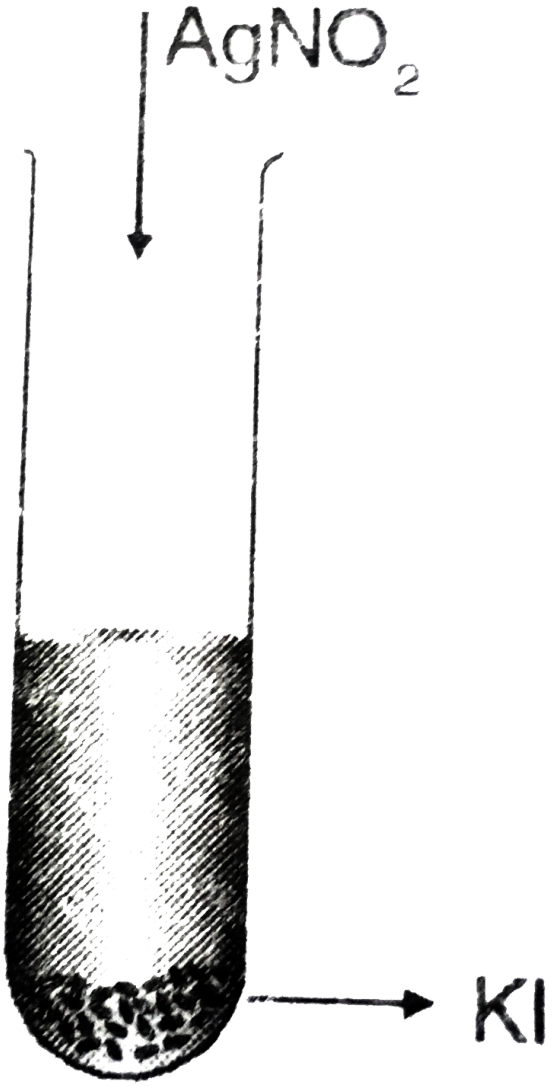
11. (a) A colloidal sol is prepared by the given method in figure. What is the charge of AgI colloidal particles in the test tube ? How is the sol formed, represented?



(b) Explain how the phenomenon of adsorption finds application in Heterogeneous

catalysis.

(c) Which of the following electroytes is the most effective for the coagulation of $Fe(OH)_3$ sol which is a positively charged sol?

$NaCI, Na_2SO_4, Na_3PO_4$

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12. Describe how the following steps can be carried out?

(a) Recovery of Gold from leached gold metal complex.

(b) Conversion of Zirconium iodide to pure Zirconium.

(c) Formation of slag in the extraction of copper.

(Write the chemical equations also for the reactions involved)

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13. Explain the use of the following : (a) NaCN in Froth Floatation Method.

(b) Carbon monoxide in Mond process.

(c) Coke in the extraction of Zinc from Zinc Oxide

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14. Explain the following :

(a) Out of Sc^{3+}, Co^{2+} and Cr^{3+} ions, only Sc^{3+} is colourless in aqueous solutions. (Atomic no.: Co =27, Sc = 21 and Cr =24)

(b) The $E^{\circ} Cu^{2+}/Cu$ for copper metal is positive (+0.34), unlike the remaining members of the first transition series.

(c) $La(OH)_3$ is more basic than Lu $(OH)_3$.

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15. A metal complex having composition $Cr\left(NH_3\right)_4 CI_2 Br$ has been isolated in two forms A and B. The form A reacts with $AgNO_3$ to give a white precipitate readily soluble in dilute aqueous ammonia whereas B gives a pale yellow precipitate soluble in concentrated ammonia.

(i) Write the formulae of isomers A and B.

(ii) State the hybridisation of chromium in each of them.

(iii) Calculate the magnetic moment (spin only) of the isomer A.

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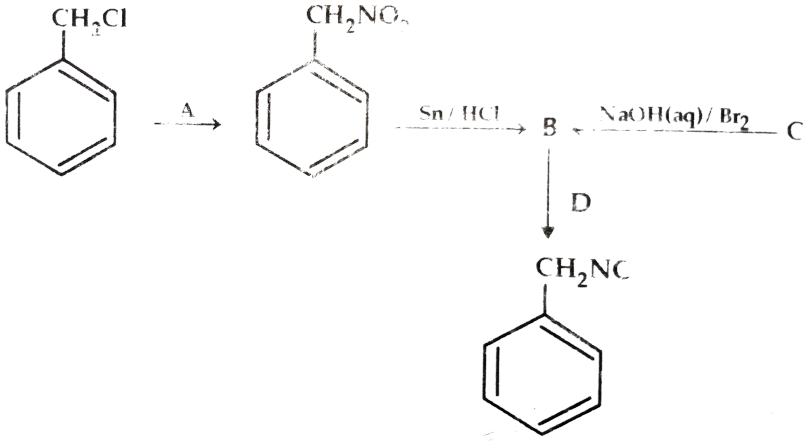
16. (a) Identify A-D

(b) Distinguish between the following pair of compounds :

(i) Aniline and Benzylamine.



(ii) Methylamine and Dimethylamine

(c) Complete the following :

$$CH_3CH_2CN \xrightarrow{LiAlH_4} A \xrightarrow{0^\circ C / HNO_2} B$$

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17. (a) Account for the following :

(i) Direct nitration of aniline yields significant amount of meta derivative.

(ii) Primary aromatic cannot be prepared by Gabriel phthalimide synthesis.

(b) Carry out the following conversions :

(i) Ethanoic acid into methanamine.

(ii) Aniline to p-Bromoniline.

(c) Arrange the following in increasing order of basic strength :

Aniline, p-nitroaniline and p-toludine.

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18. (a) A cell is prepared by dipping a zinc rod in 1M zinc sulphate solution and a silver electrode in 1M silver nitrate solution. The standard electrode potential given :

$E^{\circ} Zn_{2+1/Zn} = -0.76V, E^{\circ} A_{g+/}A_{g} = +0.80V$

What is the effect of increase in concentration of Zn^{2+} on the E_{cell} ?

(b) Write the products of electrolysis of aqueous solution of NaCI with

platinum electrodes.

(c) Calculate e.m.f. of the following cell at 298 K:

$Ni(s)/Ni^{2+}(0.01M)//Cu^{2+}(0.1M)/Cu(s)$

$\left[\text{Given} E^{\circ}_{Ni2+/Ni} = -0.025V E^{\circ}_{Cu2+/Cu} = +0.34V\right]$

Write the overall cell reaction.

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19. (a) Apply Kohlrausch law of independent migration of ions, write the expression to determine the limiting molar conductivity of calcium chloride.

(b) Given are the conductivity and molar conductivity of NaCI solutions at 298 K at different concentrations :

Concentration M	Conductivity Scm^{-1}	Molar conductivity $Scm^2\ mol^{-1}$
0.100	106.74×10^{-4}	106.7
0.05	55.53×10^{-4}	111.1
0.02	23.15×10^{-4}	115.8

Compare the variation of conductivity and molar conductivity of NaCI solutions on dilution. Give reason.

(c) 0.1 M KCI solution offered a resistance of 100 ohms in conductivity cell

at 298 K. If the cell constant of the cell is $1.29 cm^{-1}$, calculate the molar conductivity of KCI solution.

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20. (a) Account for the following observations :

(i) SF_4 is easily hydrolysed whereas SF_6 is not easily hydrolysed.

(ii) Chlorine water is a powerful bleaching agent.

(iii) Bi (V) is a stronger oxidising agent than Sb(V)

(b) What happens when :

(i) White phosphorus is heated with concentrated NaOH solution in an inert atmosphere of CO_2.

(ii) XeF_6 undergoes partial hydrolysis.

(Give the chemical equations involved).

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21. (a) What inspired N.Bartlett for carrying out reaction between Xe and PtF_6 ?

(b) Arrange the following in the order of property indicated against each set :

(i) F_2, I_2, Br_2, CI_2 (increasing bond dissociation enthalpy)

(ii) $NH_3, AsH_3, SbH_3, BiH_3, PH_3$ (decreasing base strength)

(c) Complete the following equations :

(i) $CI_2 + NaOH(\text{cold and dilute}) \rightarrow$

(ii) $Fe^{3+} + SO_2 + H_2O \rightarrow$

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SET- I

1. 'Crystalline solids-are anisotropic in nature.' What does this statement mean?

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2. Express the relation between.conductivity and molar conductivity of a solution.

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3. Draw the structure of XeF_2

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4. Write the IUP AC name of the following compound :

$\left(CH_3\right)_3CCH_2Br$

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5. Draw the structure of the compound :

3-methyl-2-butanol

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6. Arrange the following compounds in an increasing order of their solubility in water:

$C\text{-}6H_5NH_2\left(C_2H_5\right)_2NH, C_2H_5NH_2$

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7. Stereochemistry Of Polymers

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8. The chemistry of corrosion of iron is essentially an electrochemical phenomenon. Explain the reactio:rs occurring during the corrosion of iron in the atmosphere.

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9. Determine the values of equilibrium constant $\left(K_C\right)$ and ΔG^o for the following reaction :

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10. Distinguish between 'rate expression' and 'rate constant' of a reaction.

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11. Give reason for :

(i) SF_6 is kinetically an inert substance.

(ii) The N - O bond in $N0_2^-$ is shorter than the N - O bond in NO_3^- .

Watch Video Solution

12. State reasons for each of the following :

(i) All the P-Cl bonds in PCl_5 molecule are not equivalent.

(ii) Sulphur has greater tendency for catenation than oxygen.

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13. Assign reasons for the following :

(i) Copper (I) ion is not known in aqueous solution.

(ii) Actinoids exhibit greater range of oxidation states than lanthanoids.

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14. Explain the following giving one example for each :

(i) Reimer-Tiemann reaction.

(ii) Friedel Craft's acetylation of anisole.

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15. How would you obtain

(i). Picric acid (2, 4, 6-trinitrophenol) from phenol,

(ii) 2-Methylpropene from 2-methylpropanol?

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16. What is essentially the difference between α-form of glucose and β-form of glucose? Explain.

Watch Video Solution

17. Describe what do you understand by the primary and secondary structures of proteins.

Watch Video Solution

18. Arrange the following polymers in increasing order of their intermolecular forces :

(i) Nylon 6 6, Buna-S, Polythene.

(ii) Nylon 6, Neoprene, Polyvinyl chloride.

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19. Silver crystallizes in face-centred cubic unit cell. Each side of this unit cell has a length of 400 pm. Calculate the radius of the silver atom. (Assume the atoms touch each other on the diagonal across the face of the unit cell. That is each face atom is touching the four corner atoms).

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20. Nitrogen pentoxide decomposes according to equation :

$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$

This first order reaction was allowed to proceed at $40C$ and the data below were collected:

$[N_2O_5]$ (M)	Time (min)
0.400	0.00
0.289	20.0
0.209	40.0
0.151	60.0
0.109	80.0

(a) Calculate the rate constant. Include units with your answer.

(b) What will be the concentration of N_2O_5 after 100 minutes

(c) Calculate the initial rate of reaction.

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21. Explain clearly how the phenomenon of adsorption finds applications in

(i) production of vacuum in a vessel

(ii) heterogeneous cataysis

(iii) Froth floatation process in metallurgy

Watch Video Solution

22. What are the different types of RNA found in the cell?

Watch Video Solution

23. Describe the principle behind each of the following processes :

(i) Vapour phase refining of a metal.

(ii) Electrolytic refining of a metal.

(iii) Recovery of silver after silver ore was leached with NaCN.

Watch Video Solution

24. Complete the following chemical equations:

(i) $Na_2CrO_4 + H_2SO_4 \rightarrow$

(ii) $MnO_2 + KOH + O_2 \rightarrow$

(iii) $HgCl_2 + SnCl_2 \rightarrow$

Watch Video Solution

25. Write the name, the structure and the magnetic behaviour of each one of the following complexes :

(i) $\left[Pt\left(NH_3\right)_2Cl\left(NO_2\right)\right]$

(ii) $\left[Co\left(NH_3\right)_4Cl_2\right]Cl$

(iii) $Ni(CO)_4$ (Atomic nos, $Co = 27, Ni = 28, Pt = 78$)

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26. Answer the following:

(i) Haloalkanes easily dissolve in organic solvents, why?

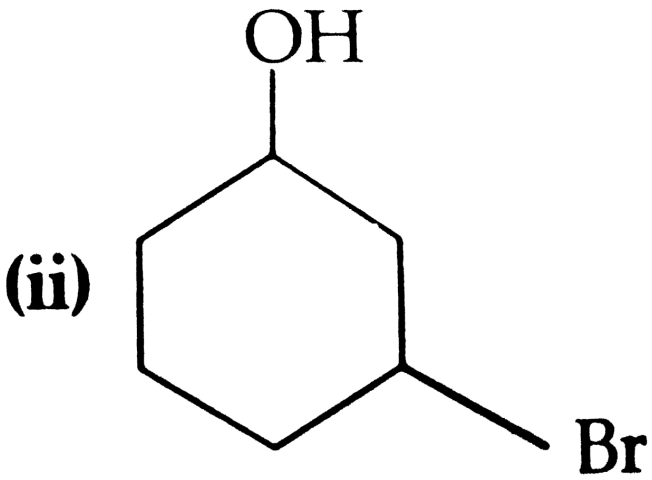
(ii) What is known as a racemic mixture ? Give an example.

(iii) Of the two bromoderivatives, $C_6H_5CH\left(CH_3\right)Br$ and $C_6H_5CH\left(C_6H_5\right)Br$, which one is more reactive in S_{n^1} substitution reaction and why?

Watch Video Solution

27. Name the following compounds according to IUPAC system.

(i) CH_3 - CH | CH_3 - CH_2 - C | OHH - CH_3



(ii)

(iii) CH - CCH_3 = C | Br - CH_2 - OH

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28. Describe the foJlowing giving one example for each :

(i) Detergents

(ii) Food preservatives

(iii) Antacids

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29. (a) Differentiate between molarity and molality for a solution. How does a change in temperature influence their values ?

(b) Calculate the freezing point of an aqueous solution containing $10.50g$ of $MgBr_2$ in $200g$ of water. (Molar mass of $MgBr_2 = 184g$) (K_f for waer $= 1.86Kkgmol^{-1}$)

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30. (a) Define the terms osmosis and osmotic pressure. Is the osmotic pressure of a solution a colligative property? Explain.

(b) Calculate the boiling point of a solution prepared by adding $15.00g$ of $NaCl$ to $250.0g$ of water. (K_b for water $= 0.512Kkgmol^{-1}$, Molar mass of $NaCl = 58.44g$)

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31. A translucent white waxy solid (A) on heating in an inert atomosphere is converted to its allotropic form (B). The solid (A) on reaction with very

dilute aqueous KOH liberates a highly poisonous gas (C) having rotten fish smell. With excess of chlorine, (A) forms (D) which hydrolyses to compound (E). Identify compounds (A) to (E).

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32. (a) What is meant by unidentate, bidentate and ambidentate ligands? Give two examples for each.

(b) Calculate the overall complex dissociation equilibrium constant for the $Cu\left(NH_3\right)_4^{2+}$ ion, given that $\beta 4$ for this complex is 2.1×10^{13}.

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33. (a) Explain the following :

(i) NF_3 is an exothermic compound whereas NCl_3 is not

(ii) F_2 is most reactive of all the four common halogens.

(b) Complete the following chemical equations :

(i) $C + H_2SO_4(conc) \rightarrow$

(ii) $P_4 + NaOH + H_2O \rightarrow$

(iii) $Cl_2 + F_{2\text{excess}} \rightarrow$

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34. (a)Account for the following :

(i)The acidic strength decreases in the order $HCl > H_2S > PH_3$

(ii)Tendency to form pentahalides decreases down the group in group 15 of the periodic table.

(b)Complete the following chemical equations. :

(i)$P_4 + SO_2Cl_2 \rightarrow$

(ii)$XeF_2 + H_2O \rightarrow$

(iii)$I_2 + HNO_{3\,(\text{conc})} \rightarrow$

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SET- II

1. Which stoichiometric defect in crystals increses the density a solid?

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2. Suggest a list of metals that are extracted electrolytically.

Watch Video Solution

3. Draw the structure of XeF_4 molecule.

Watch Video Solution

4. Explain what is meant by (i) a peptide linkage, (ii) a glycosidic linkage.

Watch Video Solution

5. Name the bases present in RNA. Which one these is not present in DNA ?

Watch Video Solution

6. Explain the role of each of the following in the extraction of metals from their ores :

(i) CO in the extraction of nickel.

(ii) Zinc in the extraction of silver.

(iii) Silica in the extraction of copper.

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7. For the complex $\left[Fe(en)_2Cl_2\right]Cl$, identify the following:

(i) Oxidation number of iron.

(ii) Hybrid orbitals and shape of the complex.

(iii) Magnetic behaviour of the complex.

(iv) Number of its geometrical isomers.

(v) whether there may be optical isomer also.

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8. Explain the following terms with one suitable example for each :

(i) A sweetening agent for diabetic patients

(ii) Enzymes

(iii) Analgesics

Watch Video Solution

9. What weight of the non-volatile urea (NH_2 - CO - NH_2) needs to be dissolved in 100g of water in order to decrease the vapour pressure of water by 25%? What will be molality of the solution?

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10. (a) Differentiate between molarity and molality in a solution. What is the effect of temperature change on molarity and molality in a solution? . (b) What would be the molar mass of a compound if 6.21 g of it dissolved in 24.0g of chloroform from a solution tharhas a boiling point of $68.04^\circ C$. The boiling point of pure chloroform is $61.7^\circ C$ and the boiling point elevation constant, K_b for chloroform is $3.63^\circ C/m$.

Watch Video Solution

SET- III

1. What is negative deviation?

Watch Video Solution

2. Deaw the structure of BrF_3 molecule.

Watch Video Solution

3. What do '6, 6' indicate in the nylon-6, 6 ?

Watch Video Solution

4. (a) What type of a cell is the lead storage battery ? Write the anode and the cathode reactions and the overall reaction reaction occuring in a lead storage battery while operating .

(b) A voltaic cell is set up at $25^{\circ}C$ with the half-cells , $Al \mid Al^{3+}(0.001M)$ and $Ni \mid Ni^{2+}(0.50M)$. Write the equation for the reaction that occurs when the cell generates an elastric current and determine the cell potential.

(Given : $E^{\circ}_{Ni^{2+} \mid Ni} = -0.25V, E^{\circ}_{Al^{3+} \mid Al} = -1.66V$).

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5. Two half-reactions of an electrochemical cell are given below:

$MnO_4^-(aq) + 8H^+(aq) + 5e^- \rightarrow Mn^{2+}(aq) + 4H_2O(l), E^{\Theta} = +1.51V$

$Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + 2e^-, E^{\Theta} = 0.15V$

Construct the redox reaction equation from the two half reactions and calculate the cell potential from the standard potentials and predict if the reaction is reactant or product favoured.

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6. Assign reasons for each of the following :

(i) Transiti9n metals generally form coloured compounds.

(ii) Manganese exhibits the highest oxidation state of+ 7 among the 3d series of transition elements.

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7. Name the sub-groups into which polymers are classified on the basis of magnitude of intermolecular forces.

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8. The density of lead is $11.35 gcm^{-3}$ and the metal crystallizes with fee unit cell. Estimate the radius of lead atom. (At. Mass of lead $= 207 gmol^{-1}$ and $NA = 6.02 \times 10^{23} mol^{-1}$)

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9. Complete the following

(i) $R - \overset{\overset{O}{\|}}{C} - NH_2 \xrightarrow{LiAl/H_4} \xrightarrow{H_2O}$

(ii) $C_6H_5N_2Cl + H_3PO_2 + H_2O \rightarrow$

(iii) $CH_3CH_2Cl \xrightarrow{NaCN} (A) \xrightarrow{\text{reduction}} \xrightarrow{Ni/H_2} (B)$

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10. Answer the following questions :

(i) Why do soaps not work in hard water?

(ii) What are the main constituents of dettol?

(iii) How do antiseptics differ from disinfectants?

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C.B.S.E. CLASS-XII

1. Give one example each of 'oil water' and 'water oil' emulsion.

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2. Which reducing agent is employed to get copper from the leached low-grade copper ore ?

Watch Video Solution

3. Which of the following complexes is more stable and why ? $\left[Co(en)_3\right]^{3+}$ and $\left[Co\left(NH_3\right)_6\right]^{3+}$

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4. Write the IUPAC Name of the compound.

Watch Video Solution

5. Which of the following isomers is move volatile : o-nitrophenol or p-nitrophenol

Watch Video Solution

6. What are isotonic solutions?

Watch Video Solution

7. Arrange the following compounds is increasing order of solubility in water :

$C_6H_5NH_2, \left(C_2H_5\right)NH, C_2H_5NH_2$

Watch Video Solution

8. Which of the components of starch is water soluble ?

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9. An element with density $11.2 gcm^{-3}$ forms a f. c. c. lattice with edge length of 4×10^{-8} cm. Calculate the atomic mass of the element. (Given : $N_A = 6.022 \times 10^{23} mol^{-1}$

Watch Video Solution

10. Calculatate the mass of compound (molar mass = $256 gmol^{-1}$ be the dissolved in 75 g of benzene to lower its freezing point by $0.48k \left(k_f = 5.12 kkgmol^{-1} \right.$.

Watch Video Solution

11. Define an ideal solution and write one of its characteristics.

Watch Video Solution

12. Write two differences between 'order of reaction' and 'molecularity of reaction'.

Watch Video Solution

13. Outline the principples behind the refining of metals by the following methods :

(i) Zone refining method

(ii)Chormatographaphic method

Watch Video Solution

14. Complete the following chemical eqution s :

(i) $Ca_3P_2 + H_2O \rightarrow$

(ii) $Cu + H_2SO(conc) \rightarrow$

Watch Video Solution

15. Arrange the following order of property indicated against each set :

(i) HF,HCl,HBr,HI- increasing bond dissociiation enthelpy.

(ii) H_2O, H_2S, H_2Se, H_2Te - increasing acidic character.

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16. Write the IUPAC name of the complex $\left[Cr\left(NH_3\right)_4Cl_2\right]^+$. What type of isomerism does it exhibit ?

Watch Video Solution

17. (a) In reference to Freundlich adorption isotherm write the expression for adsorption of gases on solids in the form of an equation.

(b) Write an important characteristic of lyophilic solc.

(c) Based on type of particles of dispersed phase, give one example each of associated colloid and multimolecular colloid.

Watch Video Solution

18. Draw the structures of the following molecules :

(i) $XeOF_4$ (ii) H_2SO_4

(b) Write the structurel difference between white phosphorus and red phosphorus .

Watch Video Solution

19. Account for the following :

(i) PCl_5 is more covalent than PCl_3.

(ii) Iron on reaction with HCl forms $FeCl_2$ and not $FeCl_3$.

(iii) The two O-O bond lengths in the ozone molecule are equal.

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20. The following data were obtained during the first order thermal decompostion of SO_2CI_2 at a constant volume :

$$SO_2Cl_2(g) \longrightarrow SO_2(g) + Cl_2(g)$$

Experiment	Time/s^{-1}	Total pressure/atm
1	0	0.4
2	100	0.7

Calculate rate constant

Watch Video Solution

21. (i) Give two examples of macromolecules that are chosen as drug targets.

(ii) What are antiseptics ? Give an example.

(iii) Why is use of aspartame limited to cold foods and soft dirink ?

Watch Video Solution

22. (i) Deficiency of which vitamin causes night-blindness ?

(ii) Name the base that is found in nucleotide of RNA only.

(iii) Glucose on reaction with HI gives n-hexane. What does it suggest about the structure of glucose ?

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23. After the ban on plastic bags, students of one school decided to make the people aware of the harmful effects of plastic bags on environment ans Yamuna River. To make the awareness more implctful, they organized rally by joining hands with other school and distributed paper bags to vegetable vendors, shopkeepers and departmental stores. All students pledged not to use polythene bags in future to save Yamuna River.

After reading the above passage, answer the following questions :

(i) What values are shown by the students ?

(ii) What are biodegradable polymers ? Given one example.

(iii) Is polythene a condensation or an addition polymer ?

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24. (A)Write the mechanism of the following raction :

$$CH_3CH_2OH \xrightarrow{HBr} CH_3CH_2Br + H_2O$$

(b) Write the equation involved in Reimer-Tiemann reaction.

Watch Video Solution

25. Given the structures of A, B and C in the following reactions :

(i) $CH_3Br \xrightarrow{KCN} A \xrightarrow{LilH_4} B \xrightarrow{HNO_2} 273kC$

(ii) $CH_3COOH \xrightarrow{NH_3} \Delta A \rightarrow B \rightarrow C$

Watch Video Solution

26. How will you canvert the following :

(i) Nitrobenzene into aniline,

(ii) Ethanoic acid into methanmine

(iii) Aniline into N-phenylethanaminde (write the chemical equations involved).

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27. (a) Define the following terms :

(i) Limiting molar conductivity,

(ii) Fuel cell

(b) Resistance of a conductivity cell filled with $0.1 molL^{-1} KCl$ solution is 100 Ohm. If the resistance of the same cell when filled with $0.2 molL^{-1} KCl$ solution is 520 Ohm , calculate the conductivity and molar conductivity of $0.2 molL^{-1} KCl$ solution. The conductivity of $0.1 molL^{-1} KCl$ solution is $1.29 \times 10^{-1} Scm^{-1}$.

Watch Video Solution

28. State Faraday's first law of electrolysis . How much charge in terms of Faraday is required for the reduction of $1 molof$Cu^(2+) $\rightarrow Cu. (b) Calcateemfofthefollow \in gcellat$298 K : Mg(s) | Mg ^(2+)(0.1 M)||Cu^(2+) (0.01)|Cu(s)[$Given$E_(cell)^(@)=+ 2.71V, 1 F = 96500C mol^(-1)]`

Watch Video Solution

29. How do you prepare :

(i) $k_2 MnO_4 omMnO_2$?

(ii) $Na_2 Cr_2 O_7 omNaCrO_4$?

Watch Video Solution

30. (i) Name the element of 3d transition series which shows maximum number of oxidation states. Why does it show so ?

(ii) Complete the following equation : $MnO_4^- + 8H^+ + 5e^- \rightarrow$.

Watch Video Solution

31. Account for the following :

(i) CH_3CHO is more reactive than CH_3COCH_3 towards reaction with HCN .

(ii) Carboxylic acid is a stronger acid then phenol .

(b) Wrtie the chemical equations to illuustrate the following reaction :

(i) Wolff-Kishner reduction

(ii) Aldol condensation

(iii) Cannizzaro reaction

Watch Video Solution

32. Give one example each of sol and gel.

Watch Video Solution

33. Some liquids on mixing from 'azeotropes'. What are 'azeotropes'?

Watch Video Solution

34. Which component of starch is a branched polymer of α - glucose and insoluble in water ?

Watch Video Solution

35. State Henry's law. What is the effect of temperature on the solubility of a gas in a liquid ?

Watch Video Solution

36. Define the following terms :

(i) Pseudo first order reactions

(ii) Half life period of reaction $\left(t_{1/2}\right)$.

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37. Write the principle behind the following methods of refining :

(i)Hydrauic washing

(ii) Vapour phase refining.

Watch Video Solution

38. Draw the structure of the following :

(i) XeF_2

(ii) BrF_3

Watch Video Solution

39. Account for the follwing :

(i) $Bi(v)$ is a stronger oxidizing agent then Sb(v).

(ii) N-N single bond is weaker then P - P Single bond.

(iii) Noble gases have very low boiling points.

Watch Video Solution

40. Name the sweetening agent used in the preparation of sweets for a diabetic patient.

(ii) What are antibiotics ? Give an example .

(iii) Give two example of macromolecules that are chosen as drug targetsm.

Watch Video Solution

41. Deficiency of which vitamin causes rickets ?

(ii) Given an example for each of fibrous protein and globular protein. (iii) Write the product formed on reaction of D-glucose with Br_2 water.

Watch Video Solution

42. Given one example each of lyophobic sol and lyophilic so .

Watch Video Solution

43. Write the IUPAC name of the compound.

$CH_3 - C(OH) - CH - C(=O) - CH_3$.

Watch Video Solution

44. What type of intermolecular attractive interaction exits in the pair of methanol and acetone

Watch Video Solution

45. Arrange the following in incresing order of basic strength :

$C_6H_5NH_2, C_2H_5NHCH_3, C_6H_5N\left(CH_3\right)_2$.

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46. What are the hydrolysis products of sucrose ?

Watch Video Solution

47. Which reducing agent is employed to get copper from the leached low-grade copper ore ?

Watch Video Solution

48. State Raoult's law for the solution containing volatile components. What is the similarity .

between Raoult's law and Henry's law ?

Watch Video Solution

49. Define the following terms :

(i) Half- life of a reaction $\left(t_{1/2}\right)$

(ii) Rate constant (k).

Watch Video Solution

50. Describe the principle involved in each of the following processes of metallurgy :

(i) Froth floatation method

(ii) Electrolytic refining of metals

(iii) Zone refining of metals

Watch Video Solution

51. (a) Draw the structures of the following compounds :

(i) XeF_4

(ii) N_2O_5.

Watch Video Solution

Watch Video Solution

52. Account for the following :

(i) Sulphur in vapour from exhibits paramagnetic behavious.

(ii) $SnCl_4$ is more covalent the $SnCl_2$.

(iii) H_3PO_2 is a stronger reducing agent then H_3PO_3.

Watch Video Solution

53. (i) What are disinfectants ? Given an example.

(ii) Given two example of macro-molecules that are chosen as drug targets.

(iii) What are anionic detergents ? Give an example .

Watch Video Solution

54. (i) Deficiency of which vitamin causes scurvy ?

(ii) What type of linkage is responsible for the formation of proteins ?

(iii) Wrtie the product formed when glucose is treated with HI.

Watch Video Solution

SET - II

1. What are lyophobic colloids? Give one example for them.

Watch Video Solution

2. Why is thie that only sulphide ores are connectrated by forth floatation process ?

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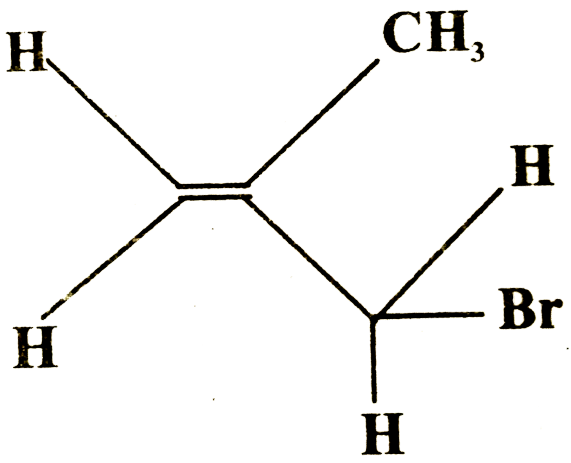
3. Write the IUPAC name of the following compounds:



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4. Darw the structure of 2,6 Dimethyphenol.

Watch Video Solution

5. Rerrange the following in an increasing order of their basic strengths:

$C_6H_5NH_2$, $C_6H_5N\left(CH_3\right)_2$, $\left(C_6H_5\right)_2$ NH and CH_3NH_2.

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6. In corundum, oxide ions are arranged in hexagonal close packing and aluminium ionsa occpy tow-third of the octaheral voids. What is the formula of corrundum ? .

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7. Calculate the equilibrium constant K_c for the rections.

$3Sn^4 + 2cr \rightarrow 3Sn^{2+} + 2Cr^{3+}$

Given $E^o = 0.885V$.

Watch Video Solution

8. Explain giving a suitable reason for each of the following :

(i) Transition metals and their compounds are generally found to be good catalysts.

(ii) Metal-metals bonding is more frequent for the 4d and the 5d series of transitions metals than that for the 3d series.

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9. Write the main structural difference between DNA and RNA. Of the four bases, common to both DNA and RNA.

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10. What mass of $NaCI\left(\text{molar mass} = 58.5 gmol^{-1}\right)$ be dissolved in $65g$ of water to tower the freezing point by $7.5^{\circ}C$? The freezing point depression constant, K_f, for water is $1.86 Kkgmol^{-1}$. Assume van't Hoff factor for $NaCI$ is 1.87.

Watch Video Solution

11. Write the stucture and names of all steresiomers fo the following compounds:

(i) $\left[Co\left(en_3\right)\right]Cl_3$

(ii) $\left[Pt\left(NH_3\right)_2Cl_2\right]$

(iii) $\left[Fe\left(NH_3\right)_4Cl_2\right]Cl$

Watch Video Solution

12. (a) Differentiate between a disinfectant and an antiseptics. Given one example of each.

(ii) What is tincture of iodine and what is it used for ? .

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Others

1. Name the products of hydrolysis of sucrose. Why is sucrose not a reducing sugar ?

Watch Video Solution

2. Describe the role of

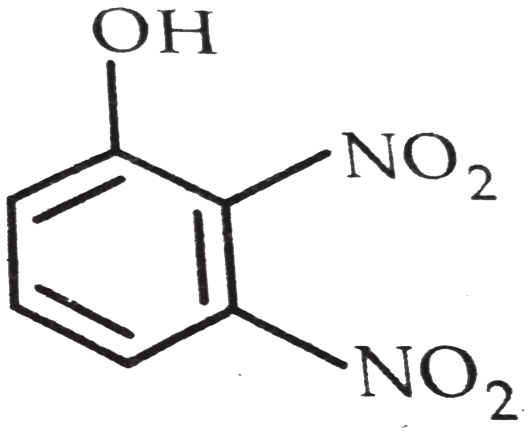
(i) $NaCN$ in the extraction of gold from gold ore.

(ii) SiO_2 in the extraction of copper from copper matter. (iii) Iodine in the refining of zirconium.

Write chemical equations for the involved reactions.

Watch Video Solution

3. Write IUPAC name of the following compound :



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4. What type of aldehydes undergo Aldol condensation ?

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5. Which of the following is most effective in coagulating positively charged hydrated ferric oxide sol ?

(i) $NaNO_3$ (ii) Na_2SO_4 (iii) $\left(NH_4\right)_3PO_4$

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6. A metallic element crystallises into a lattice having a ABC ABC ..... pattern and packing of spheres leaves out voids in the lattice. What type of structure is formed by this arrrangement ?

Watch Video Solution

7. What is the covalence of nitrogen in N_2O_5 ?

Watch Video Solution

8. Which alkyl halide from the following pair is (i) Chiral and (ii) undergoes S_N1 reaction faster ?

(a) $\left(CH_3\right)_3CBr$

(b) $CH_3CH_2CHBrCH_3$

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9. For a chemical reactin R → P, variation of concentration of R vs time plot is given below : For this reaction :

(i) Predict the order of reaction.

(ii) What is the unit of rate constant (k) ?

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10. Account for the following :

Two S - O bond lengths in SO_2 are equal.

(ii) Fluorine shows only - 1 oxidation state in its compounds.

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11. (a) What type of linkage is present in proteins ?

(b) Give one example each of water soluble and fat soluble vitamins.

(c) Draw pyranose structure of glucose.

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12. Define the following terms :

(i) Kraft temperature

(ii) Peptization

(iii) Electrokinetic potential

Watch Video Solution

13. Write the therapeutic action of following on human body and mention the class of drugs to which each of these belong :

(i) Ranitidine (ii) Morphine (iii) Aspirin

Watch Video Solution

14. (a) What happens when CH_3 - O - CH_3 is heated with HI ?

(b) Explain mechanism for hydration of acid catalyzed ethene :

$$CH_2 = CH_2 + H_2O \xrightarrow{H^+} CH_3 - CH_2 - OH$$

Watch Video Solution

15. An element crystallises in fcc lattice with cell edge of 400 pm. Calculate its density if 250 g of this element contain 2.5×10^{24} atoms.

Watch Video Solution

16. (a) Write the principle involved in the vapour phase refining of metals.

(b) Write the name of the metal refined by each of the following processes :

(i) Mond process (ii) van Arkel method

(c) What is the role of depresent in froth floatation process ?

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17. The vapour pressure of pure liquids A and B at 400 K are 450 and 700 mmHg respectively. Find out the composition of liquid mixture if total vapour pressure at this temperature is 600 mmHg.

Watch Video Solution

18. (a) Arrange the hydrides of group 16 in increasing order of the acidic character. Justify your answer. (b) Draw structure of $XeOF_4$.

Watch Video Solution

19. (a) Account for the following :

(i) PCl_5 is more covalent than PCl_3.

(ii) Iron on reaction with HCl forms $FeCl_2$ and not $FeCl_3$.

(b) Draw sturcture of XeO_3.

Watch Video Solution

20. For the complexion $\left[CoF_6\right]^{3-}$ write the hybridization type, magnetic character and spin nature. [Atomic number : Co = 27].

Watch Video Solution

21. (a) Write the structural formula of A, B, C and D in the following sequence of reaction :

$$CH_3 - \underset{|}{\overset{CI}{CH}} - CH_3 \xrightarrow{alc\ KOH} A \xrightarrow[\text{Peroxide}]{HBr} B \xrightarrow[\text{dry ether}]{NaI} C \xrightarrow[\text{dry ether}]{Mg} D$$

Illustrate Sandmeyer's reaction with the help of a suitable example.

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22. The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at constant volume :

Experiment	Time (s)	Total Pressure (atm)
1	0	0.3
2	100	0.5

Calculate rate constant

[Given : log 6 = 0.7782, log 3 = 0.4771]

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23. When a chromite ore (A) is fused with sodium carbonate in free excess of air and the product is dissolved in water, a yellow solution of compound (B) is obtained. After treatment of this yellow solution with sulphuric acid, compound (C) can be crystallised from the solution. When compound (C) is treated with KCl, orange crystals of compound (D) crystallise out. Identify A to D and also explain the reactions.

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24. (i) Which transition element in 3d series has positive $E^{\circ}_{M^{2+}/M}$ value and why ?

(ii) Name a member of lanthanoid series which is well known to exhibit to exhibit +4 oxidation state and why?

(b) Account for the following :

(i) The highest oxidation state is exhibited in oxoanions of transition metals.

(ii) HCl is not used to acidify $KMnO_4$ solution.

(iii) Transition metals have high enthalpy of atomisation.

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25. (a) How will you convert

(i) Benzene to acetophenone

(ii) Propanone to 2-Methylpropan-2-ol

(b) Give reasons :

(i) Electrophilic substitution in benzoic acid takes place at meta position.

(ii) Carboxlic acids are higher boiling liquids than aldehydes,, ketones and

alchols of comparable molecular masses.

(iii) Propanal is more reactive than propanone in nucleophilic addition reactions.

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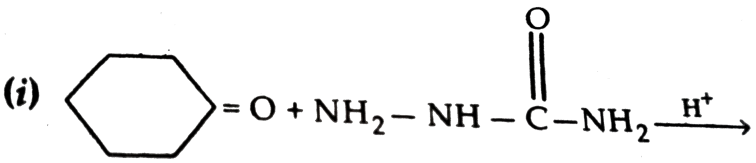
26. (a) Write the products of the following reactions :

(i) 

(ii) $CH_3MgBr + CO_2 \xrightarrow[]{\text{Dry ether}} H_3O^+$

(iii) $CH_3CH_2COOH + Br_2 \xrightarrow{\text{Red Phosphorus}}$

(b) Write simple chemical tests to distinguish between the following pairs of compounds :

(i) Propanal and propanone (ii) Benzaldehyde and Benzoic acid

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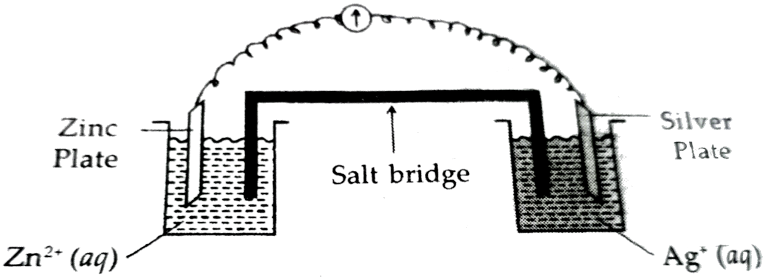
27. (a) When a bright silver object is placed in the solution of gold chloride, it acquires a golden tings but nothing happens when it is placed in solution of copper chloride. Explain this behaviour of silver.

[Given : $E^{\circ}_{Cu^{2+}/Cu} = +0.34V, E^{\circ}_{Ag^{+}/Ag} = +0.80V, E^{\circ}_{Au^{3+}/Au} = +1.40V$]

(b)



Consider the figure given above and answer the following questions :

(i) What is the direction of flow of electrons?

(ii) Which is anode and which is cathode?

(iii) What will happen if the salt bridge is removed ?

(iv) How will concentration of Zn^{2+} and Ag^{+} ions be affected when the cell functions ?

(v) How will concentration of these ions be affected when the cell becomes dead ?

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28. (a) What is limiting molar conductivity ? Why there is step rise in the molar conductivity of weak electrolyte on dilution ?

(b) Calculate the emf of the following cell at 298 K : Mg(s) $\left|Mg^{2+}(0.1M)\right|\left|Cu^{2+}\left(1.0 \times 10^{-3}M\right)\right|Cu(s)$

[Given : E°_{cell} = 2.71 V]

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29. Write the formulae of any two oxoacides of sulphur.

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30. Write the IUPAC name of the given compound :

$CH_3 - C \mid {}_{CH_3}H - CH_2 - O - CH_2 - CH_3$

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31. How does a delta form at the meeting place of sea and river water?

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32. Which would undergo S_N1 reaction faster in the following pair :

CH_3 - CH_2 - CH_2 - Br and CH_3 - C | $Br$$H$ - CH_3

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33. What is the formula of a compound in which the element Y forms ccp lattice and atoms of X occupy $2/3^{rd}$ of tetrahedral voids ?

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34. Write one similarity and one difference between the chemistry of lanthanoids and that of actinoids.

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35. (i) Write down the IUPAC name of the following complex :

$$\left[Co\left(NH_3\right)_5Cl\right]^{2+}$$

(ii) Write the formula for the following complex : Potassium tetrachloridonickelate (II).

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36. Write the reagents required in the following reactions :

(i) $CH_2 = CH - CH_2Oh \overset{?}{\rightarrow} CH_2 = CH - CHO$

(ii) $CH_3 - COOH \overset{?}{\rightarrow} CH_3 - CONH_2$

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37. Arrange the following compounds in increasing order of their property as indicated :

(i)

CH_3COCH_3, $C_6H_5COCH_3$, CH_3CHO(reactivity toward nucleophilic addition reaction))

(ii) Cl - CH_2 - $COOH$, F - CH_2 - $COOH$, CH_3 - $COOH$(acidic character)

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38. Two liquids A and$B$ on mixing produce a warm solution. Which type of deviation from Raoult's law does it show?

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39. Calculate the time required to deposit 1.27 g of copper at cathode when a current of 2A was passed through the solution of $CuSO_4$.

$\left(\text{Molar mass of } Cu = 63.5gmol^{-1}, 1F = 96500Cmol^{-1}\right)$.

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40. A solution is prepared by dissolving 10g of non-volatile solute in 200g of water. It has a vapour pressure of 31.84 mm Hg at 308 K. Calculate the

molar mass of the solute. (Vapour pressure of pure water at 308K =32 mm Hg)

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41. (i) Name the method of refining to obtain silicon of high purity.

(ii) What is the role of SiO_2 in the extraction of copper?

(iii) What is the role of depressants in froth floatation process ?

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42. (i) Which one of the following is a polysaccharide : starch, maltose, fructose, glucose

(ii) Write one difference between α-helix and β-pleated sheet structures of protein.

(iii) Write the name of the disease caused by the deficiency of vitamin B_{12}.

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43. (i) What type of isomerism is shown by the complex $\left[Cr\left(H_2O\right)_6\right]Cl_3$?

(ii) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_0 > P$.

(iii) Write the hybridization and shape of $\left[CoF_6\right]^{3-}$. (Atomic number of Co=27)

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44. How will you bring about the following conversions ?

Aniline to bromobenzene

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45. What happens when

(i) chlorobenzene is treated with $Cl_2/FeCl_3$

(ii) ethyl chloride is treated with $AgNO_2$,

(iii) 2-bromopentane is treated with alcoholic KOH ?

Write the chemical equations in support of your answer.

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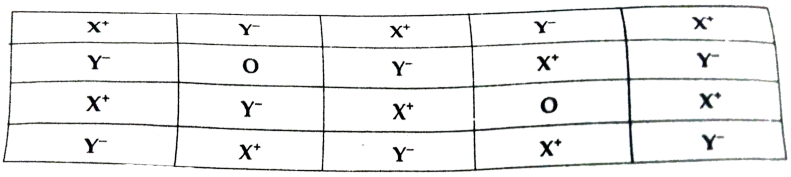
46. Examine the given defective crystal :



X^+	Y^-	X^+	Y^-	X^+
Y^-	O	Y^-	X^+	Y^-
X^+	Y^-	X^+	O	X^+
Y^-	X^+	Y^-	X^+	Y^-

Answer the following questions :

(i) Is the above defect stoichiometric or non-stoichiometric ?

(ii) Write the term used for this type of defect. Give an example of the compound which shows this type of defect.

(iii) How does this defect affect the density of the crystal ?

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47. Conductivity of 2.5×10^{-4} M methanoic acid is $5.25 \times 10^{-5} Scom^{-1}$. Calculate its molar conductivity and degree of dissociation.

Given : $\lambda^0\left(H^+\right) = 349.5 Scm^2 mol^{-1}$ and $\lambda^0\left(HCOO^-\right) = 50.5 Scm^2 mol^{-1}$.

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48. Give three points of difference between physisorption and chemisorption.

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49. Give reasons for the following :

(i) Phenol is more acidic than methanol.

(ii) The C-O-H bond angle in alcohols is slightly less than the tetrahedral angle $\left(109^\circ 28'\right)$.

(iii)

$\left(CH_3\right)_3 C - O - CH_3$ on reaction with HI gives $\left(CH_3\right)_3 C - I$ and $CH_3 - OH$ as th

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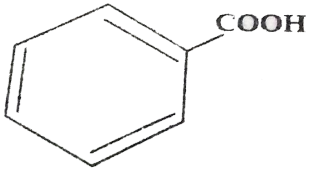
50. Perdict the products of the following reactions :

(i) $CH_3 - C(CH_3) = O \xrightarrow{H_2N-NH_2} ?$

(ii) $C_6H_5 - CH_3 \xrightarrow[(b)\,H^+]{(a)\,KMnO_4/KOH} ?$

(iii) 

$\xrightarrow{Br_2/FeBr_3} ?$

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51. (a) Account for the following :

(i) Cu^+ is unstable in an aqueous solution.

(ii) Transition metals form complex compounds.

(b) Complete the following equation:

$Cr_2O_7^{2-} + 8H^+ + 3NO_2^- \rightarrow$

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52. Write the names and structures of the monomers of the folfowing polymers : (i) Terylene, (ii) Buna-S, (iii) Neoprene

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53. Seeing the growing cases of diabetes and depression among young children, Mr. Chopra, the principal of one reputed school organized a seminar in which he invited parents and principals. They all resolved this issue by strictly banning junk food in schools and introducing healthy snacks and drinks like soup, lassi, milk, etc. in school canteens. They also decided to make compulsory half an hour of daily physical activities for the students in the morning assembly. After six months, Mr. Chopra conducted the health survey in most of the schools and discovered a tremendous improvement in the health of the students.

After reading the above passage, answer the following questions :

(i) What are the values (at least two) displayed by Mr. Chopra ?

(ii) As a student, how can you spread awareness about this issue ?

(iii) Why should antidepressant drugs not be taken without consulting a

doctor ?

(iv) Give two examples of artificial sweeteners.

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54. (a) Write the structures of main products when benzene diazonium chloride reacts with the following reagents :

(i) $H_3PO_2 + H_2O$

(ii) $CuCN/KCN$

(iii) H_2O

(b) Arrange the following in the increasing order of their basic character in an aqueous solution :

$C_2H_5NH_2, \left(C_2H_5\right)_2NH, \left(C_2H_5\right)_3N$

(c) Give a simple chemical test to distinguish between the following pair of compounds :

C_6H_5 - NH_2 and C_6H_5 - NH - CH_3

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55. For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained :

t/s	0	10	20
$[CH_3COOCH_3]/mol\ L^{-1}$	0.10	0.05	0.025

(a) Show that it follows pseudo first order reaction, as the concentration of water remains constant.

(b) Calculate the average rate of reaction between the time interval 10 to 20 seconds. (Given : log 2 = 0.3010, log 4 = 0.6021)

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56. (a) For a reaction $A + B \rightarrow P$, the rate is given by Rate $= K[A][B]^2$

(i) How is the rate of reaction affected if the concentration of B is doubled ?

(ii) What is the overall order of reaction if A is present in large excess ?

(b) A first order reaction takes 30 minutes for 50% completion. Calculate the time required for 90% completion of this reaction.

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