12 CHEMISTRY

12th Standard

Chemistry

312 x 1 = 312

1) Bauxite has the composition

(a) Al_2O_3 (b) $Al_2O_3.nH_2O$ (c) $Fe_2O_3.2H_2O$ (d) None of these

2) Roasting of sulphide ore gives the gas (A).(A) is a colourless gas. Aqueous solution of (A) is acidic. The gas (A) is

(a) CO_2 (b) SO_3 (c) SO_2 (d) H_2S

3) Which one of the following reaction represents calcinations?

(a) $2Zn + O_2 \rightarrow 2ZnO$ (b) $2ZnS + 3O_2 \rightarrow 2ZnS + 3O_2 \rightarrow 2ZnO_2 \rightarrow 2ZnO + 2SO_2$

(c) $MgCO_3 \rightarrow MgO + CO_2$ (d) Both (a) and (c)

4) The metal oxide which cannot be reduced to metal by carbon is

(a) PbO   (b) AL_2O_3 (c) ZnO   (d) Feo

5) Which of the metal is extracted by Hall-Heroult process?

(a) Al   (b) Ni   (c) Cu   (d) Zn

6) Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

(a) ΔG_f^0 of sulphide is greater than those for CS_2 and H_2S

(b) ΔG_r^0 is negative for roasting of sulphide ore to oxide

(c) Roasting of the sulphide to its oxide is thermodynamically feasible

(d) Carbon and hydrogen are suitable reducing agents for metal sulphides

7) Match items in column - I with the items of column – II and assign the correct code.

Column-I		Column-II
A.	Cyanide process	(i)	Ultrapure Ge
B	Froth floatation process	(ii)	Dressing of ZnS
C	Electrolytic reduction	(iii)	Extraction of Al
D	Zone refining	(iv)	Extraction of Au
		(v)	Purification of Ni

(a)

A	B	C	D
(iv)	(ii)	(iii)	(i)

(b)

A	B	C	D
(i)	(ii)	(iii)	(iv)

(c)

A	B	C	D
(iii)	(iv)	(v)	(i)

(d)

A	B	C	D
(ii)	(iii)	(i)	(v)

8) Wolframite ore is separated from tinstone by the process of

(a) Smelting   (b) Calcination   (c) Roasting   (d) Electromagnetic separation

9) Which one of the following is not feasible

(a) $Zn(s) + Cu^{2+}(aq) \rightarrow Cu(s) + Zn^{2+}(aq)$ (b) $Cu(s) + Zn^{2+}(aq) \rightarrow Zn(s) + Cu^{2+}(aq)$

(c) $Cu(s) + 2Ag^+(aq) \rightarrow Ag(s) + Cu^{2+}(aq)$ (d) $Fe(s) + Cu^{2+}(aq) \rightarrow Cu(s) + Fe^{2+}(aq)$

10) Electrochemical process is used to extract

(a) Iron   (b) Lead   (c) Sodium   (d) silver

11) Flux is a substance which is used to convert

(a) Mineral into silicate   (b) Infusible impurities to soluble impurities

(c) Soluble impurities to infusible impurities   (d) All of these

12) Which one of the following ores is best concentrated by froth – floatation method?

(a) Magnetite (b) Hematite (c) Galena (d) Cassiterite

13) In the extraction of aluminium from alumina by electrolysis, cryolite is added to

(a) Lower the melting point of alumina (b) Remove impurities from alumina

(c) Decrease the electrical conductivity (d) Increase the rate of reduction

14) Zinc is obtained from ZnO by

(a) Carbon reduction (b) Reduction using silver (c) Electrochemical process

(d) Acid leaching

15) Extraction of gold and silver involves leaching with cyanide ion. silver is later recovered by

(a) Distillation (b) Zone refining (c) Displacement with zinc (d) liquation

16) Considering Ellingham diagram, which of the following metals can be used to reduce alumina?

(a) Fe (b) Cu (c) Mg (d) Zn

17) The following set of reactions are used in refining Zirconium

$(impure) + 2I_2 \xrightarrow{523k} ZrI_4$

$ZrI_4 \xrightarrow{1800K} Zr(pure) + 2I_2$ This method is known as

(a) Liquation (b) van Arkel process (c) Zone refining (d) Mond's process

18) Which of the following is used for concentrating ore in metallurgy?

(a) Leaching (b) Roasting (c) Froth floatation (d) Both (a) and (c)

19) The incorrect statement among the following is

(a) Nickel is refined by Mond's process (b) Titanium is refined by Van Arkel's process

(c) Zinc blende is concentrated by froth floatation

(d) In the metallurgy of gold, the metal is leached with dilute sodium chloride solution

20) In the electrolytic refining of copper, which one of the following is used as anode?

(a) Pure copper (b) Impure copper (c) Carbon rod (d) Platinum electrode

21) Which of the following plot gives Ellingham diagram

(a) $\Delta S Vs T$ (b) $\Delta G^0 Vs T$ (c) $\Delta G^0 Vs \dfrac{1}{T}$ (d) $\Delta G^0 Vs T^2$

22) In the Ellingham diagram, for the formation of carbon monoxide

(a) $\left(\dfrac{\Delta S^0}{\Delta T} \right)$ (b) $\left(\dfrac{\Delta G^0}{\Delta T} \right)$ is positive (c) $\left(\dfrac{\Delta G^0}{\Delta T} \right)$ is negative

(d) initially $\left(\dfrac{\Delta T}{\Delta G^0} \right)$ is positive, after 700°C, $\left(\dfrac{\Delta G^0}{\Delta T} \right)$ is negative

23) Which of the following reduction is not thermodynamically feasible?

(a) $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$ (b) $Al_2O_3 + 2Cr \rightarrow Cr_2O_3 + 2Al$

(c) $3TiO_2 + 4Al \rightarrow 2Al_2O_3 + 3Ti$ (d) none of these

24) Which of the following is not true with respect to Ellingham diagram?

(a) Free energy changes follow a straight line. Deviation occurs when there is a phase change.

(b) The graph for the formation of CO_2 is a straight line almost parallel to free energy axis.

(c) Negative slope of CO shows that it becomes more stable with increase in temperature

(d) Positive slope of metal oxides shows that their stabilities decrease with increase in temperature

25) An aqueous solution of borax is

(a) neutral (b) acidic (c) basic (d) amphoteric

26) Boric acid is an acid because its molecule

(a) contains replaceable H+ ion   (b) gives up a proton

(c) combines with proton to form water molecule

(d) accepts OH- from water, releasing proton.

27) Which among the following is not a borane?

(a) B_2H_6 (b) B_3H_6 (c) B_4H_{10} (d) none of these

28) Which of the following metals has the largest abundance in the earth's crust?

(a) Aluminium (b) calcium (c) Magnesium (d) sodium

29) In diborane, the number of electrons that accounts for banana bonds is

(a) six (b) two (c) four (d) three

30) The element that does not show catenation among the following p-block elements is

(a) Carbon (b) silicon (c) Lead (d) germanium

31) Carbon atoms in fullerene with formula C_{60} have

(a) sp^3 hybridised (b) sp hybridised (c) sp^2 hybridised

(d) partially sp^2 and partially sp^3 hybridised

32) Oxidation state of carbon in its hydrides

(a) +4 (b) -4 (c) +3 (d) +2

33) The basic structural unit of silicates is

(a) $\left(SiO_3\right)^{2-}$ (b) $\left(SiO_4\right)^{2-}$ (c) $(SiO)^-$ (d) $\left(SiO_4\right)^{4-}$

34) The repeating unit in silicone is v

(a) SiO_2 (b)   (c)   (d)

35) Which of these is not a monomer for a high molecular mass silicone polymer?

(a) Me_3SiCl (b) $PhSiCl_3$ (c) $MeSiCl_3$ (d) Me_2SiCl_2

36) Which of the following is not sp^2 hybridised?

(a) Graphite (b) graphene (c) Fullerene (d) dry ice

37) The geometry at which carbon atom in diamond are bonded to each other is

(a) Tetrahedral (b) graphene (c) Fullerene (d) dry ice

38) Which of the following statements is not correct?

(a) Beryl is a cyclic silicate   (b) Mg_2SiO_4 is an orthosilicate

(c) $SiO_4^{4-}$is the basic structural unit of silicates   (d) Feldspar is not aluminosilicate

39)

	Column-I		Column-II
A	Borazole	1	$B(OH)_3$
B	Boric acid	2	$B_3N_3H_6$
C	Quartz	3	$Na_2[B_4O_5(OH)_4]8H_2O$
D	Borax	4	SiO_2

(a) | (b) | (c) | (d) None of these

A	B	C	D
2	1	4	3

A	B	C	D
1	2	4	3

A	B	C	D
1	2	4	3

40) Duralumin is an alloy of

(a) Cu,Mn   (b) Cu,Al,Mg   (c) Al,Mn   (d) Al,Cu,Mn,Mg

41) The compound that is used in nuclear reactors as protective shields and control rods is

(a) Metal borides   (b) metal oxides   (c) Metal carbonates   (d) metal carbide

42) The stability of +1 oxidation state increases in the sequence

(a) Al < Ga < In < Tl   (b) Tl < In < Ga < Al   (c) In < Tl < Ga < Al   (d) Ga< In < Al < Tl

43) In which of the following, NH_3 is not used?

(a) Nessler's reagent   (b) Reagent for the analysis of IV group basic radical

(c) Reagent for the analysis of III group basic radical   (d) Tollen's reagent

44) Which is true regarding nitrogen?

(a) least electronegative element   (b) has low ionisation enthalpy than oxygen

(c) d- orbitals available   (d) ability to form pπ-pπ bonds with itself

45) An element belongs to group 15 and 3rd period of the periodic table, its electronic configuration would be

(a) $1s^2\ 2s^2\ 2p^4$ (b) $1s^2\ 2s^2\ 2p^3$ (c) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^2$ (d) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

46) Solid (A) reacts with strong aqueous NaOH liberating a foul smelling gas(B) which spontaneously burn in air giving smoky rings. A and B are respectively

(a) P_4(red) and PH_3 (b) P_4(white) and PH_3 (c) S_8 and H_2S (d) P_4(white) and H_2S

47) On hydrolysis, PCl_3 gives

(a) H_3PO_3 (b) PH_3 (c) H_3PO_4 (d) $POCl_3$

48) P_4O_6 reacts with cold water to give

(a) H_3PO_3 (b) $H_4P_2O_7$ (c) HPO_3 (d) H_3PO_4

49) The basicity of pyrophosphorous acid ($H_4P_2O_5$) is

(a) 4   (b) 2   (c) 3   (d) 5

50) The molarity of given orthophosphoric acid solution is 2M. its normality is

(a) 6N   (b) 4N   (c) 2N   (d) none of these

51) Among the following, which is the strongest oxidizing agent?

(a) Cl_2 (b) F_2 (c) Br_2 (d) I_2

52) The correct order of the thermal stability of hydrogen halide is

(a) HI > HBr > HCl > HF   (b) HF > HCl > HBr > HI   (c) HCl > HF > HBr > HI

(d) HI > HCl > HF > HBr

53) Which one of the following compounds is not formed?

(a) $XeOF_4$ (b) XeO_3 (c) XeF_2 (d) NeF_2

54) Most easily liquefiable gas is

(a) Ar   (b) Ne   (c) He   (d) Kr

55) XeF_6 on complete hydrolysis produces

(a) $XeOF_4$ (b) XeO_2F_2 (c) XeO_3 (d) XeO_2

56) Which of the following is strongest acid among all?

(a) HI (b) HF (c) HBr (d) HCl

57) Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?

(a) $Br_2 > I_2 > F_2 > Cl_2$ (b) $F_2 > Cl_2 > Br_2 > l_2$ (c) $I_2 > Br_2 > Cl_2 > F_2$

(d) $Cl_2 > Br_2 > F_2 > I_2$

58) Among the following the correct order of acidity is

(a) $HClO_2 < HClO < HClO_3 < HClO_4$ (b) $HClO_4 < HClO_2 < HClO < HClO_3$

(c) $HClO_3 < HClO_4 < HClO_2 < HClO$ (d) $HClO < HClO_2 < HClO_3 < HClO_4$

59) When copper is heated with conc HNO_3 it produces

(a) $Cu(NO_3)_2$, NO and NO_2 (b) $Cu(NO_3)_2$ and N_2O (c) $Cu(NO_3)_2$ and NO_2

(d) $Cu(NO_3)_2$ and NO

60) Sc (Z = 21) is a transition element but Zinc (z = 30) is not because

(a) both Sc^{3+} and Zn^{2+} ions are colourless and form white compounds

(b) in case of Sc, 3d orbital are partially filled but in Zn these are completely filled

(c) last electron as assumed to be added to 4s level in case of zinc

(d) both Sc and Zn do not exhibit variable oxidation states

61) Which of the following d block element has half filled penultimate d sub shell as well as half filled valence sub shell?

(a) Cr (b) Pd (c) Pt (d) none of these

62)

Among the transition metals of 3d series, the one that has highest negative $\left(\dfrac{M^{2+}}{M}\right)$

standard electrode potential is

(a) Ti (b) Cu (c) Mn (d) Zn

63) Which one of the following ions has the same number of unpaired electrons as present in V^{3+}?

(a) Ti^{3+} (b) Fe^{3+} (c) Ni^{2+} (d) Cr^{3+}

64) The magnetic moment of Mn^{2+} ion is

(a) 5.92BM (b) 2.80BM (c) 8.95BM (d) 3.90BM

65) The catalytic behaviour of transition metals and their compounds is ascribed mainly due to

(a) their magnetic behaviour (b) their unfilled d orbitals

(c) their ability to adopt variable oxidation states (d) their chemical reactivity

66) The correct order of increasing oxidizing power in the series

(a) $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$ (b) $Cr_2O_7^{2-} < VO_2^+ < MnO_4^-$ (c) $Cr_2O_7^{2-} < MnO_4^- < VO_2^+$

(d) $MnO_4^- < Cr_2O_7^{2-} < VO_2^+$

67) In acid medium, potassium permanganate oxidizes oxalic acid to

(a) oxalate (b) Carbon dioxi (c) acetate (d) acetic acid

68) Which of the following statements is not true?

(a) on passing H_2S, through acidified $K_2Cr_2O_7$ solution, a milky colour is observed

(b) $Na_2Cr_2O_7$ is preferred over $K_2Cr_2O_7$ in volumetric analysis

(c) $K_2Cr_2O_7$ solution in acidic medium is orange in colour

(d) $K_2Cr_2O_7$ solution becomes yellow on increasing the P^H beyond 7

69) Permanganate ion changes to _____ in acidic medium

(a) MnO_4^{2-} (b) Mn^{2+} (c) Mn^{3+} (d) MnO_2

70) How many moles of I2 are liberated when 1 mole of potassium dichromate react with potassium iodide

(a) 1 (b) 2 (c) 3 (d) 4

71) The number of moles of acidified $KMnO_4$ required to oxidize 1 mole of ferrous oxalate(FeC_2O_4) is

(a) 5 (b) 3 (c) 0.6 (d) 1.5

72) Which one of the following statements related to lanthanons is incorrect?

(a) Europium shows +2 oxidation state

(b) The basicity decreases as the ionic radius decreases from Pr to Lu.

(c) All the lanthanons are much more reactive than aluminium

(d) Ce^{4+} solutions are widely used as oxidising agents in volumetric analysis.

73) Which of the following lanthanoid ions is diamagnetic?

(a) Eu^{2+} (b) Yb^{2+} (c) Ce^{2+} (d) Sm^{2+}

74) Which of the following oxidation states is most common among the lanthanoids?

(a) +4 (b) +2 (c) +5 (d) +3

75) The most common oxidation state of actinoids is

(a) +2 (b) +3 (c) +4 (d) +6

76) The actinoid elements which show the highest oxidation state of +7 are

(a) Np, Pu, Am (b) U, Fm, Th (c) U, Th, Md (d) Es, No, Lr

77) Which one of the following is not correct?

(a) $La(OH)_2$ is less basic than $Lu(OH)_3$

(b) In lanthanoid series ionic radius of Ln^{3+} ions decreases

(c) La is actually an element of transition metal series rather than lanthanide series

(d) Atomic radii of Zr and Hf are same because of lanthanide contract

78) The sum of primary valence and secondary valence of the metal M in the complex $[M(en)_2(Ox)]Cl$ is $_L$

(a) 3 (b) 6 (c) -3 (d) 9

79) An excess of silver nitrate is added to 100ml of a 0.01M solution of pentaaquachloridochromium(III)chloride. The number of moles of AgCl precipitated would be

(a) 0.02 (b) 0.002 (c) 0.01 (d) 0.2

80) A complex has a molecular formula $MSO_4Cl.6H_2O$. The aqueous solution of it gives white precipitate with Barium chloride solution and no precipitate is obtained when it is treated with silver nitrate solution. If the secondary valence of the metal is six, which one of the following correctly represents the complex?

(a) $[M(H_2O)_4Cl]SO_4.2H_2O$ (b) $[M(H_2O)_6]SO_4$ (c) $[M(H_2O)_5Cl]SO_4.H_2O$

(d) $[M(H_2O)_3Cl]SO_4.3H_2O$

81) Oxidation state of Iron and the charge on the ligand NO in $[Fe(H_2O)_5NO]SO_4$ are
(a) +2 and 0 respectively   (b) +3 and 0 respectively   (c) +3 and -1 respectively
(d) +1 and +1 respectively

82) As per IUPAC guidelines, the name of the complex $[Co(en)_2(ONO)Cl]Cl$ is
(a) chlorobisethylenediaminenitritocobalt(III) chloride
(b) chloridobis(ethane-1, 2-diamine)nitro K-Ocobaltate(III) chloride
(c) chloridobis(ethane-1, 2-diammine)nitrito K-Ocobalt(II) chloride
(d) chloridobis(ethane-1, 2-diamine)nitro K-Ocobalt(III) chloride

83) IUPAC name of the complex $K_3[Al(C_2O_4)_3]$ is
(a) potassiumtrioxalatoaluminium(III)   (b) possiumtrioxalatoaluminate(II)
(c) potassiumtrisoxalatoaluminate(III)   (d) potassiumtrioxalatoaluminate(III)

84) A magnetic moment of 1.73BM will be shown by one among the following.
(a) $TiCl_4$ (b) $[CoCl_6]^{4-}$ (c) $[Cu(NH_3)_4]^{2+}$ (d) $[Ni(CN)4]^{2-}$

85) Crystal field stabilization energy for high spin d^5 octahedral complex is
(a) $-0.6\Delta_0$ (b) 0   (c) $2(P-\Delta_0)$ (d) $2(P+\Delta_0)$

86) In which of the following coordination entities the magnitude of Δ_0 will be maximum?
(a) $[Co(CN)_6]^{3-}$ (b) $[Co(C_2O_4)_3]^{3-}$ (c) $[Co(H_2O)_6]^{3+}$ (d) $[Co(NH_3)_6]^{3+}$

87) Which one of the following will give a pair of enantiomorphs?
(a) $[Cr(NH_3)_6][Co(CN)_6]$ (b) $[Co(en)_2Cl_2]Cl$ (c) $[Pt(NH_3)_4][PtCl_4]$ (d) $[Co(NH_3)_4Cl_2]NO_2$

88) Which type of isomerism is exhibited by $[Pt(NH_3)_2Cl_2]$?
(a) Coordination isomerism   (b) Linkage isomerism   (c) Optical isomerism
(d) Geometrical isomerism

89) How many geometrical isomers are possible for $[Pt(Py)(NH_3)(Br)(Cl)]$?
(a) 3   (b) 4   (c) 0   (d) 15

90) Which one of the following pairs represents linkage isomers?
(a) $[Cu(NH_3)_4][PtCl_4]$ and $[Pt(NH_3)_4][CuCl_4]$
(b) $[Co(NH_3)_5(NO_3)]SO_4$ and $[Co(NH_3)_5(ONO)]$
(c) $[Co(NH_3)_4(NCS)_2]Cl$ and $[Co(NH_3)_4(SCN)_2]Cl$ (d) both (b) and (c)

91) Which kind of isomerism is possible for a complex $[Co(NH_3)_4Br_2]CI$?
(a) geometrical and ionization   (b) geometrical and optical   (c) optical and ionization
(d) geometrical only

92) Which one of the following complexes is not expected to exhibit isomerism?
(a) $[Ni(NH_3)_4(H_2O)_2]^{2+}$ (b) $[Pt(NH_3)_2Cl_2]$ (c) $[Co(NH_3)_5SO_4]Cl$ (d) $[FeCl_6]^{3+}$

93) A complex in which the oxidation number of the metal is zero is
(a) $K_4[Fe(CN)_6]$ (b) $[Fe(CN)_3(NH_3)_3]$ (c) $[Fe(CO)_5]$ (d) both (b) and (c)

94) Formula of tris(ethane-1, 2-diamine)iron(II)phosphate
(a) $[Fe(CH_3-CH(NH_2)_2)_3](PO_4)_3$ (b) $[Fe(H_2N-CH_2-CH_2-NH_2)_3](PO_4)$
(c) $[Fe(H_2N-CH_2-CH_2-NH_2)_3](PO_4)_2$ (d) $[Fe(H_2N-CH_2-CH_2-NH_2-NH_2)_3]_3(PO_4)_2$

95) Which of the following is paramagnetic in nature?
(a) $[Zn(NH_3)_4]^{2+}$ (b) $[Co(NH_3)_6]^{3+}$ (c) $[Ni(H_2O)_6]^{2+}$ (d) $[Ni(CN)_4]^{2-}$

96) Fac-mer isomerism is shown by
(a) $[CO(en)_3]^{3+}$ (b) $[Co(NH_3)_4(Cl)_2]^+$ (c) $[Co(NH_3)_3(Cl)_3]$ (d) $[Co(NH_3)_5Cl]SO_4$

97) Choose the correct statement

(a) Square planar complexes are more stable than octahedral complexes

(b) The spin only magnetic moment of $[Cu(Cl)_4]^{2-}$ is BM and it has square planar structure.

(c) Crystal field splitting energy (Δ_0) $[FeF_6]^{4-}$ is higher than the (Δ_0) of $[Fe(CN)_6]^{4-}$

(d) crystal field stabilization energy of $[V(H_2O)_6]^{2+}$ is higher than the crystal field stabilization of $[Ti(H_2O)_6]^{2+}$

98) Graphite and diamond are

(a) Covalent and molecular crystals   (b) ionic and covalent crystals

(c) both covalent crystals   (d) both molecular crystals

99) An ionic compound $A_x B_y$ crystallizes in fcc type crystal structure with B ions at the centre of each face and A ion occupying corners of the cube the correct formula of AxBy is

(a) AB   (b) AB_3 (c) A_3B (d) A_8B_6

100) The ratio of close packed atoms to tetrahedral hole in cubic packing is

(a) 1:1   (b) 1:2   (c) 2:1   (d) 1:4

101) Solid CO_2 is an example of

(a) Covalent solid   (b) metallic solid   (c) molecular solid   (d) ionic solid

102) In calcium fluoride, having the flurite structure the coordination number of Ca^{2+} ion and F^- Ion are

(a) 4 and 2   (b) 6 and 6   (c) 8 and 4   (d) 4 and 8

103) The number of unit cells in 8 gm of an element X (atomic mass 40) which crystallizes in bcc pattern is (N_A is the Avogadro number)

(a) 6.023×10^{23} (b) 6.023×10^{22} (c) 60.23×10^{23} (d) $\left(\dfrac{6.023 \times 10^{23}}{8 \times 40} \right)$

104)

In a solid atom M occupies ccp lattice and $\left(\dfrac{1}{3} \right)$ of tetrahedral voids are occupied by atom N. find the formula of solid formed by M and N.

(a) MN   (b) M_3N (c) MN_3 (d) M_3N_2

105) The ionic radii of A^+ and B^- are 098×10^{-10} m and 1.81×10^{-10} m. the coordination number of each ion in AB is

(a) 8   (b) 2   (c) 6   (d) 4

106) CsCl has bcc arrangement, its unit cell edge length is 400pm, its inter atomic distance is

(a) 400pm   (b) 800pm   (c) $\sqrt{3} \times 100pm$ (d) $\left(\dfrac{\sqrt{3}}{2} \right) \times 400pm$

107) A solid compound XY has NaCl structure if the radius of the cation is 100pm, the radius of the anion will be

(a) $\left(\dfrac{100}{0.414} \right)$ (b) $\left(\dfrac{0.732}{100} \right)$ (c) 100×0.414 (d) $\left(\dfrac{0.414}{100} \right)$

108) The vacant space in bcc lattice unit cell is

(a) 48% (b) 23% (c) 32% (d) 26%

109) The radius of an atom is 300pm, if it crystallizes in a face centered cubic lattice, the length of the edge of the unit cell is

(a) 488.5pm (b) 848.5pm (c) 884.5pm (d) 484.5pm

110) The fraction of total volume occupied by the atoms in a simple cubic is

(a) $\left(\dfrac{\pi}{4\sqrt{2}}\right)$ (b) $\left(\dfrac{\pi}{6}\right)$ (c) $\left(\dfrac{\pi}{4}\right)$ (d) $\left(\dfrac{\pi}{3\sqrt{2}}\right)$

111) The yellow colour in NaCl crystal is due to

(a) excitation of electrons in F centers (b) reflection of light from Cl^- ion on the surface

(c) refraction of light from Na^+ ion (d) all of the above

112) If 'a' stands for the edge length of the cubic system sc, bcc, and fcc. Then the ratio of radii of spheres in these systems will be respectively

(a) $\left(\dfrac{1}{2}a;\ \dfrac{\sqrt{3}}{2}a;\ \dfrac{\sqrt{2}}{2}a\right)$ (b) $\left(\sqrt{1a}:\sqrt{3a}:\sqrt{2a}\right)$ (c) $\left(\dfrac{1}{2}a:\dfrac{\sqrt{3}}{4}a:\dfrac{1}{2\sqrt{2}}a\right)$ (d) $\dfrac{1}{2}a:\sqrt{3}a:\dfrac{1}{\sqrt{2}}a$

113) if 'a' is the length of the side of the cube, the distance between the body centered atom and one corner atom in the cube will be

(a) $\left(\dfrac{2}{\sqrt{3}}\right)a$ (b) $\left(\dfrac{4}{\sqrt{3}}\right)a$ (c) $\left(\dfrac{\sqrt{3}}{4}\right)a$ (d) $\left(\dfrac{\sqrt{3}}{2}\right)a$

114) Potassium has a bcc structure with nearest neighbor distance 4.52 A^0. its atomic weight is 39. its density will be

(a) 915 kg m^{-3} (b) 2142 kg m^{-3} (c) 452 kg m^{-3} (d) 390 kg m^{-3}

115) Schottky defect in a crystal is observed when

(a) unequal number of anions and anions are missing from the lattice

(b) equal number of anions and anions are missing from the lattice

(c) an ion leaves its normal site and occupies an interstitial site

(d) no ion is missing from its lattice

116) The cation leaves its normal position in the crystal and moves to some interstitial position, the defect in the crystal is known as

(a) Schottky defect (b) F center (c) Frenkel defect (d) non-stoichiometric defect

117) The crystal with a metal deficiency defect is

(a) NaCl (b) FeO (c) ZnO (d) KCl

118) A two dimensional solid pattern formed by two different atoms X and Y is shown below. The black and white squares represent atoms X and Y respectively. The simplest formula for the compound based on the unit cell from the pattern is
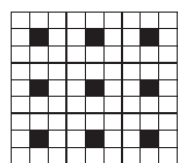

(a) XY_8 (b) X_4Y_9 (c) XY_2 (d) XY_4

119) For a first order reaction A → B the rate constant is x min^{-1}. If the initial concentration of A is 0.01M, the concentration of A after one hour is given by the expression.

(a) 001. e^{-x} (b) 1 x $10^{-2}(1-e^{-60x})$ (c) $(1\ x\ 10^{-2})e^{-60x}$ (d) none of these

120) A zero order reaction X → Product, with an initial concentration 0.02M has a half life of 10 min. if one starts with concentration 0.04M, then the half life is

(a) 10 s (b) 5 min (c) 20 min (d) cannot be predicted using the given information

121) Among the following graphs showing variation of rate constant with temperature (T) for a reaction, the one that exhibits Arrhenius behavior over the entire temperature range is

(a)   (b)   (c)   (d) both (b) and (c)
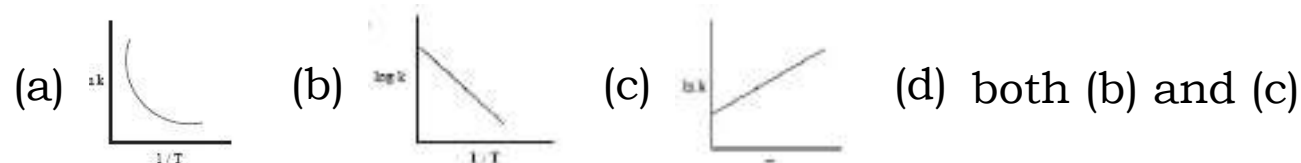
122) For a first order reaction A → product with initial concentration x mol L^{-1}, has a half life period of 2.5 hours. For the same reaction with initial concentration $\left(\frac{x}{2}\right)$ mol L^{-1} the half life is

(a) (2.5 x 2) hours (b) $\left(\frac{2.5}{2}\right)$ hours (c) 2.5 hours

(d) Without knowing the rate constant, $t_{1/2}$ cannot be determined from the given data

123) For the reaction, $2NH_3 \rightarrow N_2 + 3H_2$, if $\frac{-d[NH_3]}{dt} = k_1[NH_3]$, $\frac{d[N_2]}{dt} = k_2[NH_3]$, $\frac{d[H_2]}{dt} = k_3[NH_3]$ then the relation between k_1, k_2 and k_3 is

(a) $k_1 = k_2 = k_3$ (b) $k_1 = 3k_2 = 2k_3$ (c) $1.5k_1 = 3k_2 = k_3$ (d) $2k_1 = k_2 = 3k_3$

124) The decomposition of phosphine (PH_3) on tungsten at low pressure is a first order reaction. It is because the

(a) rate is proportional to the surface coverage

(b) rate is inversely proportional to the surface coverage

(c) rate is independent of the surface coverage (d) rate of decomposition is slow

125) For a reaction Rate = $k[acetone]^{3/2}$ then unit of rate constant and rate of reaction respectively is

(a) (mol L^{-1} S^{-1}),(mol$^{1/2}$ L$^{1/2}$ S^{-1}) (b) (mol$^{-1/2}$ L$^{1/2}$ s^{-1}),(mol L^{-1} s^{-1})

(c) (mol$^{1/2}$ L$^{1/2}$ s^{-1}),(mol L^{-1} s^{-1}) (d) (mol L s^{-1}),(mol$^{1/2}$ L$^{1/2}$ s)

126) The addition of a catalyst during a chemical reaction alters which of the following quantities?

(a) Enthalpy (b) Activation energy (c) Entropy (d) Internal energy

127) Consider the following statements:

(i) increase in concentration of the reactant increases the rate of a zero order reaction.
(ii) rate constant k is equal to collision frequency A if $E_a = 0$
(iii) rate constant k is equal to collision frequency A if $E_a = \infty$
(iv) a plot of ln (k) vs T is a straight line.

(v) a plot of ln (k) vs $\left(\frac{1}{T}\right)$ is a straight line with a positive slope.

Correct statements are

(a) (ii) only (b) (ii) and (iv) (c) (ii) and (v) (d) (i), (ii) and (v)

128) In a reversible reaction, the enthalpy change and the activation energy in the forward direction are respectively −x kJ mol^{-1} and y kJ mol^{-1}. Therefore, the energy of activation in the backward direction is

(a) (y-x) kJ mol^{-1} (b) (x+y) J mol^{-1} (c) (x-y) KJ mol^{-1} (d) (x+y) x 10^3J mol^{-1}

129) What is the activation energy for a reaction if its rate doubles when the temperature is raised from 200K to 400K? (R = 8.314 JK^{-1} mol^{-1})

(a) 234.65 kJ mol^{-1} (b) 434.65 kJ mol^{-1} (c) 2.305 kJ mol^{-1} (d) 334.65 J mol^{-1}

130) For a first order reaction, the rate constant is 6.909 min^{-1} the time taken for 75% conversion in minutes is

(a) $\left(\dfrac{3}{2}\right)log2$ (b) $\left(\dfrac{2}{3}\right)log2$ (c) $\left(\dfrac{3}{2}\right)log\left(\dfrac{3}{4}\right)$ (d) $\left(\dfrac{2}{3}\right)log\left(\dfrac{4}{3}\right)$

131) In a first order reaction $x \rightarrow y$; if k is the rate constant and the initial concentration of the reactant x is 0.1M, then, the half life is

(a) $\left(\dfrac{log2}{k}\right)$ (b) $\left(\dfrac{0.693}{(0.1)k}\right)$ (c) $\left(\dfrac{ln2}{k}\right)$ (d) none of these

132) Predict the rate law of the following reaction based on the data given below
$2A + B \rightarrow C + 3D$

Reaction number	[A] (min)	[B] (min)	Initial rate (M s^{-1})
1	0.1	0.1	x
2	0.2	0.1	2x
3	0.1	0.2	4x
4	0.2	0.2	8x

(a) rate = k[A]^2 [B] (b) rate = k[A] [B]^2 (c) rate = k[A] [B] (d) rate = k[A]$^{1/2}$ [B]$^{3/2}$

133) The rate constant of a reaction is 5.8 x 10^{-2} S^{-1} The order of the reaction is

(a) First order (b) zero order (c) Second order (d) Third order

134)
For the reaction $N_2O_5(g) \rightarrow 2NO_2(g) + \dfrac{1}{2}O_2(g)$ value of rate of disappearance of N_2O_5 is given as 6.5 x 10^{-2} mol L^{-1}s^{-1}. The rate of formation of NO_2 and O_2 is given respectively as

(a) (3.25 x 10^{-2} mol L^{-1}s^{-1}) and (1.3 x 10^{-2} mol L^{-1}s^{-1})
(b) (1.3 x 10^{-2} mol L^{-1}s^{-1}) and (3.25 x 10^{-2} mol L^{-1}s^{-1})
(c) (1.3 x 10^{-1} mol L^{-1}s^{-1}) and (3.25 x 10^{-2} mol L^{-1}s^{-1}) (d) None of these

135) During the decomposition of H_2O_2 to give dioxygen, 48 g O_2 is formed per minute at certain point of time. The rate of formation of water at this point is

(a) 0.75 mol min^{-1} (b) 1.5 mol min^{-1} (c) 2.25 mol min^{-1} (d) 3.0 mol min^{-1}

136) If the initial concentration of the reactant is doubled, the time for half reaction is also doubled. Then the order of the reaction is

(a) Zero (b) one (c) Fraction (d) none

137) In a homogeneous reaction $A \rightarrow B + C + D$, the initial pressure was P_0 and after time t it was P expression for rate constant in terms of P_0, P and t will be

(a) $k = \left(\dfrac{2.303}{t}\right) log\left(\dfrac{2P_0}{3P_0 - P}\right)$ (b) $k = \left(\dfrac{2.303}{t}\right) log\left(\dfrac{2P_0}{P_0 - P}\right)$ (c) $k = \left(\dfrac{2.303}{t}\right) log\left(\dfrac{3P_0 - P}{2P_0}\right)$

(d) $k = \left(\dfrac{2.303}{t}\right) log\left(\dfrac{2P_0}{3P_0 - 2P}\right)$

138) If 75% of a first order reaction was completed in 60 minutes, 50% of the same reaction under the same conditions would be completed in

(a) 20 minutes   (b) 30 minutes   (c) 35 minutes   (d) 75 minutes

139) The half life period of a radioactive element is 140 days. After 560 days, 1 g of element will be reduced to

(a) $\left(\dfrac{1}{2}\right) g$ (b) $\left(\dfrac{1}{4}\right) g$ (c) $\left(\dfrac{1}{8}\right) g$ (d) $\left(\dfrac{1}{16}\right) g$

140) The correct difference between first and second order reactions is that

(a) A first order reaction can be catalysed; a second order reaction cannot be catalysed.

(b) The half life of a first order reaction does not depend on $[A_0]$; the half life of a second order reaction does depend on $[A_0]$.

(c) The rate of a first order reaction does not depend on reactant concentrations; the rate of a second order reaction does depend on reactant concentrations.

(d) The rate of a first order reaction does depend on reactant concentrations; the rate of a second order reaction does not depend on reactant concentrations.

141)
     After 2 hours, a radioactive substance becomes $\left(\dfrac{1}{16}\right)^{th}$ of original amount Then the half life (in min) is

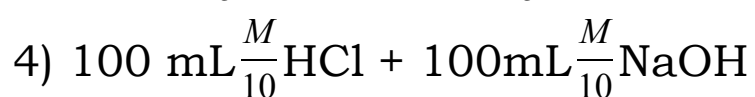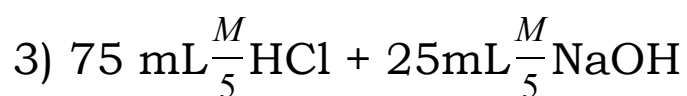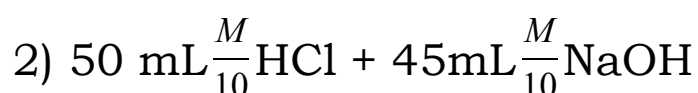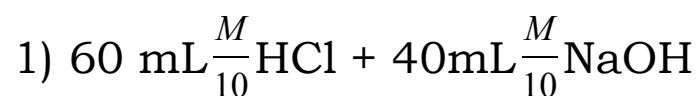(a) 60 minutes   (b) 120 minutes   (c) 30 minutes   (d) 15 minutes

142) $\triangle \longrightarrow \wedge$. This reaction follows first order kinetics. The rate constant at particular temperature is 2.303×10^{-2} hour^{-1}. The initial concentration of cyclopropane is 0.25 M. What will be the concentration of cyclopropane after 1806 minutes? (log 2 = 0.3010)

(a) 0.125 M   (b) 0.215 M   (c) 0.25 x 2.303 M   (d) 0.05 M

143) Concentration of the Ag^+ ions in a saturated solution of $Ag_2C_2O_4$ is 2.24×10^{-4} mol L^{-1} solubility product of $Ag_2C_2O_4$ is

(a) 2.42×10^{-8} mol^{3}L^{-3} (b) 2.66×10^{-12} mol^{3}L^{-3} (c) 4.5×10^{-11} mol^{3}L^{-3}

(d) 5.619×10^{-12} mol^{3}L^{-3}

144) Following solutions were prepared by mixing different volumes of NAOH of HCL different concentrations

1) 60 mL $\frac{M}{10}$ HCl + 40mL $\frac{M}{10}$ NaOH

2) 50 mL $\frac{M}{10}$ HCl + 45mL $\frac{M}{10}$ NaOH

3) 75 mL $\frac{M}{5}$ HCl + 25mL $\frac{M}{5}$ NaOH

4) 100 mL $\frac{M}{10}$ HCl + 100mL $\frac{M}{10}$ NaOH

pH of which one of them will be equal to 1?

(a) iv (b) i (c) ii (d) iii

145) The solubility of $BaSO_4$ in water is $2.42 \times 10^{-3} gL^{-1}$ at 298K. The value of its solubility product(K_{sp}) will be (Given molar mass of $BaSO_4$ =233g mol^{-1})

(a) $1.08 \times 10^{-14} mol^2 L^{-2}$ (b) $1.08 \times 10^{-12} mol^2 L^{-2}$ (c) $1.08 \times 10^{-10} mol^2 L^{-2}$

(d) $1.08 \times 10^{-8} mol^2 L^{-2}$

146) pH of a saturated solution of $Ca(OH)_2$ is 9. The Solubility product (K_{sp}) of $Ca(OH)_2$

(a) 0.5×10^{-15} (b) 0.25×10^{-10} (c) 0.125×10^{-15} (d) 0.5×10^{-10}

147) Conjugate base for Bronsted acids H_2O and HF are

(a) OH^- and H_2FH^+, respectively (b) H_3O^+ and F^-, respectively

(c) OH^- and F^-, respectively (d) H_3O^+ and H_2F^+, respectively

148) Which will make basic buffer?

(a) 50 mL of 0.1M NaOH+25mL of 0.1M CH_3COOH

(b) 100 mL of 0.1M CH_3COOH+100 mL of 0.1M NH_4OH

(c) 100 mL of 0.1M HCl+200 mL of 0.1M NH_4OH

(d) 100 mL of 0.1M HCl+100 mL of 0.1M NaOH

149) Which of the following fluro compounds is most likely to behave as a Lewis base?

(a) BF_3 (b) PF_3 (c) CF_4 (d) SiF_4

150) Which of these is not likely to act as Lewis base?

(a) BF_3 (b) PF_3 (c) CO (d) F^-

151) The aqueous solutions of sodium formate, anilinium chloride and potassium cyanide are respectively

(a) acidic, acidic, basic (b) basic, acidic, basic (c) basic, neutral, basic

(d) none of these

152) The percentage of pyridine (C_5H_5N) that forms pyridinium ion (C_5H_5NH) in a 0.10M aqueous pyridine solution (K_b for C_5H_5N = 1.7×10^{-9}) is

(a) 0.006% (b) 0.013% (c) 0.77% (d) 1.6%

153) Equal volumes of three acid solutions of pH 1,2 and 3 are mixed in a vessel. What will be the H^+ ion concentration in the mixture?

(a) 3.7×10^{-2} (b) 10^{-6} (c) 0.111 (d) none of these

154) The solubility of AgCl (s) with solubility product 1.6×10^{-10} in 0.1M NaCl solution would be

(a) $1.26 \times 10^{-5} M$ (b) $1.6 \times 10^{-9} M$ (c) $1.6 \times 10^{-11} M$ (d) Zero

155) If the solubility product of lead iodide is 3.2×10^{-8}, its solubility will be

(a) $2 \times 10^{-3} M$ (b) $4 \times 10^{-4} M$ (c) $1.6 \times 10^{-5} M$ (d) $1.8 \times 10^{-5} M$

156) MY and NY$_3$, are insoluble salts and have the same Ksp values of 6.2×10^{-13} at room temperature. Which statement would be true with regard to MY and NY$_3$?

(a) The salts MY and NY$_3$ are more soluble in 0.5M KY than in pure water

(b) The addition of the salt of KY to the suspension of MY and NY$_3$ will have no effect on their solubility's

(c) The molar solubilities of MY and NY$_3$ in water are identical

(d) The molar solubility of MY in water is less than that of NY$_3$

157) What is the pH of the resulting solution when equal volumes of 0.1M NaOH and 0.01M HCl are mixed?

(a) 2.0 (b) 3 (c) 7.0 (d) 12.65

158) The dissociation constant of a weak acid is 1×10^{-3}. In order to prepare a buffer solution with a pH = 4, the [Acid]/[Salt] ratio should be

(a) 4:3 (b) 3:4 (c) 10:1 (d) 1:10

159) The pH of 10^{-5}M KOH solution will be

(a) 9 (b) 5 (c) 19 (d) none of these

160) H$_2$PO$_4^-$ the conjugate base of

(a) PO$_4^{3-}$ (b) P$_2$O$_5$ (c) H$_3$PO$_4$ (d) HPO$_4^{2-}$

161) Which of the following can act as Lowery – Bronsted acid well as base?

(a) HCl (b) SO$_4^{2-}$ (c) HPO$_4^{2-}$ (d) Br$^-$

162) The pH of an aqueous solution is Zero. The solution is

(a) slightly acidic (b) strongly acidic (c) neutral (d) basic

163) The hydrogen ion concentration of a buffer solution consisting of a weak acid and its salts is given by

(a) $[H^+] = \dfrac{K_a[acid]}{[salt]}$ (b) $[H^+] = K_a[salt]$ (c) $[H^+] = K_a[acid]$ (d) $[H^+] = \dfrac{K_a[salt]}{[acid]}$

164) Which of the following relation is correct for degree of hydrolysis of ammonium acetate?

(a) $h = \sqrt{\dfrac{K_h}{C}}$ (b) $h = \sqrt{\dfrac{K_h}{K_b}}$ (c) $h = \sqrt{\dfrac{K_h}{K_a \cdot K_b}}$ (d) $h = \sqrt{\dfrac{K_a \cdot K_b}{K_h}}$
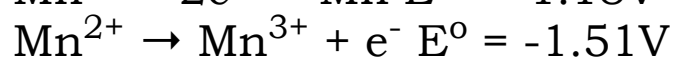
165) Dissociation constant of NH$_4$OH is 1.8×10^{-5} the hydrolysis constant of NH$_4$Cl would be

(a) 1.8×10^{-19} (b) 5.55×10^{-10} (c) 5.55×10^{-5} (d) 1.80×10^{-5}

166) The number of electrons that have a total charge of 9650 coulombs is

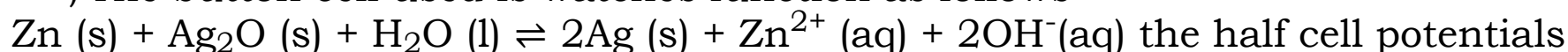(a) 6.22×10^{23} (b) 6.022×10^{24} (c) 6.022×10^{22} (d) 6.022×10^{-34}

167) Consider the following half cell reactions.
Mn^{2+} + 2e$^-$ → Mn E° = -1.18V
Mn^{2+} → Mn^{3+} + e$^-$ E° = -1.51V
The E° for the reaction 3Mn^{2+} → Mn + 2Mn^{3+}, and the possibility of the forward reaction are respectively

(a) 2.69V and spontaneous (b) -2.69 and non spontaneous

(c) 0.33V and Spontaneous (d) 4.18V and non spontaneous

168) The button cell used is watches function as follows
Zn (s) + Ag$_2$O (s) + H$_2$O (l) ⇌ 2Ag (s) + Zn^{2+} (aq) + 2OH$^-$(aq) the half cell potentials are Ag$_2$O (s) + H$_2$O (l) + 2e$^-$ → 2Ag (s) + 2OH$^-$ (aq) E° = 34V and Zn (s) → Zn^{2+} (aq) + 2e$^-$ E° = 0.76V . The cell potential will be

(a) 0.84V (b) 1.34V (c) 1.10V (d) 0.42V

169) The molar conductivity of a 0.5 mol dm^{-3} solution of $AgNO_3$ with electrolytic conductivity of 5.76 $\times10^{-3}$ S cm^{-1} at 298 K is

(a) 2.88 S cm^{2}mol^{-1} (b) 11.52 S cm^{2}mol^{-1} (c) 0.086 S cm^{2}mol^{-1} (d) 28.8 S cm^{2}mol^{-1}

170)

Electrolyte	KCl	KNO$_3$	HCl	NaOAC	NaCl
Λ_- (Scm^2 mol^{-1})	149.9	145.0	426.2	91.0	126.5

Calculate Λ^o_{HoAC} using appropriate molar conductances of the electrolytes listed above at infinite dilution in water at 25°C.

(a) 517.2   (b) 552.7   (c) 390.7   (d) 217.5

171) Faraday constant is defined as

(a) charge carried by 1 electron   (b) charge carried by one mole of electrons

(c) charge required to deposit one mole of substance

(d) charge carried by 6.22 $\times10^{10}$ electrons

172) How many faradays of electricity are required for the following reaction to occur
$MnO_4^- \rightarrow Mn^{2+}$

(a) 5F   (b) 3F   (c) 1F   (d) 7F

173) A current strength of 3.86 A was passed through molten Calcium oxide for 41 minutes and 40 seconds. The mass of Calcium in grams deposited at the cathode is (atomic mass of Ca is 40g / mol and 1F = 96500C).

(a) 4   (b) 2   (c) 8   (d) 6

174) During electrolysis of molten sodium chloride, the time required to produce 0.1mole of chlorine gas using a current of 3A is

(a) 55 minutes   (b) 107.2 minutes   (c) 220 minutes   (d) 330 minutes

175) The number of electrons delivered at the cathode during electrolysis by a current of 1A in 60 seconds is (charge of electron = 1.6 $\times10^{-19}$C)

(a) 6.22 $\times10^{23}$ (b) 6.022 $\times10^{20}$ (c) 3.75 $\times10^{20}$ (d) 7.48 $\times10^{23}$

176) Which of the following electrolytic solution has the least specific conductance

(a) 2N   (b) 0.002N   (c) 0.02N   (d) 0.2N

177) While charging lead storage battery

(a) $PbSO_4$ on cathode is reduced to Pb   (b) $PbSO_4$ on anode is oxidised to PbO_2

(c) $PbSO_4$ on anode is reduced to Pb   (d) $PbSO_4$ on cathode is oxidised to Pb

178) Among the following cells
I) Leclanche cell
II) Nickel – Cadmium cell
III) Lead storage battery
IV) Mercury cell
Primary cells are

(a) I and IV   (b) I and III   (c) III and IV   (d) II and III

179) Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because

(a) Zinc is lighter than iron   (b) Zinc has lower melting point than iron

(c) Zinc has lower negative electrode potential than iron

(d) Zinc has higher negative electrode potential than iron

180) In H_2-O_2 fuel cell the reaction occur at cathode is

(a) $O_2(g) + 2H_2O\ (l) + 4e^- \rightarrow 4OH^-\ (aq)$ (b) $H^+(aq) + OH^-\ (aq) \rightarrow H_2O\ (l)$

(c) $2H_2\ (g) + O_2\ (g) \rightarrow 2H_2O\ (g)$ (d) $H^+ + e^- \rightarrow 1/2\ H_2$

181) The equivalent conductance of M/36 solution of a weak monobasic acid is 6 mho cm^2 equivalent^{-1} and at infinite dilution is 400 mho cm^2 equivalent^{-1}. The dissociation constant of this acid is

(a) 1.25×10^{-6} (b) 6.25×10^{-6} (c) 1.25×10^{-4} (d) 6.25×10^{-5}

182) A conductivity cell has been calibrated with a 0.01M, 1:1 electrolytic solution (specific conductance ($k = 1.25 \times 10^{-3} cm^{-1}$) in the cell and the measured resistance was 800 Ω at 25°C. The cell constant is

(a) $10^{-1} cm^{-1}$ (b) $10^1 cm^{-1}$ (c) $1 cm^{-1}$ (d) 5.7×10^{-12}

183) Conductivity of a saturated solution of a sparingly soluble salt AB (1:1 electrolyte) at 298K is 1.85×10^{-5} S m^{-1}. Solubility product of the salt AB at 298K $(\Lambda^o{}_m)_{AB} = 14 \times 10^{-3}$ S m^2 mol^{-1}.

(a) 5.7×10^{-12} (b) 1.32×10^{-12} (c) 7.5×10^{-12} (d) 1.74×10^{-12}

184) In the electrochemical cell: Zn|ZnSO$_4$ (0.01M)|| CuSO$_4$ (1.0M)|Cu, the emf of this Daniel cell is E_1. When the concentration of ZnSO$_4$ is changed to 1.0M and that CuSO$_4$ changed to 0.01M, the emf changes to E_2. From the above, which one is the relationship between E_1 and E_2?

(a) $E_1 < E_2$ (b) $E_1 > E_2$ (c) $E_2 \geq E_1$ (d) $E_1 = E_2$

185) Consider the change in oxidation state of Bromine corresponding to different emf values as shown in the diagram below:

$$BrO_4^- \xrightarrow{1.82V} BrO_3^- \xrightarrow{1.5V} HBrO \xrightarrow{1.595v} Br_2 \xrightarrow{1.0652V} Br$$

Then the species undergoing disproportional is

(a) Br_2 (b) BrO_4^- (c) BrO^-_3 (d) HBrO

186) For the cell reaction
$2Fe^{3+}(aq) + 2I^-(aq) \rightarrow 2Fe^{2+}(aq) + I_2(aq)$
$E^o{}_{cell} = 0.24V$ = at 298K. The standard Gibbs energy (Δ, G^o) of the cell reactions is:

(a) -46.32 KJ mol^{-1} (b) -23.16 KJ mol^{-1} (c) 46.32 KJ mol^{-1} (d) 23.16 KJ mol^{-1}

187) A certain current liberated 0.504gm of hydrogen in 2 hours. How many grams of copper can be liberated by the same current flowing for the same time in a copper sulphate solution

(a) 31.75 (b) 15.8 (c) 7.5 (d) 63.5

188) A gas X at 1 atm is bubbled through a solution containing a mixture of 1MY$^-$ and 1MZ$^-$ at 25°C. If the reduction potential of Z > Y > X, then

(a) Y will oxidize X and not Z (b) Y will oxidize Z and not X

(c) Y will oxidize both X and Z (d) Y will reduce both X and Z

189) Cell equation: A + 2B$^-$ → A^{2+}+ 2B;
$A^{2+} + 2e^- \rightarrow A$ $E^o = +0.34V$ and $\log_{10} K = 15.6$ at 300K for cell reactions find E^o for
$B^1 + e^- \rightarrow B$

(a) 0.80 (b) 1.26 (c) -0.54 (d) -10.94

190) For Freundlich isotherm a graph of $\log \frac{x}{m}$ is plotted against log P. The slope of the line and its y – axis intercept respectively corresponds to

(a) $\frac{1}{n}$, K (b) $\log \frac{1}{n}$, K (c) $\frac{1}{n}$, log K (d) $\log \frac{1}{n}$, log K

191) Which of the following is incorrect for physisorption?

(a) reversible (b) increases with increase in temperature (c) low heat of adsorption
(d) increases with increase in surface area

192) Which one of the following characteristics are associated with adsorption?

(a) ΔG and ΔH are negative but ΔS is positive

(b) ΔG and ΔS are negative but ΔH is positive

(c) ΔG is negative but ΔH and ΔS are positive   (d) ΔG, ΔH and ΔS all are negative.

193) Fog is colloidal solution of

(a) solid in gas   (b) gas in gas   (c) liquid in gas   (d) gas in liquid

194) Statement :
To stop bleeding from an injury, ferric chloride can be applied. Which comment about the statement is justified?

(a) It is not true, ferric chloride is a poison.

(b) It is true, Fe^{3+} ions coagulate blood which is a negatively charged sol

(c) It is not true; ferric chloride is ionic and gets into the blood stream.

(d) It is true, coagulation takes place because of formation of negatively charged sol with Cl^-.

195) Hair cream is

(a) gel   (b) emulsion   (c) solid sol   (d) sol.

196) Which one of the following is correctly matched?

(a) Emulsion - Smoke   (b) Gel - butter   (c) foam - Mist   (d) whipped cream - sol

197) The most effective electrolyte for the coagulation of As_2S_3Sol is

(a) NaCl   (b) $Ba(NO_3)_2$ (c) $K_3[Fe(CN)_6]$ (d) $Al_2(SO_4)_3$

198) Which one of the is not a surfactant?

(a) CH_3 -$(CH_2)_{15}$ -N^+ -$(CH_3)_2$ CH_2Br (b) CH_3 -$(CH_2)_{15}$ -NH_2

(c) CH_3 -$(- CH_2-)$-$_{16}CH_2$ OSO_2^- Na^+ (d) OHC-$(CH_2)_{14}$ -CH_2 -COO^- Na^+

199) The phenomenon observed when a beam of light is passed through a colloidal solution is

(a) Cataphoresis   (b) Electrophoresis   (c) Coagulation   (d) Tyndall effect

200) In an electrical field, the particles of a colloidal system move towards cathode. The coagulation of the same sol is studied using K_2SO_4
(i), Na_3 PO_4
(ii), K_4 $[Fe(CN)_6]$
(iii) and NaCl
(iv) Their coagulating power should be

(a) II > I > IV > III   (b) III > II > I > IV   (c) I > II > III > IV   (d) none of these

201) Collodion is a 4% solution of which one of the following compounds in alcohol – ether mixture?

(a) Nitroglycerine   (b) Cellulose acetate   (c) Glycoldinitrate   (d) Nitrocellulose

202) Which one of the following is an example for homogeneous catalysis?

(a) manufacture of ammonia by Haber's process

(b) manufacture of sulphuric acid by contact process   (c) hydrogenation of oil

(d) Hydrolysis of sucrose in presence of all HCl

203) Match the following

a	V_2O_5	i	High density polyethylene
b	Ziegler – Natta	ii	PAN
c	Peroxide	iii	NH_3
d	Finely divided Fe	iv	H_2SO_4

(a)	(b)	(c)	(d)
A B C D	A B C D	A B C D	A B C D
iv i ii iii	i ii iv iii	ii iii iv i	iii iv ii i

204) The coagulation values in millimoles per litre of the electrolytes used for the coagulation of As_2S_3 are given below

(I) (NaCl) = 52

(II) ($BaCl_2$) = 0.69

(III) ($MgSO_4$) = 0.22

The correct order of their coagulating power is

(a) III > II > I   (b) I > II > III   (c) I > III > II   (d) II > III > I

205) Adsorption of a gas on solid metal surface is spontaneous and exothermic, then

(a) ΔH increases   (b) ΔS increases   (c) ΔG increases   (d) ΔS decreases

206) If x is the amount of adsorb ate and m is the amount of adsorbent, which of the following relations is not related to adsorption process?

(a) x/m = f(P) at constant T   (b) x/m = f(T) at constant P   (c) P = f(T) at constant x/m

(d) x/m = PT

207) On which of the following properties does the coagulating power of an ion depend?

(a) Both magnitude and sign of the charge on the ion.   (b) Size of the ion alone

(c) the magnitude of the charge on the ion alone

(d) the sign of charge on the ion alone.

208) Match the following

a	Pure nitrogen	i	Chlorine
b	Haber process	ii	Sulphuric acid
c	Contact process	iii	Ammonia
d	Deacons Process	iv	Sodium azide (or) Barium azide

Which of the following is the correct option?

| (a)	(b)	(c)	(d)
A B C D	A B C D	A B C D	A B C D
i ii iii iv	ii iv i iii	iii iv ii i	iv iii ii i

209) An alcohol (x) gives blue colour in victormayer's test and 3.7g of X when treated with metallic sodium liberates 560 mL of hydrogen at 273 K and 1 atm pressure what will be the possible structure of X?

(a) $CH_3 CH (OH) CH_2CH_3$ (b) $CH_3 – CH (OH) – CH_3$ (c) $CH_3 – C (OH) – (CH_3)_2$

(d) $CH_3- CH_2 –CH (OH) – CH_2 – CH_3$

210) Which of the following compounds on reaction with methyl magnesium bromide will give tertiary alcohol.

(a) benzaldehyde   (b) propanoic acid   (c) methyl propanoate   (d) acetaldehyde

211) The X is
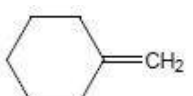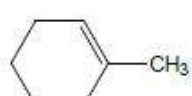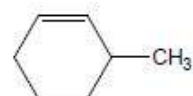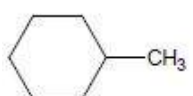
(a) (b) (c) (d) None of these
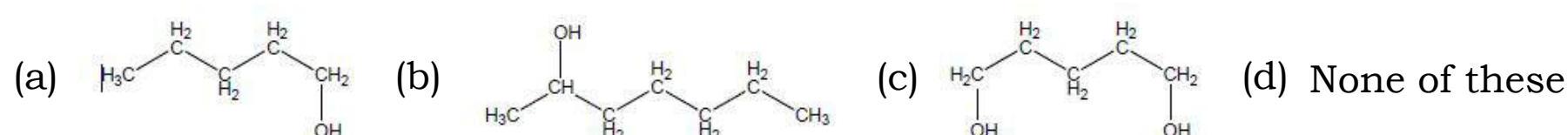
212) In the reaction sequence, Ethane $\xrightarrow{HOCl} A \xrightarrow{x}$ ethan -1, 2 - diol. A and X respectively are

(a) Chloroethane and NaOH (b) ethanol and H_2SO_4

(c) 2 – chloroethan -1-ol and $NaHCO_3$ (d) ethanol and H_2O

213) Which one of the following is the strongest acid

(a) 2 - nitrophenol (b) 4 – chlorophenol (c) 4– nitrophenol (d) 3 – nitrophenol

214) on treatment with Con H_2SO_4, predominately gives

(a)   (b)   (c)   (d)

215) Carbolic acid is

(a) Phenol (b) Picri cacid (c) benzoic acid (d) phenylacetic acid

216) Which one of the following will react with phenol to give salicyladehyde after hydrolysis.

(a) Dichlo methane (b) trichloroethane (c) trichloro methane (d) CO_2

217) $(CH_3)_3$-C-CH(OH) CH_3 $\xrightarrow{conH_2SO_4}$ X (major product)

(a) $(CH_3)_3$ CCH = CH_2 (b) $(CH_3)_2C = C (CH_3)_2$ (c) $CH_2= C(CH_3)CH_2$-CH_2- CH_3

(d) $CH_2= C (CH_3) - CH_2$- CH_2- CH_3
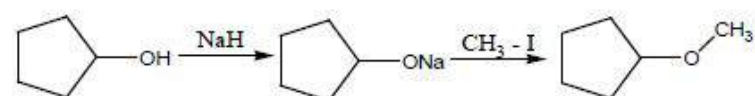
218) The correct IUPAC name of the compound
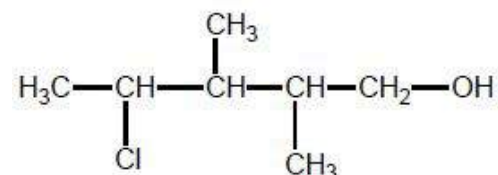
(a) 4 – chloro – 2,3 – dimethyl pentan – 1-ol (b) 2,3 – dimethyl – 4- chloropentan -1-ol

(c) 2,3,4 – trimethyl – 4- chlorobutan -1-ol

(d) 4– chloro – 2,3,4 – trimethyl pentan – 1-ol

219) In the reaction Ethanol $\xrightarrow{PCl_5} X \xrightarrow{alc.KOH} Y \xrightarrow{H_2SO_4/H_2O}_{298k} Z$. The 'Z' is

(a) ethane (b) ethoxyethane (c) ethylbisulphite (d) ethanol

220) The reaction

Can be classified as

(a) dehydration (b) Williams on alcoholsynthesis (c) Williamson ether synthesis

(d) dehydrogenation of alcohol

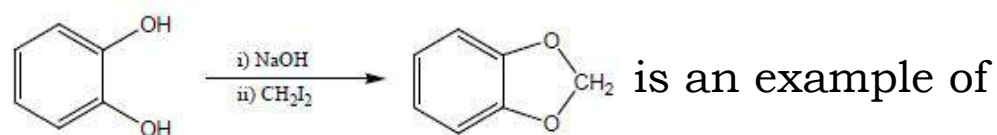221) HO CH_2 CH_2 – OH on heating with periodic acid gives

(a) methanoic acid (b) Glyoxal (c) methanol (d) CO_2

222) Which of the following compound can be used as antifreeze in automobile rediators?

(a) methanol (b) ethanol (c) Neopentyl alcohol (d) ethan -1, 2-diol

223) The reactions

 is an example of

(a) Wurtz reaction (b) cyclic reaction (c) Williamson reaction (d) Kolbe reactions

224) One mole of an organic compound (A) with the formula C_3H_8O reacts completely with two moles of HI to form X and Y. When Y is boiled with aqueous alkali it forms Z. Z answers the iodoform test. The compound (A) is

(a) propan – 2-ol (b) propan -1-ol (c) ethoxy ethane (d) methoxy ehane

225) Among the following ethers which one will produce methyl alcohol on treatment with hot HI?

(a) $(H_3C)_3C\text{-}O\text{-}CH_3$ (b) $(CH_3\text{-})_2\text{-}CH\text{-}CH_2\text{-}O\text{-}CH_3$ (c) $CH_3\text{-}(CH_2)_3\text{-}O\text{-}CH_3$

(d) $CH_3\text{-}CH_2\text{-}\overset{|}{C}HCH_3\text{-}O\text{-}CH_3$

226) Williamson synthesis of preparing dimethyl ether is a / an

(a) SN^1 reactions (b) SN^2 reaction (c) electrophilic addition
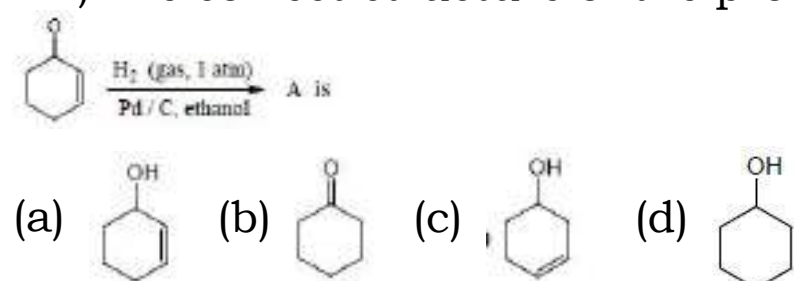
(d) electrophilic substitution

227) On reacting with neutral ferric chloride, phenol gives

(a) red colour (b) violet colour (c) dark green colour (d) no colouration.

228) Isoprophylbenzene on air oxidation in the presence of dilute acid gives

(a) C_6H_5COOH (b) $C_6H_5COCH_3$ (c) $C_6H_5COC_6H_5$ (d) $C_6H_5\text{-}OH$

229) The correct structure of the product 'A' formed in the reaction

(a) (b) (c) (d)

230) The formation of cyanohydrin from acetone is an example of

(a) nucleophilic substitution (b) electrophilic substitution (c) electrophilic addition

(d) Nucleophilic addition

231) Reaction of acetone with one of the following reagents involves nucleophilic addition followed by elimination of water. The reagent is

(a) Grignard reagent (b) Sn / HCl (c) hydrazine in presence of slightly acidic solution

(d) hydrocyanic acid

232)
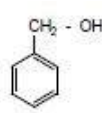In the following reaction, $HC \equiv \xrightarrow{H_2SO_4} HgSO_4 X$ Product 'X' will not give

(a) Tollen's test (b) Victor meyer test (c) Iodoform test (d) Fehling solution test

233)
$CH_2 = CH_2 \xrightarrow[zn/H_2O]{i)O_3} X \xrightarrow{NH_3} Y \, 'Y'$ is

(a) Formaldelyde (b) di acetone ammonia (c) hexamethylene tetraamine (d) oxime

234) Predict the product Z in the following series of reactions Ethanoic acid
$\xrightarrow{PCI_5} X \xrightarrow[Anhydrous\ AlCI_3]{C_6H_6} Y \xrightarrow[II)H_3O^+]{1)CH_3MgBr} Z.$
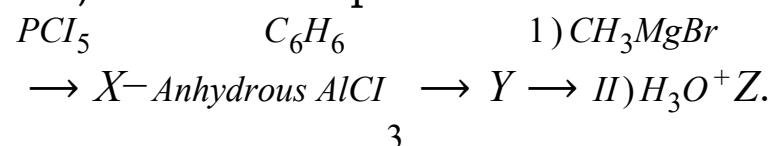
(a) $(CH_3)_2 C(OH)C_6H_5$ (b) $CH_3CH(OH)C_6H_5$ (c) $CH_3CH(OH)CH_2\text{-} CH_3$ (d)

235) Which of the following represents the correct order of acidity in the given compounds

(a) $FCH_2COOH > CH_3COOH > BrCH_2COOH > ClCH_2COOH$

(b) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH > CH_3COOH$

(c) $CH_3COOH > ClCH_2COOH > FCH_2COOH > Br\text{-}CH_2COOH$

(d) $Cl\, CH_2COOH > CH_3COOH > BrCH_2COOH > ICH_2COOH$

236) Benzoic acid $\xrightarrow[ii)\Delta A]{i)NH_3}$ $\xrightarrow{NaOBr}$ B $\xrightarrow{NaNO_2/HCl}$ C $'C'$ is

(a) anilinium chloride   (b) O – nitro aniline   (c) benzene diazonium chloride
(d) m– nitro benzoic acid

237) Ethanoic acid $\xrightarrow{P/Br_2}$ 2-bromoethanoic acid. This reaction is called

(a) Finkelstein reaction   (b) Haloform reaction   (c) Hell – Volhard – Zelinsky reaction
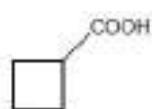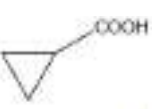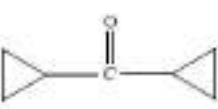(d) none of these

238) $CH_3Br \xrightarrow{KCN} (A) \xrightarrow{H_2O^+} (B) \xrightarrow{PCl_5} (C)$ product (c) is

(a) acetylchloride   (b) chloro acetic acid   (c) α- chlorocyano ethanoic acid
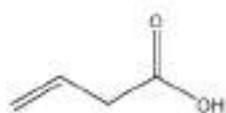(d) none of these

239) Which one of the following reduces tollens reagent
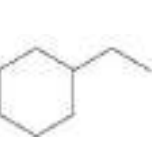
(a) formic acid   (b) acetic acid   (c) benzophenone   (d) none of these

240)
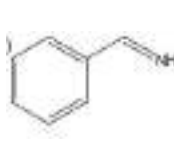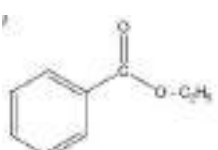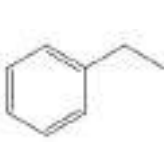
(a)   (b)   (c)   (d)

241) The IUPAC name of
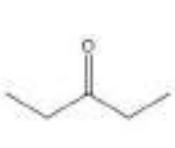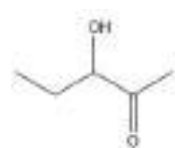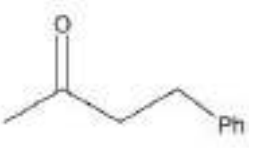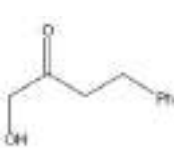
(a) but – 3- enoicacid   (b) but – 1- ene-4-oic acid   (c) but – 2- ene-1-oic acid
(d) but -3-ene-1-oicacid

242) Identify the product formed in the reaction

(a)   (b)   (c)   (d)

243) In which case chiral carbon is not generated by reaction with HCN

(a)   (b)   (c)   (d)

244) Which one of the following reaction is an example of disproportionation reaction

(a) Aldol condensation   (b) cannizaro reaction   (c) Benzoin condensation
(d) none of these

245) Which one of the following undergoes reaction with 50% sodium hydroxide solution to give the corresponding alcohol and acid

(a) Phenylmethanal   (b) ethanal   (c) ethanol   (d) methanol

246) The reagent used to distinguish between acetaldehyde and benzaldehyde is

(a) Tollens reagent   (b) Fehling's solution   (c) 2,4 – dinitrophenyl hydrazine
(d) semicarbazide

247) Phenyl methanal is reacted with concentrated NaOH to give two products X and Y. X reacts with metallic sodium to liberate hydrogen X and Y are

(a) sodium benzoate and phenol   (b) Sodium benzoate and phenyl methanol
(c) phenyl methanol and sodium benzoate   (d) none of these

248) In which of the following reactions new carbon – carbon bond is not formed?

(a) Aldol condensation (b) Friedel craft reaction (c) Kolbe's reaction

(d) Wolf kishner reduction

249) An alkene "A" on reaction with O_3 and Zn - H_2O gives propanone and ethanol in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is

(a)
$$Cl-CH_2-CH_2-\underset{\underset{CH_3}{|}}{CH}$$

(b)
$$H_3C-CH_2-\underset{\underset{}{|}}{\overset{\overset{CH_2Cl}{|}}{CH}}-CH_3$$

(c)
$$H_3C-CH_2-\underset{\underset{CL}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$$

(d)
$$H_3C-CH-\underset{\underset{Cl}{|}}{\overset{\overset{CH_3}{|}}{C}}$$

250) Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their

(a) more extensive association of carboxylic acid via van der Waals force of attraction

(b) formation of carboxylate ion (c) formation of intramolecular H-bonding

(d) formation of intermolecular H – bonding

251) Which of the following reagent can be used to convert nitrobenzene to aniline

(a) Sn / HCl (b) ZnHg / NaOH (c) Zn/NH_4Cl (d) All of these

252) The method by which aniline cannot be prepared is

(a) degradation of benzamide with Br_2 / NaOH

(b) potassium salt of phthalimide treated with chlorobenzene followed by hydrolysis with aqueous NaOH solution.

(c) reduction of Nitrobenzene with $LiAlH_4$ (d) reduction of nitrobenzene by Sn / HCl

253) Which one of the following will not undergo Hofmann bromamide reaction

(a) $CH_3CONHCH_3$ (b) $CH_3CH_2CONH_2$ (c) CH_3CONH_2 (d) $C_6H_5CONH_2$

254)
$$CH_3CH_2\,Br \xrightarrow[\Delta]{aqNaOH} A \xrightarrow[\Delta]{KMnO_4/H^+} B \xrightarrow[\Delta]{NH_3} C \xrightarrow{Br_2/NaOH} D \quad D'\,is$$

(a) bromomethane (b) α-bromo sodium acetate (c) methanamine (d) acetamide

255) Which one of the following nitro compounds does not react with nitrous acid

(a) CH_3 -CH_2 -CH_2 -NO_2 (b) $(CH_3)_2$ CH - CH_2NO_2 (c) $(CH_3)_3$ C NO_2

(d)
$$CH_3-\overset{\overset{||}{O}}{C}-\overset{\overset{||}{}}{C}HCH_3-NO_2$$

256)
$$\text{Aniline + benzoylchloride} \xrightarrow{NaOH} C_6H_5 - NH - COC_6\,H_5 \text{ this reaction is known as}$$

(a) Friedel – crafts reaction (b) HVZ reaction (c) Schotten – Baumann reaction

(d) none of these

257) The product formed by the reaction an aldehyde with a primary amine

(a) carboxylic acid (b) aromatic acid (c) schiff 's base (d) ketone

258) Which of the following reaction is not correct.

(a)
$$CH_3\,CH_2\,NH_2 \xrightarrow{HNO_2} CH_3CH_2\,OH + N_2$$

(b) $(CH_3)_2$ N—⟨ ⟩ $\xrightarrow{NaNO_2\,/\,HCl}$ $(CH_3)_2$ N—⟨ ⟩—N = NCl

(c)
$$CH_2\,CONH_2 \xrightarrow{Br_2/NaOH} CH_3\,NH_2$$

(d) none of these

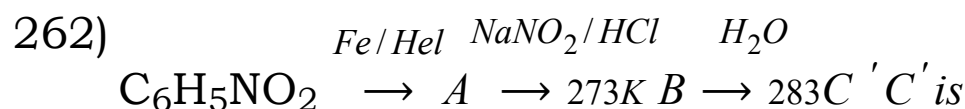259) When aniline reacts with acetic anhydride the product formed is

(a) o – aminoacetophenone (b) m-aminoacetophenone (c) p – aminoacetophenone

(d) acetanilide

260) The order of basic strength for methyl substituted amines in aqueous solution is

(a) $N(CH_3)_3 > N(CH_3)_2H > N(CH_3)H_2 > NH_3$ (b) $N(CH_3)H_2 > N(CH_3)_2H > N(CH_3)_3 > NH_3$

(c) $NH_3 > N(CH_3)H_2 > N(CH_3)_2H > N(CH_3)_3$ (d) $N(CH_3)_2H > N(CH_3)H_2 > N(CH_3)_3 > NH_3$

261)

'A' is
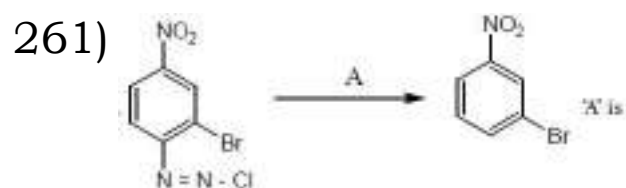
(a) H_3PO_2 and H_2O (b) H^+/H_2O (c) $HgSO_4/H_2SO_4$ (d) Cu_2Cl_2

262)

$$C_6H_5NO_2 \xrightarrow{Fe/Hcl} A \xrightarrow[273K]{NaNO_2/HCl} B \xrightarrow[283C]{H_2O} C \quad 'C' \text{ is}$$

(a) C_6H_5-OH (b) $C_6H_5-CH_2OH$ (c) C_6H_5-COH (d) $C_6H_5NH_2$

263) Nitrobenzene on reaction with Con HNO_3 / H_2SO_4 at 80-100°C forms which one of the following products?

(a) 1,4 – dinitrobenzene (b) 2,4,6 – tirnitrobenzene (c) 1,2 – dinitrobenzene

(d) 1,3 – dinitrobenzene

264) $C_5H_{13}N$ reacts with HNO_2 to give an optically active compound – The compound is

(a) pentan – 1- amine (b) pentan – 2- amine (c) N,N – dimethylpropan -2-amine

(d) diethyl methyl amine

265) Secondary nitro alkanes react with nitrous acid to form
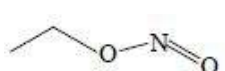
(a) red solution (b) blue solution (c) green solution (d) yellow solution

266) Which of the following amines does not undergo acetylation?

(a) t – butylamine (b) ethylamine (c) diethylamine (d) triethylamine

267) Which one of the following is most basic?

(a) 2,4 – dichloroaniline (b) 2,4 – dimethyl aniline (c) 2,4 – dinitroaniline

(d) 2,4 – dibromoaniline

268) When is reduced with Sn / HCl the pair of compounds formed are
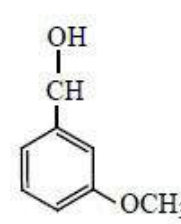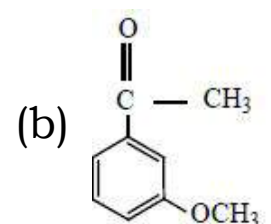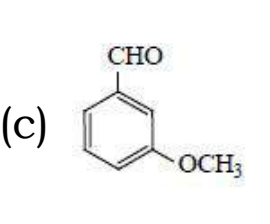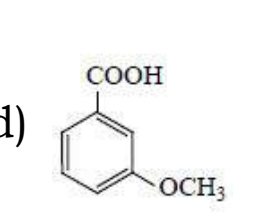
(a) Ethanol, hydrozylamine hydrochloride (b) Ethanol, ammonium hydroxide

(c) Ethanol, NH_2OH (d) $C_3H_5NH_2$, H_2O

269) IUPAC name for the amine
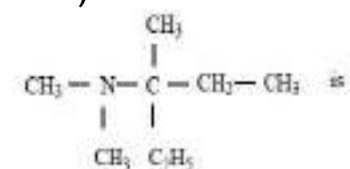
(a) 3 – Bimethylamino – 3 – methyl pentane (b) 3 (N,N – Triethyl) – 3- amino pentane

(c) 3 – N,N – trimethyl pentanamine (d) N,N – dimethyl – 3- methyl - pentan - 3 amine

270)

 P Product 'P' in the above reaction is

271) Ammonium salt of benzoic acid is heated strongly with and the product so formed is reduced and then treated with $NaNO_2$ / HCl at low temperature. The final compound formed is

(a) Benzene diazonium chloride (b) Benzyl alcohol (c) Phenol (d) Nitrosobenzene

272) Identify X in the sequence give below

(a) H₂N—⟨benzene⟩—Cl (b) C≡N—⟨benzene⟩—Cl (c) N≡C—⟨benzene⟩—Cl (d) CH₃—NH—⟨benzene⟩—Cl
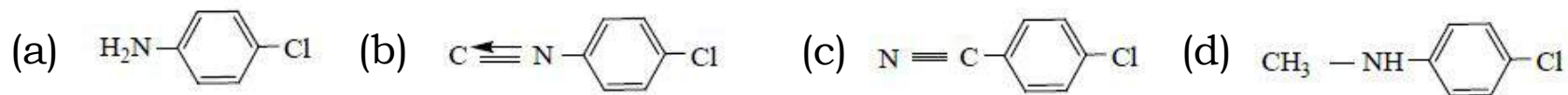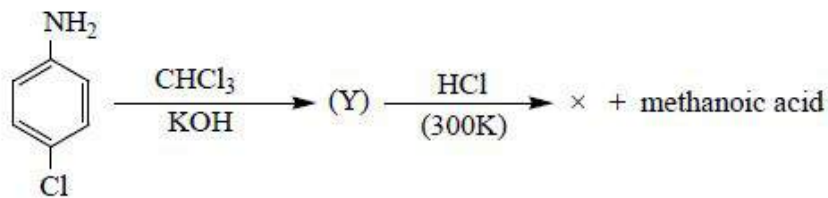
273) Among the following, the reaction that proceeds through an electrophilic substitution, is :

(a) ⟨benzene⟩—N₂Cl →(Cu₂Cl₂)→ ⟨benzene⟩—CH₂N₂   (b) ⟨benzene⟩ + Cl₂ →(AlCl₃)→ ⟨benzene⟩—Cl+HCl   (c) ⟨benzene⟩ + Cl₂ →(UV light)→ ⟨hexachlorocyclohexane⟩

(d) ⟨benzene⟩—CH₂OH+HCl →(heat)→ ⟨benzene⟩—CH₂Cl + H₂O
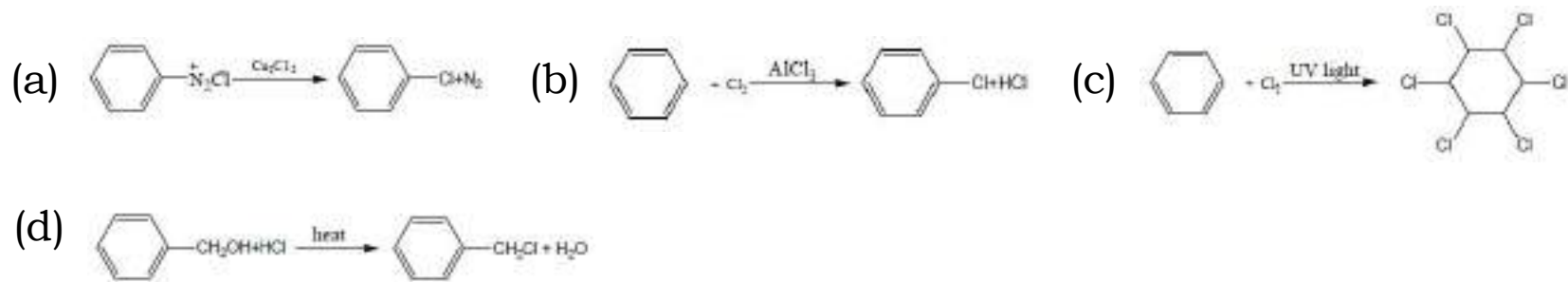
274) The major product of the following reaction

(a) ⟨o-COOH, CONH₂⟩ (b) ⟨imide NH⟩ (c) ⟨o-COOH, NH₂⟩ (d) ⟨o-NH₂, NH₂⟩
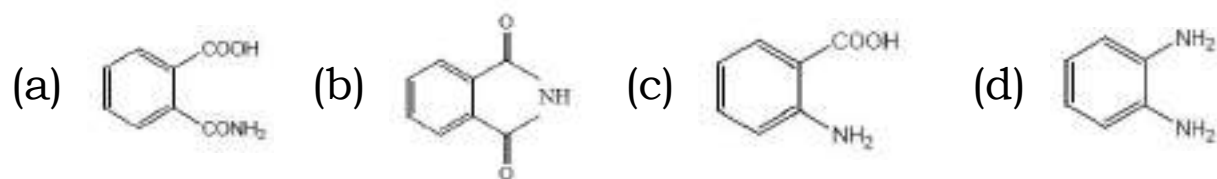
275) Which one of the following rotates the plane polarized light towards left?

(a) D(+) Glucose   (b) L(+) Glucose   (c) D(-) Fructose   (d) D(+) Galactose

276) The correct corresponding order of names of four aldoses with configuration given below Respectively is

(a) L-Erythrose, L-Threose, L-Erythrose, D-Threose
(b) D-Threose, D-Erythrose, L-Threose, L-Erythrose,
(c) L-Erythrose, L-Threose, D-Erythrose, D-Threose
(d) D-Erythrose, D-Threose, L-Erythrose, L-Threose

277) Which one given below is a non-reducing sugar?

(a) Glucose   (b) Sucrose   (c) maltose   (d) Lactose

278)   Glucose →(HCN)→ Product →(hydrolysis)→ Product →(HI+ Heat)→ A , the compound A is

(a) Heptanoic acid   (b) 2-Iodohexane   (c) Heptane   (d) Heptanol

279) The central dogma of molecular genetics states that the genetic information flows from

(a) Amino acids Protein DNA   (b) DNA Carbohydrates Proteins   (c) DNA RNA Proteins
(d) DNA RNA Carbohydrates

280) In a protein, various amino acids linked together by

(a) Peptide bond   (b) Dative bond   (c) α - Glycosidic bond   (d) β - Glycosidic bond

281) Among the following the achiral amino acid is

(a) 2-ethylalanine   (b) 2-methylglycine   (c) 2-hydroxymethylserine   (d) Tryptophan

282) The correct statement regarding RNA and DNA respectively is

(a) the sugar component in RNA is an arabinos and the sugar component in DNA is ribose

(b) the sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose

(c) the sugar component in RNA is an arabinose and the sugar component in DNA is 2'-deoxyribose

(d) the sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose

283) In aqueous solution of amino acids mostly exists in

(a) NH_2-CH(R)-COOH (b) NH_2-CH(R)-COO$^-$ (c) H_3N^+-CH(R)-COOH

(d) H_3N^+-CH(R)-COO$^-$

284) Which one of the following is not produced by body?

(a) DNA (b) Enzymes (c) Harmones (d) Vitamins

285) The number of sp2 and sp3 hybridised carbon in fructose are respectively

(a) 1 and 4 (b) 4 and 2 (c) 5 and 1 (d) 1 and 5

286) Vitamin B2 is also known as

(a) Riboflavin (b) Thiamine (c) Nicotinamide (d) Pyridoxine

287) The pyrimidine bases present in DNA are

(a) Cytosine and Adenine (b) Cytosine and Guanine (c) Cytosine and Thiamine

(d) Cytosine and Uracil

288) Among the following L-serine is

(a)   (b)   (c)   (d)
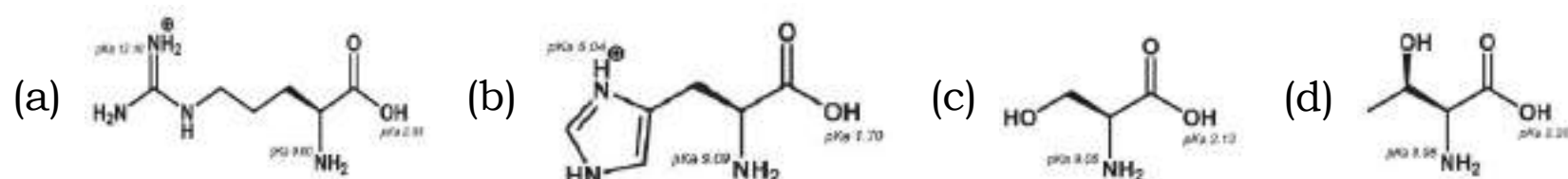
289) The secondary structure of a protein refers to

(a) fixed configuration of the polypeptide backbone (b) hydrophobic interaction

(c) sequence of α-amino acids (d) α − helical backbone.

290) Which of the following vitamins is water soluble?

(a) Vitamin E (b) Vitamin K (c) Vitamin A (d) Vitamin B

291) Complete hydrolysis of cellulose gives

(a) L-Glucose (b) D-Fructose (c) D-Ribose (d) D-Glucose

292) Which of the following statement is correct?

(a) Ovalbumin is a simple food reserve in egg-white

(b) Blood proteins thrombin and fibrinogen are involved in blood clotting

(c) Denaturation makes protein more active

(d) Insulin maintains the sugar level of in the human body

293) Glucose is an aldose. Which one of the following reactions is not expected with glucose?

(a) It does not form oxime (b) It does not react with Grignard reagent

(c) It does not form osazones (d) It does not reduce tollens reagent

294) If one strand of the DNA has the sequence 'ATGCTTGA', then the sequence of complementary strand would be

(a) TACGAACT (b) TCCGAACT (c) TACGTACT (d) TACGRAGT

295) Insulin, a hormone chemically is

(a) Fat (b) Steroid (c) Protein (d) Carbohydrates

296) α-D (+) Glucose and β-D (+) glucose are

(a) Epimers (b) Anomers (c) Enantiomers (d) Conformational isomers

297) Which of the following are epimers?

(a) D(+)-Glucose and D(+)-Galactose (b) D(+)-Glucose and D(+)-Mannose

(c) Neither (a) nor (b) (d) Both (a) and (b)

298) Which of the following amino acids are achiral?

(a) Alanine (b) Leucine (c) Proline (d) Glycine

299) Which of the following is an analgesic?

(a) Streptomycin (b) Chloromycetin (c) Asprin (d) Penicillin

300) Antiseptics and disinfectants either kill or prevent growth of microorganisms. Identify which of the following statement is not true.

(a) dilute solutions of boric acid and hydrogen peroxide are strong antiseptics.

(b) Disinfectants harm the living tissues

(c) A 0.2% solution of phenol is an antiseptic while 1% solution acts as a disinfectant

(d) Chlorine and iodine are used as strong disinfectants

301) Drugs that bind to the receptor site and inhibit its natural function are called

(a) antagonists (b) agonists (c) enzymes (d) molecular targets

302) Aspirin is a/an

(a) acetylsalicylic acid (b) benzoyl salicylic acid (c) chlorobenzoic acid

(d) anthranilic acid

303) Which one of the following structures represents nylon 6,6 polymer?

(a)   (b)   (c)   (d)
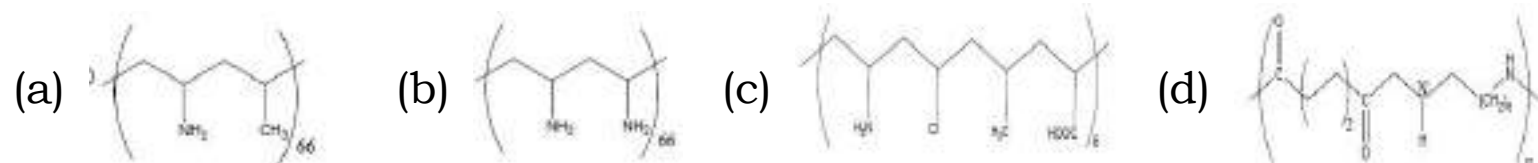
304) Natural rubber has

(a) alternate cis- and trans-configuration (b) random cis- and trans-configuration

(c) all cis-configuration (d) all trans-configuration

305) Nylon is an example of

(a) polyamide (b) polythene (c) polyester (d) poly saccharide

306) Terylene is an example of

(a) polyamide (b) polythene (c) polyester (d) polysaccharide

307) Which one of the following is a bio-degradable polymer?

(a) HDPE (b) PVC (c) Nylon 6 (d) PHBV

308) Non stick cook wares generally have a coating of a polymer, whose monomer is

(a) ethane (b) prop-2-enenitrile (c) chloroethene (d) 1,1,2,2-tetrafluoroethane

309) Which of the following is a co-polymer?

(a) Orlon (b) PVC (c) Teflon (d) PHBV

310) The polymer used in making blankets (artificial wool) is

(a) polystyrene (b) PAN (c) polyester (d) polythene

311) Regarding cross-linked or network polymers, which of the following statement is incorrect?

(a) Examples are Bakelite and melamine

(b) They are formed from bi and tri-functional monomers

(c) They contain covalent bonds between various linear polymer chains

(d) They contain strong covalent bonds in their polymer chain

312) Which is the monomer of neoprene in the following?

(a) $CH_2-\underset{Cl}{\overset{}{C}}-CH=CH_2$ (b) $CH_2 = CH - C \equiv CH$ (c) $CH_2 = CH - CH = CH_2$ (d) $CH_2-\underset{CH_3}{\overset{}{C}}-CH=CH_2$

160 x 2 = 320

313) What are the difference between minerals and ores?

314) What are the various steps involved in extraction of pure metals from their ores?

315) What is the role of Limestone in the extraction of Iron from its oxide Fe_2O_3?

316) Give the uses of zinc.

317) Explain the electrometallurgy of aluminium.

318) Give the basic requirement for vapour phase refining.

319) Describe the role of the following in the process mentioned.
(i) Silica in the extraction of copper.
(ii) Cryolite in the extraction of aluminium.
(iii) Iodine in the refining of Zirconium.
(iv) Sodium cyanide in froth floatation.

320) The selection of reducing agent depends on the thermodynamic factor: Explain with an example.

321) Describe briefly allotropism in p- block elements with specific reference to carbon.

322) What is catenation? describe briefly the catenation property of carbon

323) Write a note on Fisher tropsch synthesis

324) Give the structure of CO and CO_2.

325) Describe the structure of diborane.

326) Write a short note on hydroboration.

327) How will you identify borate radical?

328) Write a note on zeolites.

329) CO is a reducing agent. Justify with an example.

330) What is inert pair effect?

331) Chalcogens belongs to p-block. Give reason.

332) Give the oxidation state of halogen in the following.
a) OF_2
b) O_2F_2
c) Cl_2O_3
d) I_2O_4

333) Why fluorine is more reactive than other halogens?

334) What is the hybridisation of iodine in IF_7? Give its structure.

335) How will you prepare chlorine in the laboratory?

336) Give a reason to support that sulphuric acid is a dehydrating agent.

337) Write the molecular formula and structural formula for the following molecules.
a) Nitric acid
b) dinitrogen pentoxide
c) phosphoric acid
d) phosphine

338) Give the uses of argon.

339) Write the valence shell electronic configuration of group-15 elements.

340) Give two equations to illustrate the chemical behaviour of phosphine.

341) Give a reaction between nitric acid and a basic oxide.

342) What happens when PCl_5 is heated?

343) Suggest a reason why HF is a weak acid, whereas binary acids of the all other halogens are strong acids.

344) Deduce the oxidation number of oxygen in hypofluorous acid - HOF.

345) Explain the oxidation states of 4d series elements.

346) What are actinides? Give three example.

347) Describe the preparation of potassium dichromate.

348) What is lanthanide contraction and what are the effects of lanthanide contraction?

349) What are interstitial compounds?

350) Calculate the number of unpaired electrons in Ti^{3+} , Mn^{2+} and calculate the spin only magnetic moment.

351) Write the electronic configuration of Ce^{4+} and Co^{2+}.

352) Explain briefly how +2 states becomes more and more stable in the first half of the first row transition elements with increasing atomic number.

353) Why first ionization enthalpy of chromium is lower than that of zinc?

354) Transition metals show high melting points why?

355) Write the IUPAC names for the following complexes
 i) $Na_2[Ni(EDTA)]$

356) Write the formula for the following coordination compounds.
 a) potassiumhexacyanidoferrate(II)

357) Give an example of coordination compound used in medicine and two examples of biologically important coordination compounds.

358) $[Ti(H_2O)_6]^{3+}$ is coloured, while $[Sc(H_2O)6]^{3+}$ is colourless- explain.

359) Give an example for complex of the type $[Ma_2b_2c_2]$ where a, b, c are monodentate ligands and give the possible isomers.

360) In an octahedral crystal field, draw the figure to show splitting of d orbitals

361) What is linkage isomerism? Explain with an example

362) Classify the following ligand based on the number of donor atoms
 a) NH_3
 b) en
 c) ox^{2-}
 d) pyridine

363) Why tetrahedral complexes do not exhibit geometrical isomerism

364) Explain optical isomerism in coordination compounds with an example.

365) What is crystal field splitting energy?

366) What is crystal field stabilization energy (CFSE)?

367) Discuss briefly the nature of bonding in metal carbonyls.

368) Write the oxidation state, co-ordination number, nature of ligand, magnetic property and electronic configuration in octahedral crystal field for the complex $K_4[Mn(CN)_6]$

369) Write the IUPAC names for the following complexes
 iv) $[CO(ONO)(NH_3)_5]^{2+}$

370) Write the IUPAC names for the following complexes
 v) $[Pt(NH_3)_2Cl(NO_2)]$

371) Write the formula for the following coordination compounds.
 b) petacarbonyliron(0)

372) Write the formula for the following coordination compounds.
 d) hexaamminecobalt(III)sulphate

373) Write the formula for the following coordination compounds.
 e) sodiumtetrafluoridodihydroxidochromate(III)

374) Define unit cell.

375) Classify the following solids
  a. P_4
  b. Brass
  c. diamond
  d. NaCl
  e. Iodine

376) What are point defects?

377) Calculate the number of atoms in a fcc unit cell.

378) Why ionic crystals are hard and brittle?

379) What is the two dimensional coordination number of a molecule in square close packed layer?

380) KF crystallizes in fcc structure like sodium chloride. Calculate the distance between K^+ and F^- in KF. (given : density of KF is 248 g cm^{-3})

381) An atom crystallizes in fcc crystal lattice and has a density of 10 gcm^{-3} with unit cell edge length of 100pm. Calculate the number of atoms present in 1 g of crystal.

382) Explain the effect of catalyst on reaction rate with an example.

383) Explain briefly the collision theory of bimolecular reactions.

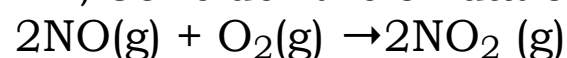384) Write Arrhenius equation and explains the terms involved.

385) The decomposition of Cl_2O_7 at 500K in the gas phase to Cl_2 and O_2 is a first order reaction. After 1 minute at 500K, the pressure of Cl_2O_7 falls from 0.08 to 0.04 atm. Calculate the rate constant in s^{-1}

386) A gas phase reaction has energy of activation 200 kJ mol^{-1}. If the frequency factor of the reaction is 1.6×10^{13}s^{-1}. Calculate the rate constant at 600 K.($e^{-40.09} = 3.8 \times 10^{-48}$)

387) A zero order reaction is 20% complete in 20 minutes. Calculate the value of the rate constant. In what time will the reaction be 80% complete?

388) The activation energy of a reaction is 22.5 k Cal mol^{-1} and the value of rate constant at 40°C is 1.8×10^{-5}s^{-1}. Calculate the frequency factor, A.

389) Consider the oxidation of nitric oxide to form NO_2
  $2NO(g) + O_2(g) \rightarrow 2NO_2$ (g)
  (a). Express the rate of the reaction in terms of changes in the concentration of NO,O_2 and NO_2.
  (b). At a particular instant, when [O_2] is decreasing at 0.2 mol L^{-1}s^{-1} at what rate is [NO_2] increasing at that instant?

390) The rate of the reaction X + 2y→ product is 4×10^{-3} mol L^{-1}S^{-1}, if [X] = [Y] = 0.2M and rate constant at 400K is 2×10^{-2}s^{-1}, What is the overall order of the reaction.

391) Rate constant k of a reaction varies with temperature T according to the following

Arrhenius equation $logK = logA - \dfrac{E_a}{2.303R}\left(\dfrac{1}{T}\right)$ Where E_a is the activation energy. When a

graph is plotted for log k Vs $\dfrac{1}{T}$ a straight line with a slope of -4000K is obtained. Calculate the activation energy.

392) What are Lewis acids and bases? Give two example for each.

393) Identify the conjugate acid base pair for the following reaction in aqueous solution
  i) HS$^-$ (aq) + HF $\rightleftharpoons$ F$^-$(aq) + H_2S(aq)
  ii) HPO^{2-}_4 + SO_3^{2-} $\rightleftharpoons$ PO_4^{3-} + HSO_3^-
  iii) NH_4^+ + CO_3^{2-} $\rightleftharpoons$ NH_3 + HCO_3^-
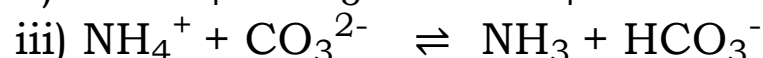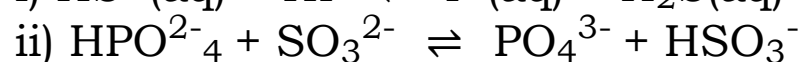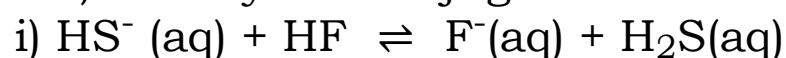
394) Account for the acidic nature of $HClO_4$ in terms of Bronsted – Lowry theory, identify its conjugate base.

395) Define solubility product.

396) Define pH.

397) K_{sp} of AgCl is 1.8×10^{-10}. Calculate molar solubility in 1 M AgNO$_3$

398) Calculate the concentration of OH⁻ in a fruit juice which contains 2×10^{-3} M, H_3O^+ ion. Identify the nature of the solution.

399) Calculate the pH of 0.001M HCl solution

400) A solution of 0.10M of a weak electrolyte is found to be dissociated to the extent of 1.20% at 25°C. Find the dissociation constant of the acid.

401) Calculate the pH of 0.1M CH_3COOH solution. Dissociation constant of acetic acid is 1.8×10^{-5}.

402) Define anode and cathode

403) Why does conductivity of a solution decrease on dilution of the solution

404) Describe the electrolysis of molten NaCl using inert electrodes

405) Explain the function of H_2 - O_2 fuel cell.

406) A solution of silver nitrate is electrolysed for 20 minutes with a current of 2 amperes. Calculate the mass of silver deposited at the cathode.

407) A conductivity cell has two platinum electrodes separated by a distance 1.5 cm and the cross sectional area of each electrode is 4.5 sq cm. Using this cell, the resistance of 0.5 N electrolytic solution was measured as 15 Ω. Find the specific conductance of the solution.

408) Calculate the molar conductance of 0.025M aqueous solution of calcium chloride at 25°C. The specific conductance of calcium chloride is 12.04 x 10^{-2} Sm^{-1}.

409) Give two important characteristics of physiscorption

410) In case of chemisorption, why adsorption first increases and then decreases with temperature?

411) Which will be adsorbed more readily on the surface of charcoal and why NH_3 or CO_2?

412) Heat of adsorption is greater for chemisorptions than physisorption. Why?

413) Peptising agent is added to convert precipitate into colloidal solution. Explain with an example.

414) What happens when a colloidal sol of $Fe(OH)_3$ and As_2S_3 are mixed?

415) Why are lyophillic colloidal sols are more stable than lyophobilc colloidal sol.

416) Addition of Alum purifies water. Why?

417) What are enzymes? Write a brief note on the mechanism of enzyme catalysis.

418) What do you mean by activity and selectivity of catalyst?

419) Describe some feature of catalysis by Zeolites.

420) Why does bleeding stop by rubbing moist alum

421) Why is desorption important for a substance to act as good catalyst?

422) Comment on the statement: Colloid is not a substance but it is a state of substance.

423) Explain any one method for coagulation

424) Formation of water due to the reaction of H_2 and O_2 in the presence of Cu proceeds as follows. Steps in the reaction $H_2 + 1/2O_2 \rightarrow H_2O$ can be given as

425) Oxidation of HCl by air in presence of $CuCl_2$ proceeds as follows

426) Write the structure of the aldehyde, carboxylic acid and ester that yield 4-methylpent -2-en-1-ol.

427) What is meta metamerism? Give the structure and IUPAC name of metamers of 2-methyoxy propane

428) Complete the following reactions

ii) $C_6H_5 - CH_2CH(OH)CH(CH_3)_2 \xrightarrow{ConH_2SO_4}$

429) How is propanoic acid is prepared starting from
(a) an alcohol

430) How will you convert benzaldehyde into the following compounds?
 (i) benzophenone

431) What is the action of HCN on
 (i) propanone

432) How will you prepare
 i. Acetic anhydride from acetic acid

433) How is propanoic acid is prepared starting from
 (b) an alkylhalide

434) How is propanoic acid is prepared starting from
 (c) an alkene

435) How will you convert benzaldehyde into the following compounds?
 (ii) benzoic acid

436) How will you convert benzaldehyde into the following compounds?
 (iii) α - hydroxyphenylaceticacid.

437) What is the action of HCN on
 (ii) 2,4-dichlorobenzaldehyde.

438) What is the action of HCN on
 (iii) ethanal

439) How will you prepare Ethylacetate from methylacetate

440) How will you prepare
  Lactic acid from ethanal

441) How will you prepare
 vi. Ethane from sodium acetate

442) How will you prepare Malachitegreen from benzaldehyde

443) How will you prepare
 x. Acetaldehyde from ethyne

444) Write down the possible isomers of the $C_4H_9NO_2$ give their IUPAC names

445) There are two isomers with the formula CH_3NO_2. How will you distinguish between
 them?

446) What happens when
 i. 2 – Nitropropane boiled with HCl

447) What happens when
 ii. Nitrobenezene undergo electrolytic reduction in strongly acidic medium.

448) What happens when
 iv. Oxidation of acetoneoxime with trifluoroperoxy acetic acid.

449) How will you convert nitrobenzene into
 ii. o and p- nitrophenol

450) How will you convert nitrobenzene into
 iii. m – nitro aniline

451) How will you convert nitrobenzene into
 vi. N – phenylhydroxylamine

452) What type of linkages hold together monomers of DNA?

453) Name the Vitamins whose deficiency cause
 i) rickets
 ii) scurvy

454) Write the Zwitter ion structure of alanine

455) Give two difference between Hormones and vitamins.

456) Write a note on denaturation of proteins.

457) Why carbohydrates are generally optically active.

458) Classify the following into monosaccharides, oligosaccharides and polysaccharides.
 i) Starch
 ii) fructose
 iii) sucrose
 iv) lactose
 iv) maltose
459) How are vitamins classified
460) What are harmones? Give examples
461) Define enzymes
462) Writhe the structure of α-D (+) glucophyranose
463) What are different types of RNA which are found in cell
464) Write a note on formation of α-helix .
465) What are the functions of lipids in living organism.
466) What are antibiotics?
467) Write a note on synthetic detergents
468) How do antiseptics differ from disinfectants?
469) What are food preservatives?
470) How the tranquilizers work in body?
471) Write the structural formula of aspirin.
472) Explain the mechanism of cleansing action of soaps and detergents.

<div align="right">150 x 3 = 450</div>

473) Which type of ores can be concentrated by froth floatation method? Give two
 examples for such ores.
474) Describe a method for refining nickel.
475) Explain the following terms with suitable examples.
 (i) Gangue
 (ii) slag
476) Write a short note on electrochemical principles of metallurgy.
477) Give the uses of Borax
478) Give the uses of silicones.
479) Write a note on metallic nature of p-block elements.
480) How will you convert boric acid to boron nitride?
481) Write a short note on anamolous properties of the first element of the p-block.
482) CO and CO_2 is reducing agent. Justify your answer.
483) What are silicates and write short note on Amphiboles
484) What are interhalogen compounds? Give examples.
485) Give the uses of helium.
486) Give the uses of sulphuric acid.
487) Write the reason for the anamolous behaviour of Nitrogen.
488) What are transition metals? Give four examples.
489) What are inner transition elements?
490) Justify the position of lanthanides and actinides in the periodic table.
491) Compare lanthanides and actinides.
492) Explain why Cr^{2+} is strongly reducing while Mn^{3+} is strongly oxidizing.
493) Compare the ionization enthalpies of first series of the transition elements.
494) Actinoid contraction is greater from element to element than the lanthanoid
 contraction, why?
495) Out of $Lu(OH)_3$ and $La(OH)_3$ which is more basic and why?
496) Why europium (II) is more stable than Cerium (II)?
497) Why do zirconium and Hafnium exhibit similar properties?

498) Which is stronger reducing agent Cr^{2+} or Fe^{2+}?

499) The $E^0_{M^{2+}/M}$ value for copper is positive. Suggest a possible reason for this.

500) Describe the variable oxidation state of 3d series elements.

501) Based on VB theory explain why $[Cr(NH_3)_6]^{3+}$ is paramagnetic, while $[Ni(CN)_4]^{2-}$ is diamagnetic.

502) Draw all possible geometrical isomers of the complex $[Co(en)_2Cl_2]^+$ and identify the optically active isomer.

503) Give the difference between double salts and coordination compounds.

504) What are hydrate isomers? Explain with an example.

505) Give any three characteristics of ionic crystals.

506) Explain briefly seven types of unit cell.

507) Distinguish between hexagonal close packing and cubic close packing.

508) Distinguish tetrahedral and octahedral voids.

509) Explain Schottky defect.

510) What is meant by the term 'coordination number'? What is the coordination number of atoms in a bcc structure?

511) Aluminium crystallizes in a cubic close packed structure. Its metallic radius is 125 pm. Calculate the edge length of unit cell.

512) Atoms X and Y form bcc crystalline structure. Atom X is present at the corners of the cube and Y is at the centre of the cube. What is the formula of the compound?

513) Sodium metal crystallizes in bcc structure with the edge length of the unit cell 4.3 x 10^8 cm. Calculate the radius of sodium atom.

514) Write a note on Frenkel defect.

515) Define average rate and instantaneous rate.

516) Define rate law and rate constant.

517) Derive integrated rate law for a zero order reaction A $\rightarrow$ product

518) Define half life of a reaction. Show that for a first order reaction half life is independent of initial concentration.

519) Explain the rate determining step with an example.

520) Describe the graphical representation of first order reaction.

521) The rate of formation of a dimer in a second order reaction is 7.5 X 10^{-3} mol L^{-1} s^{-1} at 0.05 mol L^{-1} monomer concentration. Calculate the rate constant.

522) For a reaction x + y + z $\rightarrow$ productsthe rate law is given by ratek $=k[x]^{3/2}[y]^{1/2}$. What is the overall order of the reaction and what is the order of the reaction with respect to z.

523) Explain pseudo first order reaction with an example.

524) How do concentrations of the reactant influence the rate of reaction?

525) How do nature of the reactant influence rate of reaction.

526) The rate constant for a first order reaction is 1.54 x 10^{-3} s-1. Calculate its half life time.

527) The time for half change in a first order decomposition of a substance A is 60 seconds. Calculate the rate constant. How much of A will be left after 180 seconds?

528) A first order reaction is 40% complete in 50 minutes. Calculate the value of the rate constant. In what time will the reaction be 80% complete?

529) (i) A first order reaction takes 8 hours for 90% completion. Calculate the time required for 80% completion. (log 5 = 0.6989 ; log10 = 1)

530) (ii) The half life of a first order reaction x $\rightarrow$products is 6.932 x 10^4 s at 500K. What percentage of x would be decomposed on heating at 500K for 100 min. ($e^{0.06}$ = 1.06).

531) Show that in case of first order reaction, the time required for 99.9% completion is nearly ten times the time required for half completion of the reaction.

532) Give two examples for zero order reaction.

533) The concentration of hydroxide ion in a water sample is found to be 2.5×10^{-6}M. Identify the nature of the solution.

534) A lab assistant prepared a solution by adding a calculated quantity of HCl gas 25^0C o to get a solution with $[H_3O^+] = 4 \times 10^{-5}$M. Is the solution neutral (or) acidic (or) basic.

535) Calculate the pH of 0.04 M HNO_3 Solution.

536) Define ionic product of water. Give its value at room temperature.

537) Explain common ion effect with an example.

538) Calculate the pH of 1.5×10^{-3} M solution of $Ba(OH)_2$

539) 50ml of 0.05M HNO_3 is added to 50ml of 0.025M KOH. Calculate the pH of the resultant solution.

540) The K_a value for HCN is 10^{-9}. What is the pH of 0.4M HCN solution?

541) Derive an expression for the hydrolysis constant and degree of hydrolysis of salt of strong acid and weak base.

542) Solubility product of Ag_2 CrO_4 4 is 1×10^{-12}. What is the solubility of Ag_2CrO_4 in 0.01M $AgNO_3$ solution?

543) Write the expression for the solubility product of Ca_3 $(PO_4)_2$

544) Write the expression for the solubility product of Hg_2Cl_2 .

545) Will a precipitate be formed when 0.150 L of 0.1M $Pb(NO_3)_2$ and 0.100L of 0.2 M NaCl are mixed? K_{sp} $(PbCl_2) = 1.2 \times 10^{-5}$.

546) K_{sp} of $Al(OH)_3$ is 1×10^{-15}M. At what pH does 1.0×10^{-3}M Al^{3+} precipitate on the addition of buffer of NH_4Cl and NH_4OH solution?

547) Calculate pH of 10^{-7} M HCl

548) Fine the pH of a buffer solution containing 0.20 mole per litre sodium acetate and 0.18 mole per litre acetic acid. K_a for acetic acid is 1.8×10^{-5}.

549) Establish a relationship between the solubility product and molar solubility for the following
a) $BaSO_4$
b) $Ag_2(CrO_4)$

550) Indicate find out whether lead chloride gets precipitated or not when 1 mL of 0.1M lead nitrate and 0.5 mL of 0.2 M NaCl solution are mixed? K_{sp} of $PbCl_2$ is 1.2×10^{-5} .

551) State Faraday's Laws of electrolysis

552) Describe the construction of Daniel cell. Write the cell reaction.

553) Why is anode in galvanic cell considered to be negative and cathode positive electrode?

554) Which of 0.1M HCl and 0.1 M KCl do you expect to have greater Λ_m^0 and why?

555) Why is AC current used instead of DC in measuring the electrolytic conductance?

556) 0.1M NaCl solution is placed in two different cells having cell constant 0.5 and 0.25 cm^{-1} respectively. Which of the two will have greater value of specific conductance.

557) A current of 1.608A is passed through 250 mL of 0.5M solution of copper sulphate for 50 minutes. Calculate the strength of Cu^{2+} after electrolysis assuming volume to be constant and the current efficiency is 100%.

558) Two metals M_1 and M_2 have reduction potential values of -xV and +yV respectively. Which will liberate H_2 and H_2SO_4.

559) In fuel cell H_2 and O_2 react to produce electricity. In the process, H_2 gas is oxidised at the anode and O_2 at cathode. If 44.8 litre of H_2 at 25^0C and 1 atm pressure reacts in 10 minutes, what is average current produced? If the entire current is used for electro deposition of Cu from Cu^{2+}, how many grams of Cu deposited?

560) The same amount of electricity was passed through two separate electrolytic cells containing solutions of nickel nitrate and chromium nitrate respectively. If 2.935 g of Ni was deposited in the first cell. The amount of Cr deposited in the another cell? Give : molar mass of Nickel and chromium are 58.74 and 52gm^{-1} respectively.

561) A copper electrode is dipped in 0.1M copper sulphate solution at 25°C. Calculate the electrode potential of copper. [Given: $E^0_{Cu^{2+}|Cu}$ = 0.34V].

562) Write a note on sacrificial protection.

563) Ionic conductance at infinite dilution of Al^{3+} and $SO_4{}^{2-}$ are 189 and 160 mho cm^2 equiv^{-1}. Calculate the equivalent and molar conductance of the electrolyte $Al_2(SO_4)_3$ at infinite dilution.

564) Differentiate physisorption and chemisorption

565) What is the difference between a sol and a gel?

566) What are the factors which influence the adsorption of a gas on a solid?

567) Give three uses of emulsions.

568) Write a note on electro osmosis

569) Write a note on catalytic poison

570) Identify the product (s) is / are formed when 1 – methoxy propane is heated with excess HI. Name the mechanism involved in the reaction

571) Draw the major product formed when 1-ethoxyprop-1-ene is heated with one equivalent of HI

572) Suggest a suitable reagent to prepare secondary alcohol with identical group using Grignard reagent.

573) What is the major product obtained when two moles of ethyl magnesium bromide is treated with methyl benzoate followed by acid hydrolysis.

574) Can we use nucelophiles such as NH_3,CH_3O^- for the Nucleophilic substitution of alcohols

575) Is it possible to oxidise t – butyl alcohol using acidified dichromate to form a carbonyl compound.

576) What happens when 1-penyl ethanol is treated with acidified $KMnO_4$.

577) Write the mechanism of acid catalysed dehydration of ethanol to give ethane.

578) How is phenol prepared form
i) chloro benzene
ii) isoprophy benzene

579) Explain Kolbe's reaction

580) How will you convert acetylene into n-butyl alcohol.

581) Phenol is distilled with Zn dust followed by friedel – crafts alkylation with prophyl chloride to give a compound B, B on oxidation gives (c) Indentify A,B and C.

582) 0.44g of a monohydric alcohol when added to methyl magnesium iodide in ether liberates at STP 112 cm^3 of methane with PCC the same alcohol form a carbonyl compound that answers silver mirror test. Identify the compound.

583) Write the structure of the major product of the aldol condensation of benzaldehyde with acetone.

584) How are the following conversions effected
(a) propanal into butanone

585) Oxidation of ketones involves carbon – carbon bond cleavage. Name the product (s) is / are formed on oxidising 2,5 – dimethyhexan – 3- one using strong oxidising agent.

586) How are the following conversions effected
(b) Hex-3-yne into hexan-3-one.

587) How are the following conversions effected
phenylmethanal into benzoic acid

588) How are the following conversions effected
phenylmethanal into benzoin

589) Identify compounds A, B and C in the following sequence of reactions.

i) $C_6H_5NO_2 \xrightarrow{Fe/HCL} A \xrightarrow[273KB]{HNO_2} \xrightarrow{C_6H_5OH} C$

590) Write short notes on the following
 i. Hofmann's bromide reaction

591) Account for the following
 i. Aniline does not undergo Friedel – Crafts reaction

592) How will you convert diethylamine into
 i) N, N – diethylacetamide
 ii) N – nitrosodiethylamine

593) Arrange the following
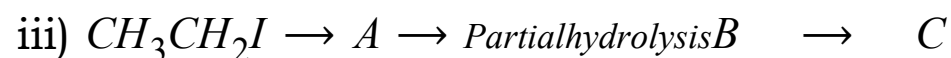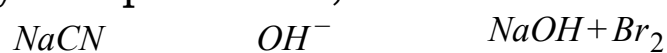 i. In increasing order of solubility in water, $C_6H_5\ NH_2$, $(C_2H_5)_2NH$, $C_2H_5NH_2$

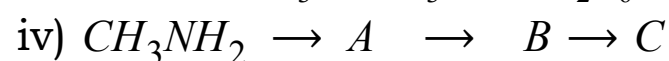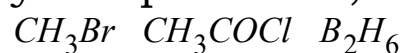594) How will you prepare propan – 1- amine from
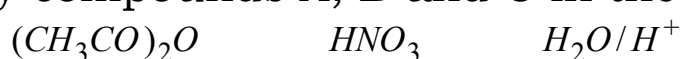 i) butane nitrile
 ii) propanamide
 ii) 1- nitropropane

595) Identify compounds A, B and C in the following sequence of reactions.

iii) $CH_3CH_2I \xrightarrow{NaCN} A \xrightarrow[Partial hydrolysis]{OH^-} B \xrightarrow{NaOH+Br_2} C$

596) Identify compounds A, B and C in the following sequence of reactions.

iv) $CH_3NH_2 \xrightarrow{CH_3Br} A \xrightarrow{CH_3COCl} B \xrightarrow{B_2H_6} C$

597) Identify compounds A, B and C in the following sequence of reactions.

v) $C_6H_5NH_2 \xrightarrow[Pyridine]{(CH_3CO)_2O} A \xrightarrow[H_2SO_4, 288KB]{HNO_3} B \xrightarrow{H_2O/H^+} C$

598) Identify compounds A, B and C in the following sequence of reactions.

vii) $CH_3CN_2NC \xrightarrow[H_2O]{HgO} A \rightarrow B \xrightarrow[ii)\ H_2O]{i)\ NaNO_2/HCL}$
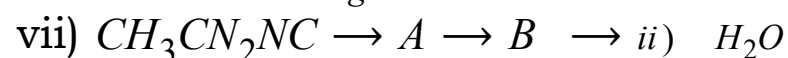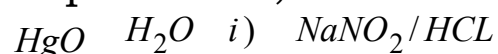
599) Write short notes on the following
 iii. Gabriel phthalimide synthesis

600) Write short notes on the following
 iv. Schotten – Baumann reaction

601) Write short notes on the following
 v. Carbylamine reaction

602) Write short notes on the following
 vi. Mustard oil reaction

603) Write short notes on the following
 viii. Diazotisation

604) Account for the following
 ii. Diazonium salts of aromatic amines are more stable than those of aliphatic amines

605) Account for the following
 iii. pK$_b$ of aniline is more than that of methylamine

606) Account for the following
 v. Ethylamine is soluble in water whereas aniline is not

607) Account for the following
 vi. Amines are more basic than amides

608) Account for the following
 vii. Although amino group is o – and p – directing in aromatic electrophilic substitution reactions, aniline on nitration gives a substantial amount of m – nitroaniline.

609) Arrange the following

 ii. In increasing order of basic strength

 a) aniline, p- toludine and p – nitroaniline

 b) $C_6H_5 NH_2$, $C_6H_5 NHCH_3$, $C_6H_5NH_2$, p-Cl-C_6- H_4-NH_2

610) Arrange the following

 iii. In decreasing order of basic strength in gas phase

 $(C_2H_5)NH_2$, $(C_2H_5)NH$, $(C_2H_5)_5N$ and NH_3

611) Arrange the following

 iv. In increasing order of boiling point

 C_6H_5OH, $(CH_3)_2NH$, $C_2H_5NH_2$

612) Arrange the following

 vi. Increasing order of basic strength

 $C_2H_5NH_2$,$C_6H_5N(CH_3)_2$, $(C_2H_5)_2 NH$ and CH_3NH_2

613) Give the differences between primary and secondary structure of proteins.

614) Give any three difference between DNA and RNA

615) Write a short note on peptide bond

616) What are reducing and non – reducing sugars?

617) What are drugs? How are they classified.

618) What are narcotic and non – narcotic drugs. Give examples

619) What are anti fertility drugs? Give examples.

620) Write a note on co –polymer

621) Write a note on vulcanization of rubber

622) Classify the following as linear, branched or cross linked polymers

 a) Bakelite

 b) Nylon

 c) polythene

<div align="right">34 x 5 = 170</div>

623) Explain zone refining process with an example using the Ellingham diagram given below.

624) Using the Ellingham diagram,

 (A) Predict the conditions under which

 (i) Aluminium might be expected to reduce magnesia.

 (ii) Magnesium could reduce alumina.

 (B) it is possible to reduce Fe_2O_3 by coke at a temperature around 1200K

625) Explain the principle of electrolytic refining with an example.

626) Give the limitations of Ellingham diagram.

627) Give the balanced equation for the reaction between chlorine with cold NaOH and hot NaOH.

628) Write the postulates of Werner's theory.

629) A solution of $[Ni(H_2O)_6]^{2+}$ is green, whereas a solution of $[Ni(CN)_4]^{2-}$ is colorless - Explain

630) On the basis of VB theory explain the nature of bonding in $[CoC_2O_4)_3]^{3-}$

631) What are the limitations of VB theory?

632) Differentiate crystalline solids and amorphous solids.

633) Write short note on metal excess and metal deficiency defect with an example.

634) Explain AAAA and ABABA and ABCABC type of three dimensional packing with the help of neat diagram.

635) Calculate the percentage efficiency of packing in case of body centered cubic crystal.

636) State Bragg's Law. (2 marks)

637) What is an elementary reaction? Give the differences between order and molecularity of a reaction.

638) Discuss the Lowery – Bronsted concept of acids and bases.

639) Derive an expression for Ostwald's dilution law.

640) State Kohlrausch Law. How is it useful to determine the molar conductivity of weak electrolyte at infinite dilution.
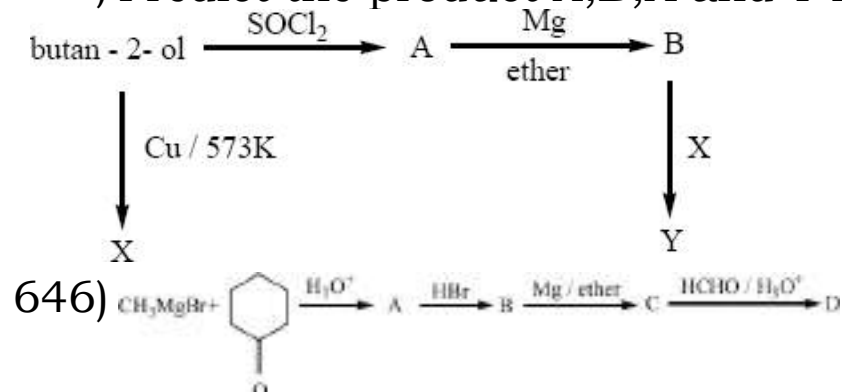
641) Derive an expression for Nernst equation.

642) Explain intermediate compound formation theory of catalysis with an example.

643) What is the difference between homogenous and hetrogenous catalysis?

644) Describe adsorption theory of catalysis

645) Predict the product A,B,X and Y in the following sequence of reaction

butan - 2- ol $\xrightarrow{SOCl_2}$ A $\xrightarrow[\text{ether}]{Mg}$ B

A $\downarrow$ Cu / 573K

B $\downarrow$ X

X

Y

646) CH_3MgBr+ [cyclohexanone] $\xrightarrow{H_3O^+}$ A $\xrightarrow{HBr}$ B $\xrightarrow{Mg\,/\,ether}$ C $\xrightarrow{HCHO\,/\,H_3O^+}$ D

Identify A,B,C,D and write the complete equation

647) 3,3 – dimethylbutan -2-ol on treatment with conc. H_2SO_4 to give tetramethyl ethylene as a major product. Suggest a suitable mechanism.

648) A Compound (A) with molecular formula C_2H_3N on acid hydrolysis gives (B) which reacts with thionylchloride to give compound(C). Benzene reacts with compound (C) in presence of anhydrous $AlCl_3$ to give compound(D). Compound (D) on reduction with Zn/Hg and Conc.HCl gives (E). Identify (A), (B), (C) (D) and (E). Write the equations.
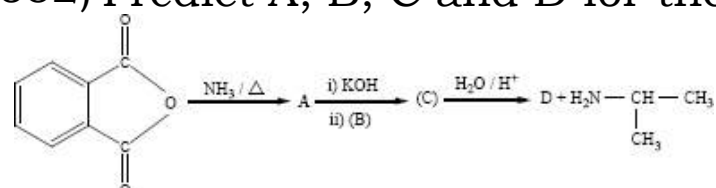
649) Identify A, B, C and D

ethanoic acid $\xrightarrow{SOCl_2}$ A $\xrightarrow{Pd/BaSO_4}$ B $\xrightarrow{NaOH}$ C $\xrightarrow{\triangle}$ D
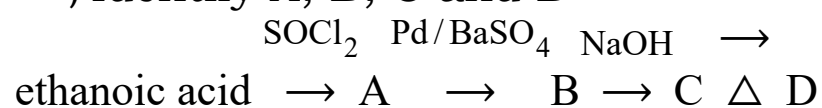
650) An alkene (A) on ozonolysis gives propanone and aldehyde (B). When (B) is oxidised (C) is obtained. (C) is treated with Br_2/P gives (D) which on hydrolysis gives (E). When propanone is treated with HCN followed by hydrolysis gives (E). Identify A, B, C, D and E.
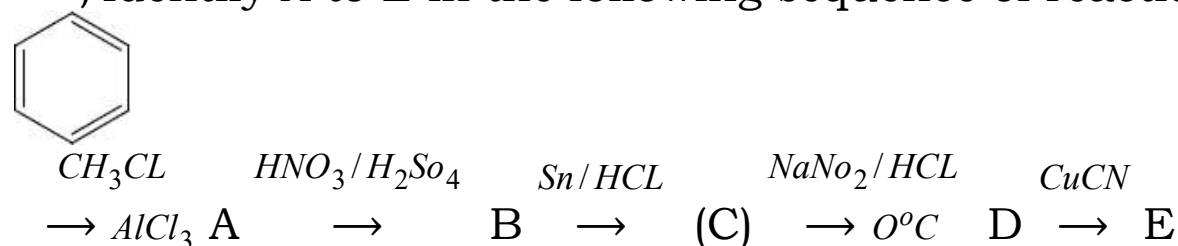
651) How will you distinguish between primary secondary and tertiary alphatic amines.

652) Predict A, B, C and D for the following reaction

[phthalic anhydride structure] $\xrightarrow{NH_3/\triangle}$ A $\xrightarrow[\text{ii) (B)}]{\text{i) KOH}}$ (C) $\xrightarrow{H_2O/H^+}$ D+$H_2N-\underset{CH_3}{CH}-CH_3$

653) A Monoobromoderivative (A) on treatment with KCN followed by acid hydrolysis and heating gives a monobasic acid (B) along with liberation of CO_2. (B) on heating with liquid ammonia followed by treating with Br_2 /KOH gives (c) which on treating with $NaNO_2$ and HCl at low temperature followed by oxidation gives a monobasic acid (D) having molecular mass 74. Identify A to D.

654) Identify A to E in the following sequence of reactions

[benzene ring] $\xrightarrow[AlCl_3]{CH_3CL}$ A $\xrightarrow{HNO_3/H_2So_4}$ B $\xrightarrow{Sn/HCL}$ (C) $\xrightarrow[0^oC]{NaNo_2/HCL}$ D $\xrightarrow{CuCN}$ E

655) What are bio degradable polymers? Give examples.

656) How is terylene prepared?

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