

**Gujarat Secondary & Higher Secondary Education Board,  
Gandhinagar**



**STD. 12 (Science)**  
**English Medium**

**Question Bank-2008**

**Subject : Chemistry**

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## CHEMISTRY (052)

### SECTION-A

\* Select correct option of following and write the answer (each of 1 mark)

- (1) The correct values of quantum numbers for  $n$ ,  $l$  and  $m$  for  $3d_{z^2}$  orbital are :  
(A)  $n=3, l=2, m=-2$  (B)  $n=3, l=2, m=+1$   
(C)  $n=3, l=2, m=0$  (D)  $n=3, l=2, m=+2$
- (2) The total number of orbitals in N-Shell are :  
(A) 2 (B) 8  
(C) 16 (D) 32
- (3) Which of the following orbital possesses spherical symmetry ?  
(A)  $5f$  (B)  $4p$   
(C)  $3d$  (D)  $3s$
- (4) Which of the followings has square planar shape ?  
(A)  $CH_4$  (B)  $PCl_5$   
(C)  $SF_6$  (D)  $[Ni(CN)_4]^{2-}$
- (5) Which quantum number was introduced by Uhlenback and Goudsmidt scientists ?  
(A) magnetic quantum number  
(B) Angular momentum quantum number  
(C) Spin quantum number  
(D) none of these three.
- (6) Which set of the quantum numbers is mentioned wrongly ?
- |     | $n$ | $l$ | $m$ | $s$  |
|-----|-----|-----|-----|------|
| (A) | 3   | 0   | 0   | -1/2 |
| (B) | 2   | 1   | -1  | -1/2 |
| (C) | 1   | 0   | 0   | +1/2 |
| (D) | 4   | 0   | -1  | -1/2 |
- (7) How much volume is occupied by a sphere of available volume in FCC structure ?  
(A) 74 % (B) 68 %  
(C) 34 % (D) 26 %
- (8) Which of the following compound has highest value of dielectric constant ?  
(A)  $NaCl$  (B)  $CsCl$   
(C)  $AgCl$  (D)  $TiO_2$

- (9) In CCP cubic close packing, a given sphere is in contact with how many other neighbouring spheres ?  
 (A) 3 (B) 6  
 (C) 12 (D) 8
- (10) Which compound of the following possesses the both Schottky defects and Frenkel defects ?  
 (A) AgCl (B) AgI  
 (C) AgBr (D) ZnS
- (11) What would be the co-ordination number if radius ratio is from 0.41 to 0.73 ?  
 (A) 3 (B) 8  
 (C) 6 (D) 4
- (12) Which oxide of transition metal possesses same electrical conductivity as that of metal ?  
 (A)  $\text{TiO}_2$  (B)  $\text{Fe}_2\text{O}_3$   
 (C)  $\text{CrO}_2$  (D)  $\text{Ti}_2\text{O}_3$
- (13) When a substance forms the crystals more than one it is known as :  
 (A) Polymorphos (B) Isomorphos  
 (C) Shapeless (D) None of these
- (14) The Bragg's correct equation is :  
 (A)  $n\lambda = d \sin \theta$  (B)  $\frac{n\lambda}{2} = d \sin \theta$   
 (C)  $n\lambda = \frac{d}{2} \sin \theta$  (D)  $n\lambda = d \sin\left(\frac{\theta}{2}\right)$
- (15) The appearance and conductivity of  $\text{ReO}_3$  is same as that of :  
 (A) Ag (B) Cu  
 (C) Pt (D) Pd
- (16) Which of the following substance is paramagnetic ?  
 (A) TiO (B) FeO  
 (C) CuO (D) All of these
- (17) What would be the value of  $i$  when solute undergoes association ?  
 (A) 1 (B) greater than 1  
 (C) less than 1 (D) zero
- (18) When  $x$ -gram urea is dissolved in 200 grams water, its boiling point increased by  $0.70^\circ \text{C}$ . What would be the elevation in boiling point in Kelvin temperature.  
 (A) 0.70 K (B) 273.70 K  
 (C) 272.30 K (D) None of these
- (19) In a solution there are A,B and C constituents. If mole fractions of A and B are 0.3 and 0.5 respectively, then the mole fraction of C is :  
 (A) 0.8 (B) 0.2  
 (C) 1.0 (D) 0.3

- (20) What would be the experimental molecular weight of benzoic acid if dissolved in kerosene ?  
 (A) 61 (B) 122  
 (C) 244 (D) 120
- (22) Which of the following instruments is used to measure the vapour pressure of a solution ?  
 (A) pH meter (B) Potentiometer  
 (C) Voltmeter (D) Menometer
- (23) The extent of air pollution is expressed in which of the following units ?  
 (A) Normality (B) Molarity  
 (C) Parts per million (D) Formality
- (24) The number of gram equivalents of solute dissolved in 1 litre of solution is known as:  
 (A) Normality (B) % w/w  
 (C) Molarity (D) Formality
- (25) Which of the following is not affected by change in temperature ?  
 (A) Normality (B) Molality  
 (C) Formality (D) Molarity
- (26) Two solutions A and B are separated by a semipermeable membrane. If the flow of solvent molecules is from solution-A to solution-B, then .....  
 (A) Solution-B is more concentrated than solution-A  
 (B) Solution-B is more concentrated than solution-B  
 (C) concentration of solution-A and solution-B are equal.  
 (D) solution-A and solution-B both are diluted.
- (27) On which of the following factors, the ionic conductivity depend ?  
 (A) nature of solute (B) nature of solution  
 (C) nature of solvent (D) mole fraction of solution
- (28)  $C_6H_{12}O_{6(s)} + 6O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O_{(l)}$  for this reaction :  $\Delta H = \dots\dots\dots$   
 (A)  $\Delta E + 5RT$  (B)  $\Delta E + 6RT$   
 (C)  $\Delta E$  (D)  $\Delta E - 5RT$
- (29) The value of K for a certain reaction is 0.8. Thus, the value of  $G^0$  for the same reaction is :  
 (A)  $\Delta G^0 = 0$  (B)  $\Delta G^0 = 0.8K$   
 (C)  $\Delta G^0 > 0$  (D)  $\Delta G^0 < 0$
- (30) What is the value of  $\Delta S$  for adiabatic change ?  
 (A)  $> 0$  (B)  $< 0$   
 (C) 0 (D) 1

- (31) When ideal gas is expanded in vacuum at constant temperature, then no work is done, because .....
- (A)  $P = 0$  (B)  $\Delta P = 0$   
 (C)  $q = 0$  (D)  $T = 0$
- (32) When does the reaction become spontaneous ?
- (A)  $\Delta S = +ve$  (B)  $\Delta H = -ve$   
 (C)  $\Delta G = -ve$  (D)  $\Delta S = -ve$
- (33) What does the temperature of substance indicate ?
- (A) quantity of energy (B) quantity of heat  
 (C) level of thermal energy (D) None of these
- (34) The correct formula showing relationship between free energy and equilibrium constant is :
- (A)  $\Delta G^0 = RT \log K$  (B)  $\Delta G^0 = 2.303 \log K$   
 (C)  $\Delta G^0 = -2.303 RT \log K$  (D)  $\Delta G^0 = 2.303 RT \log K$
- (35)  $Al_2O_3$  (l),  $CuSO_4$  (ag) and  $NaCl$  (l) filled in different cells and are connected in series. If 3 F of electricity is passed through them, then the ratio of number of moles of products obtained on cathode is :
- (A) 1:2:3 (B) 1:1.5:3  
 (C) 3:2:1 (D) 1:1.5:2
- (36) What will happen when  $CuSO_4$  solution is stirred by silver spoon ?
- (A)  $Cu^{+}$  ion will form (B)  $Ag^{+}$  ion will form  
 (C) Cu will precipitate (D) No any change will occur
- (37) What would be effect on the value of cell potential if concentration of solution in anode half cell is kept 1 M and that of cathode half cell solution is decreased ?
- (A) Decreases (B) Increases  
 (C) Becomes zero (D) remains the same
- (38) At 25° C, what will be the value of standard cell potential ?  
 $Ag / Ag^{+} (0.01 M) // Ag^{+} (0.4 M) / Ag$
- (A) 0.059 Volt (B) 0.0296 Volt  
 (C) 0.00 Volt (D) -0.0592 volt
- (39) What is the unit of equivalent conductance ?
- (A)  $mho.cm^2 (g eqv)^{-1}$  (B)  $mho.cm^3 (g mol)^{-1}$   
 (C)  $mho.m^{-1}$  (D)  $mho.cm^2 mol^{-1}$
- (40) How many moles of  $O_2$  will be obtained when 90 gram of water is electrolysed by pt. electrodes ?
- (A) 5 mole (B) 2.5 mole  
 (C) 3 mole (D) 1.5 mole

- (41) What is the order of reaction of hydrolysis of methyl acetate taking place in presence of acid ?  
 (A) First order (B) Second order  
 (C) Pseudo first order (D) zero order
- (42) Which of the following is not a correct expression of Arrhenius equation ?  
 (A)  $K \propto e^{-E_a/RT}$  (B)  $K = A \cdot e^{-E_a/RT}$   
 (C)  $\ln k = \ln A - \frac{E_a}{RT}$  (D)  $\log k = -\frac{E_a}{2.303RT}$
- (43) Rate constant of reaction depends on which of the followings ?  
 (A) Rate of reaction (B) Concentration of reactant  
 (C) Pressure of surrounding (D) Temperature
- (44) Which of the following never change for a given chemical reaction ?  
 (A) Order of reaction (B) Molecularity  
 (C) Half-life of reaction (D) Rate constant
- (45) The rate constant at particular temperature of a reaction is  $6.93 \times 10^{-2} \text{ minute}^{-1}$ . Its  $t_{1/2}$  is :  
 (A) 100 minutes (B) 10 minutes  
 (C)  $3.465 \times 10^{-1} \text{ minute}$  (D) 0.1 minute
- (46) Ionic reactions are very fast. Why ?  
 (A)  $E_a$  value very less (B)  $E_a$  value more  
 (C) Arrhenius constant is more (D) Rate constant is more
- (47) The dimension of unit of K for zero order reaction is :  
 (A)  $\text{concn.} \cdot \text{time}^{-1}$  (B)  $\text{time}^{-1}$   
 (C)  $\text{concn.}^{-1} \text{ time}^{-1}$  (D)  $\text{concn.}^{1-n} \text{ time}^{-1}$
- (48) ..... is an Emulsifier.  
 (A) NaCl (B) Water  
 (C) Soap (D) Oil
- (49) What is known as the conversion of precipitates into colloidal Sol. ?  
 (A) Coagulation (B) Peptization  
 (C) Miscelle formation (D) None of these
- (50) Which of the following order of effective coagulation is correct for positive sol  $\text{Fe}(\text{OH})_3$  ?  
 (A)  $\text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^-$  (B)  $\text{Cl}^- > \text{SO}_4^{2-} > \text{PO}_4^{3-}$   
 (C)  $\text{SO}_4^{2-} > \text{PO}_4^{3-} > \text{Cl}^-$  (D)  $\text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^-$
- (51) Under the influence of applied electric field, colloidal particles migrate. This phenomenon is known as .....  
 (A) Dialysis (B) Tyndalle effect  
 (C) Electrophoresis (D) Emulsification

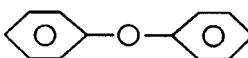
- (52) What are called biochemical catalysts ?  
 (A) Enzymes (B) Promotors  
 (C) Co-catalyst (D) Intermediate complex
- (53) Which of the following element is used in making of I.R. devices ?  
 (A) Silicon (B) Arsenic  
 (C) Aluminium (D) Germanium
- (54) Which of the following sol. is obtained by the reaction between  $\text{H}_2\text{S}$  and  $\text{SO}_2$  ?  
 (A)  $\text{H}_2\text{O}$  (B)  $\text{O}_2$   
 (C) S (D)  $\text{H}_2\text{S}_2$
- (55) Which is semimetal of group-15 ?  
 (A) N (B) Sb  
 (C) P (D) Bi
- (56) Which is used as source of heat in space equipment ?  
 (A) S (B) Se  
 (C) Te (D) Po
- (57) The formula of Plumbo-plumbic oxide is :  
 (A)  $\text{PbO}$  (B)  $\text{PbO}_2$   
 (C)  $\text{Pb}_2\text{O}_3$  (D)  $\text{Pb}_3\text{O}_4$
- (58) What is the molecular formula of perchloric acid ?  
 (A)  $\text{HClO}$  (B)  $\text{HClO}_2$   
 (C)  $\text{HClO}_3$  (D)  $\text{HClO}_4$
- (59) What is the formula of tripple phosphate ?  
 (A)  $\text{Na}_3\text{P}_3\text{O}_{10}$  (B)  $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}$   
 (C)  $\text{Ca}_3(\text{H}_2\text{PO}_4)_2$  (D)  $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot 3\text{H}_2\text{O}$
- (60) The correct decreasing order of stability of halides of sulphur is :  
 (A)  $\text{F} > \text{Cl} > \text{Br} > \text{I}$  (B)  $\text{Cl} > \text{Br} > \text{I} > \text{F}$   
 (C)  $\text{Br} > \text{I} > \text{Cl} > \text{F}$  (D)  $\text{I} > \text{Br} > \text{Cl} > \text{F}$
- (61) Which of the following elements is used in preparation of insecticides ?  
 (A) P (B) As  
 (C) Sb (D) Bi
- (62) Which of the followings is used as coolant in refrigerator ?  
 (A) Teflon (B) Carbon tetrachloride  
 (C) Freon (D) Chlorohydrocarbon
- (63) What is the type of carborundum of the followings ?  
 (A) Ionic solid (B) Covalent solid  
 (C) Metallic solid (D) Molecular solid
- (64) Which of the following alloys is used in pendulum of clock ?  
 (A) Nitinol (B) Nichrom  
 (C) Invar (D) Monel metal

- (65) What is the value of paramagnetic moment of  $V^{3+}$  ?  
 (A) 1.73 BM (B) 2.83 BM  
 (C) 3.87 BM (D) 4.90 BM
- (66) Which of the followings is a correct general E.C. of transitional elements ?  
 (A)  $(n-1) s^2 p^6 . ns^1$  (B)  $(n-1) s^2 p^6 d^5 . ns^1$   
 (C)  $(n-1) s^2 p^6 . ns^2 p^1$  (D)  $(n-1) s^2 p^6 d^{1-9} . ns^{1-2}$
- (67) The photographic plate is washed by which of the following during fixing ?  
 (A) Quinol (B) Sodium thiosulphate  
 (C) Silver nitrate (D) Hydrocarbon
- (68) Which of the following alloys has same thermal co-efficient expansion as that of glass ?  
 (A) Nitinol (B) German silver  
 (C) Cupronickel (D) Invar
- (69) The formula of slag formed during extraction of iron is :  
 (A)  $FeSiO_3$  (B)  $CaSiO_2$   
 (C)  $CaSiO_3$  (D)  $FeSiO_2$
- (70) Which of the following is used in photocopier ?  
 (A) S (B) Se  
 (C) Te (D) Po
- (71) Which alloy is useful in making of coinage ?  
 (A) Monel metal (B) cupro nickel  
 (C) Stainless steel (D) German silver
- (72) What is magnetic moment of  $Mn^{4+}$  in  $MnO_2$  ?  
 (A) 1.73 BM (B) 4.90 BM  
 (C) 3.87 BM (D) 2.83 BM
- (73) Which of the following metal ion in a given compound possesses the highest unpaired electrons ?  
 (A)  $TiCl_3$  (B)  $MnCl_2$   
 (C)  $FeSO_4$  (D)  $CuSO_4$
- (74) Which of the following is not considered as transitional element ?  
 (A) Zn (B) Cd  
 (C) Hg (D) All of these
- (75) The oxidation state of Mn in  $KMnO_4$  is :  
 (A) +5 (B) +7  
 (C) +6 (D) -6

- (76) In  $K_3 [Fe(CN)_6]$ , the anion bonded by primary valency is :  
 (A)  $[Fe(CN)_6]^{4-}$  (B)  $CN^-$   
 (C)  $6CN^-$  (D)  $[Fe(CN)_6]^{3-}$
- (78) The secondary valency of metal ion in a  $[Co(NH_3)_6]^{3+}$  ion is :  
 (A) 3 (B) 6  
 (C) -3 (D) 0
- (79) Which of the following is modern organometallic compound ?  
 (A) Ferrocene (B) Metallocene  
 (D) Di methyl Zinc (D)  $Ni(CO)_4$
- (80) By which ligand, the effect of lead poison is eliminated ?  
 (A) en (B) ptn  
 (C)  $(ox)^{2-}$  (D) edta
- (81) Which complex is used to inhibit the growth of tumor in body ?  
 (A) Haemoglobin (B) Ferrocene  
 (C) Chlorophyll (D) Cis platin
- (82) Which of the following is a chelate ?  
 (A)  $K_3[Fe(CN)_6]$  (B)  $K[MnO_4]$   
 (C)  $[CrCl_2(en)_2]NO_3$  (D)  $[Ag(NH_3)_2]OH$
- (83) Vitamin  $B_{12}$  is a complex of which metal ?  
 (A) Copper (B) Cobalt  
 (C) Magnesium (D) Iron
- (84) The secondary valency of a metal ion in  $K[Co(NH_3)_2(OX)_2]$  is :  
 (A) 2 (B) 4  
 (C) 6 (D) 8
- (85) The number of total covalent bonds in  $[Co(NH_3)_6]Cl_3$  are :  
 (A) 3 (B) 6  
 (C) 9 (D) 18
- (86) The parent element of  $4n+1$  series is :  
 (A)  $Th^{232}$  (B)  $Po^{241}$   
 (C)  $U^{238}$  (D)  $U^{235}$
- (87)  ${}^{16}_8O + {}^2_1H \rightarrow {}^{14}_7N + {}^4_2He$  is represented in short as :  
 (A) (D, n) reaction (B) (D,  $\alpha$ ) reaction  
 (C) (v,v) reaction (D) (n,  $\alpha$ ) reaction

- (88) If a parent element loses  $\beta^-$  particle, then which of the following change will occur :
- proton converts into neutron
  - neutron converts into proton
  - Proton and neutron convert into electron
  - Electron converts into proton.
- (89)  $4n + 3$  series is known as :
- Thorium series
  - Actinium series
  - Neptunium series
  - Uranium series
- (90) Due to K electron capture, the ratio of neutron to proton in new element is :
- $\frac{N+1}{Z+1}$
  - $\frac{N-1}{Z+1}$
  - $\frac{N+1}{Z-1}$
  - $\frac{N-1}{Z-1}$
- (91) Uranium series is known as :
- $4n$  series
  - $4n + 2$  series
  - $4n + 1$  series
  - $4n + 3$  series
- (92) The penetrating power of  $\alpha$  - particle is :
- less than  $\gamma$  radiation
  - more than  $\beta$  radiation
  - more than  $\gamma$  radiation
  - None of these
- (93) Which isotope is used in treatment of thyroid in medicine ?
- $^{24}\text{Na}$
  - $^{14}\text{C}$
  - $^{60}\text{Co}$
  - $^{131}\text{I}$
- (94) The number of neutrons in  $^{35}_{17}\text{Cl}$  are :
- 17
  - 35
  - 18
  - 52
- (95) The alloy of which two elements is used as coolant in breeder reactor ?
- Lithium and sodium
  - Sodium and potassium
  - Potassium and Lithium
  - None of these
- (96) What is produced in K-electron capture ?
- $\alpha$  - radiation
  - $\beta$  - radiation
  - $\gamma$  - radiation
  - X-Rays

- (97) Which of the following is in agreement with meso form ?  
(A) molecules have chiral centres (B) They are superimposable  
(C) Optically inactive (D) All of these
- (98) The method of separation of d and l isomers from racemic mixture is known as ?  
(A) Optical resolution (B) Dehydration  
(C) Dehydrohalogenation (D) None of these
- (99) By which method diastereomers are isolated ?  
(A) Difference of boiling point (B) Rate of reaction  
(C) Difference in solubility (D) All of these
- (100) What is the form of lactic acid obtained from milk sugar ?  
(A) Optically inactive (B) Dextro rotatory  
(C) Levo rotatory (D) Racemic mixture
- (101) Which of the following optical isomer is used to raise the blood pressure ?  
(A) (-) Thyroxin (B) (-) Epinephrin  
(C) Brufen (D) (+) Lucin
- (102) Which of the following product is obtained on dehydration of alcohol ?  
(A) Alkane (B) Alkene  
(C) Alkyne (D) Acid
- (103) What is obtained as product on bromination of methoxy benzene ?  
(A) o - Bromo anisole (B) p - bromo anisole  
(C) 2,4,6 Tribromo anisole (D) All of these
- (104) The oxidation of which of the following alcohols is difficult ?  
(A) Ethanol (B) 2-me-1-propanol  
(C) 2-propanol (D) 2-me-2-propanol
- (105) What is essential for formation of amalgam ?  
(A) Alcohol (B) Mercury  
(C) Acetone (D) Formalin

- (106) The compound having  $C_4H_{10}O$  formula on oxidation gives aldehyde having the formula  $C_4H_8O$ . The formula of given compound will be .....
- (A)  $CH_3 - \underset{\substack{| \\ CH_3}}{CH} - CH_2 - OH$  (B)  $CH_3 - CH_2 - CH_2 - OH$
- (C)  $CH_3 - \underset{\substack{| \\ OH}}{CH} - CH_2 - CH_3$  (D)  $CH_3 - \underset{\substack{| \\ OH}}{\overset{\substack{CH_3 \\ |}}{C}} - CH_3$
- (107) Which product is obtained by Kolbe-Schmitt reaction ?
- (A) Salicylaldehyde (B) Cinnamic acid  
(C) Salicylic acid (D) Phenetol
- (108) The IUPAC name of  is :
- (A) Di Phenyl ether (B) Diphenoxide  
(C) Benzophenone (D) Phenoxy benzene
- (109) Which of the following alcohol will respond towards Lucas test ?
- (A)  $CH_3 - \underset{\substack{| \\ CH_3}}{CH} - CH_2 - OH$  (B)  $CH_3CH_2CH_2OH$
- (C)  $CH_3OH$  (D)  $CH_3 - \underset{\substack{| \\ OH}}{\overset{\substack{CH_3 \\ |}}{C}} - CH_3$
- (110) Which colour is obtained of neutral  $FeCl_3$  with phenol ?
- (A) Pink (B) Orange  
(C) Violet (D) Brown
- (111) Which product is obtained when by-product in cumene process is subjected to the oxidation?
- (A) Ethanol (B) Acetic acid  
(C) Propanone (D) Formic acid
- (112) In ether, the hybridisation of C and O atoms is  $sp^3$ . Thus C - O - C bond angle is :
- (A)  $111^\circ 42'$  (B)  $109^\circ 28'$   
(C)  $109^\circ$  (D)  $111.7^\circ$
- (113) The correct order of decreasing boiling point of  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  alcohols is....
- (A)  $1^\circ > 2^\circ > 3^\circ$  (B)  $3^\circ > 2^\circ > 1^\circ$   
(C)  $2^\circ > 1^\circ > 3^\circ$  (D)  $2^\circ > 3^\circ > 1^\circ$

- (114) Which of the following alcohols is most reactive towards HCl in presence of anhydrous  $\text{ZnCl}_2$ ?
- (A)  $(\text{CH}_3)_3\text{C}-\text{OH}$  (B)  $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{OH}$
- (C)  $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_2\text{OH}$  (D)  $\text{CH}_3-\text{OH}$
- (115) What is the use of diethyl ether?
- (A) As explosive (B) As an anesthetic
- (C) As pesticide (D) In preparation of cream
- (116) The compound having the formula  $\text{C}_9\text{H}_{12}$  is :
- (A) Dimethyl benzene (B) Anthracene
- (C) Naphthalene (D) Cumene
- (117) What is obtained when iso-propyl alcohol is subjected to the oxidation?
- (A) Acetone (B) Ether
- (C) Ethylene (D) Acetaldehyde
- (118) Phenol gets neutralized by which of the following bases?
- (A)  $\text{NaOH}$  (B)  $\text{NaHCO}_3$
- (C)  $\text{Na}_2\text{CO}_3$  (D)  $\text{Na}$
- (119) What is detected by Lucas test?
- (A) Alcohol (B) Aldehyde
- (C) Amine (D) Nitro
- (120) Which of the following product is obtained by Reimer-Tiemann reaction of phenol?
- (A) Salicylic acid (B) Salicylaldehyde
- (C) Cinnamaldehyde (D) p-hydroxy benzaldehyde
- (121) IUPAC name of anisole is :
- (A) Methoxy benzene (B) Ethoxy benzene
- (C) Phenoxy benzene (D) Ethoxy ethane
- (122) In Dow process, the formation of which side product decreases the yield of phenol?
- (A) Phenoxy benzene (B) Methoxy benzene
- (C) Chloro benzene (D) Sodium phenoxide
- (123) What is the general formula of homologous series of alcohol?
- (A)  $\text{C}_n\text{H}_{2n+1}\text{OH}$  (B)  $\text{C}_n\text{H}_{2n+2}\text{OH}$
- (C)  $\text{C}_n\text{H}_{2n}\text{OH}$  (D)  $\text{C}_n\text{H}_{2n-1}\text{OH}$

- (124) Which of the following products is obtained when phenol is treated with  $\text{CHCl}_3$  in presence of  $\text{NaOH}$  ?
- (A) Benzaldehyde (B) Acetaldehyde  
(C) Formaldehyde (D) Salicylaldehyde
- (125) Acidic strength of phenol is as weak as that of :
- (A)  $\text{HCl}$  (B)  $\text{HCN}$   
(C)  $\text{HNO}_3$  (D)  $\text{H}_2\text{SO}_4$
- (126) Which of the followings is not the use of phenol ?
- (A) In caprolactam (B) In Shampoo  
(C) In paracetamol (D) In Bakelite
- (127) Which of the following compound will respond towards Cannizzaro reaction ?
- (A)  $\text{HCHO}$  (B)  $\text{CH}_3\text{CH}_2\text{CHO}$   
(C)  $\text{CH}_3\text{CHO}$  (D)  $(\text{CH}_3)_2\text{CH-CHO}$
- (128) In order to obtain 1-phenyl-1-ethanol, which of the following is to be treated with benzaldehyde ?
- (A)  $\text{CH}_3\text{Br}$  (B)  $\text{CH}_3\text{CH}_2\text{I} + \text{Br}$   
(C)  $\text{CH}_3\text{I} + \text{Mg}$  (D) All of these
- (129) Which of the following does not contain  $-\text{COOH}$  group ?
- (A) Ethanoic Acid (B) Formic Acid  
(C) Picric Acid (D) Lactic Acid
- (130) Which of the following compounds does not respond towards Fehling test ?
- (A)  $\text{CH}_3\text{CHO}$  (B)  $\text{C}_6\text{H}_5\text{CHO}$   
(C)  $\text{CH}_3\text{CH}_2\text{CHO}$  (D)  $\text{CH}_3\text{COCH}_3$
- (131) The important use of Vinegar is :
- (A) In preservation of dead bodies (B) As anaesthetic  
(C) As antiseptic (D) To impart sour taste to the food
- (132) Which of the following is acetaldol ?
- (A)  $\beta$  hydroxy aldehyde (B) 2-hydroxy butanal  
(C) 2-hydroxy-4-butanol (D)  $\beta$  hydroxy ketone
- (133) The name of   $\text{CH} = \text{CH} - \text{CHO}$  is :
- (A) Cinnamaldehyde (B) Salicylaldehyde  
(C) Acetaldehyde (D) 1-phenyl-2-propen aldehyde

- (134) What is known as reaction of Tollen's reagent with acetaldehyde ?  
 (A) Silver Mirror Test (B) Lucas test  
 (C) Fehling test (D) Carbile amine test
- (135) The value of bond angle R-C-O in ketone is :  
 (A)  $120^\circ$  (B)  $90^\circ$   
 (C)  $109^\circ 28'$  (D)  $109^\circ$
- (136) Which of the following products is obtained when salicylic acid is heated with soda lime ?  
 (A) Benzene (B) Benzoic acid  
 (C) Phenol (D) Toluene
- (137) Which of the following has highest boiling point ?  
 (A)  $\text{CH}_3\text{NH}_2$  (B)  $\text{CH}_3\text{OH}$   
 (C)  $\text{HCOOH}$  (D)  $\text{CH}_4$
- (138) Which of the following is used in preservation of dead bodies of animals ?  
 (A)  $\text{HCOOH}$  (B)  $\text{CH}_3\text{COOH}$   
 (C)  $\text{HCHO}$  (D)  $\text{CH}_3\text{CHO}$
- (139) Which of the following functional group is to be introduced in place of -OH group of -COOH in salicylic acid in order to get amide ?  
 (A) Hydrogen (B) Alkyl  
 (C) Aryl (D) Amino
- (140) Which of the following is a reducing agent in Clemenson reduction ?  
 (A)  $\text{NH}_2 - \text{NH}_2 / \text{KOH}$  (B)  $\text{Zn} - \text{Hg} / \text{HCl}$   
 (C)  $\text{NH}_2 - \text{NH}_2 / \text{HCl}$  (D)  $\text{LiAlH}_4$
- (141) When acetic anhydride is directly reduced by  $\text{LiAlH}_4$  two molecules of which of the following compounds are obtained ?  
 (A) Acetic Acid (B) Et-alcohol  
 (C) Grignard reagent (D) Skiff reagent
- (142) Acetamide  $\xrightarrow[\text{LiAlH}_4]{2\text{H}_2}$  B + C Then products B and C are :  
 (A) Me-cyanide and water (B) Et-amine and water  
 (C) Ac-acid and ammonia (D) Ethyl amine and ammonia
- (143) IUPAC name of  is ....  
 (A) Phenyl cyanide (B) Benzonitrile  
 (C) Benzene carbonitrile (D) Cyano benzene

- (144) Which of the following reagent will you use to obtain phenol from benzene diazonium chloride?  
 (A)  $\text{CH}_3\text{CH}_2\text{OH}$  (B)  $\text{SnCl}_2 + \text{HCl}$   
 (C)  $\text{H}_2\text{O}$  (D)  $\text{H}_3\text{PO}_2$
- (145) The reagent   $\text{SO}_2\text{Cl}$  is known as :?  
 (A) Hinsberg's reagent (B) Tollen's reagent  
 (C) Grignard reagent (D) Skiff reagent
- (146) What is obtained on acetylation of amino benzene ?  
 (A) Anisole (B) Acyl benzene  
 (C) Acetanilide (D) Ac-anhydride
- (147) Which of the following compound will not give carbile amine test ?  
 (A) Aniline (B) Di-me-aniline  
 (C) Ethyl amine (D) 2-amino butane
- (148) Why is benzene diazonium chloride not obtained in dry state ?  
 (A) As it is highly reactive (B) As it is unstable  
 (C) As it is explosive (D) As it contains azo group
- (149) What is known as the reaction of conversion of benzene diazonium chloride salt into phenyl hydrazine ?  
 (A) Sand meyer reaction (B) Reduction reaction  
 (C) Azocoupling reaction (D) Hydrolysis reaction
- (150) Which of the following amine does not respond towards carbile amine test ?  
 (A) Methyl amine (B) Ethyl amine  
 (C) Phenyl amine (D) Di-me-amine
- (151) The IUPAC name of  $\text{CH}_3\text{CN}$  is :  
 (A) Ethyl amine (B) Ethane nitrile  
 (C) Propane nitrile (D) Me-carbile amine
- (152) When aniline is reacted with  $\text{NaNO}_2$  and  $\text{HCl}$  at  $0-5^\circ\text{C}$  which of the following products is obtained ?  
 (A) Nitro aniline (B) Chloro aniline  
 (C) Benzene diazonium chloride (D) Phenol
- (153) IUPAC name of   $\text{NH}_2$  is ?  
 (A) Aniline (B) Amino benzene  
 (C) Benzoamine (D) None of these

- (154) How many total  $\sigma$  and  $\pi$  bonds are contained in cyano benzene respectively ?  
 (A) 13  $\sigma$  and 3 $\pi$  (B) 13  $\sigma$  and 4 $\pi$   
 (C) 13  $\sigma$  and 5 $\pi$  (D) 13  $\sigma$  and 1 $\pi$
- (155) Which amine has highest b. pt. ?  
 (A) 1° (B) 2°  
 (C) 3° (D) 4°
- (156) Which catalyst is used to dehydrate amides ?  
 (A)  $P_4O_{10}$  (B)  $P_2O_3$   
 (C)  $LiAlH_4$  (D)  $H_2SO_4$
- (157) What is tested by carbile amine test ?  
 (A) Primary amine (B) Secondary amine  
 (C) Tertiary amine (D) quaternary amine
- (158) Benzene sulphonyl chloride is known as.....  
 (A) Tollen's reagent (B) Hinsberg's reagent  
 (C) Grignard reagent (D) Ziggler - Natta reagent
- (159) The structural formula of benzonitrile is :  
 (A)  (B)   
 (C)  (D) None of these
- (160) Which of the following monomer is used in SBR polymer ?  
 (A) Styrene (B) Butadiene  
 (C) Both (A) and (B) (D) None of these
- (161) Which of the following is a biodegradable substance ?  
 (A) Nylon-2-Nylon-6 (B) Latex  
 (C) Polyisoprene (D) None of these
- (162) The percentage of sulphur in vulcanization of rubber for tyre is :  
 (A) 5 (B) 10  
 (C) 15 (D) 30
- (163) The polymer which used as Lubricant is :  
 (A) PAN (B) SBR  
 (C) PVC (D) PTFE

- (164) What does the polymerization of caprolactam form ?  
(A) Terelene (B) Teflon  
(C) Nylon-6 (D) Bakelite
- (165) The elasticity of natural rubber is retained upto what temperature ?  
(A)  $10^{\circ}\text{C}$ . (B)  $60^{\circ}\text{C}$ .  
(C) Between  $10^{\circ}$  to  $60^{\circ}\text{C}$  (D)  $100^{\circ}\text{C}$ .
- (166) The monomer unit present in natural rubber is :  
(A) Chloroprene (B) Isobutylene  
(C) Trans-isoprene (D) Cis-isoprene
- (167) Which of the following polymers can be prepared by condensation polymerization ?  
(A) Dacron (B) Teflon  
(C) PVC (D) Polystyrene
- (168) Which of the following is used as filler in polymers ?  
(A) Rutile (B) Oleic acid  
(C) Phenol (D) Quinol
- (169) What is the percentage of sulphur in vulcanized rubber used for battery case ?  
(A) 5 % (B) 10 %  
(C) 20 % (D) 30 %
- (170) The polymer used in making of carpet, ropes and tyre is :  
(A) Nylon 6 (B) Nylon 66  
(C) Dacron (D) Neoprene
- (171) The sweetening value of Lactose is :  
(A) 173 (B) 100  
(C) 74 (D) 16
- (172) Glucose crystallized from acetic acid shows the optical rotation :  
(A)  $+19^{\circ}$  (B)  $+52^{\circ}$   
(C)  $+111^{\circ}$  (D)  $+66.5^{\circ}$
- (173) The percentage of glucose in grapes is :  
(A) 20% (B) 30%  
(C) 10% (D) 50%
- (174) The substance which is 160 times as sweet as sucrose :  
(A) Aspartame (B) Saccharine  
(C) Sucralose (D) Thymine

- (175) Which base is not present in RNA ?  
 (A) Cytosine (B) Adenine  
 (C) Uracil (D) Thymine
- (176) What is yielded upon hydrolysis of protein ?  
 (A) Ester (B) Amino acid  
 (C) Amine (D) Carboxylic acid
- (177) The structure of alanyl glycine is :  
 (A)  $\text{H}_2\text{NCH}_2\text{CONHCH}(\text{CH}_3) - \text{COOH}$  (B)  $\text{H}_2\text{NCH}(\text{CH}_3)\text{CONHCH}_2\text{CHO}$   
 (C)  $\text{H}_2\text{NCH}(\text{CH}_3)\text{CONHCH}_2\text{COOH}$  (D)  $\text{H}_2\text{NCH}(\text{CH}_3)\text{CONHCH}_2\text{CONH}_2$
- (178) By which of the following bonds nucleic acid units are bonded with each other in nucleic acid ?  
 (A) Peptide bond (B) Phosphodiester bond  
 (C) Glycosidic bond (D) Hydrogen bond
- (179) Which of the following option is odd (not consistent) ?:  
 (A) Carotene (B) Tetrazine  
 (C) Alkyamine (D) Caramal
- (180) Which of the following reactant when reacted with glucose proves the presence of  $\text{C} = \text{O}$  group in it ?  
 (A)  $(\text{CH}_3\text{CO})_2\text{O}$  (B) HCN  
 (C)  $\text{HNO}_3$  (D) HI
- (181) What is the chemical name of  $\text{B}_1$  Vitamin ?  
 (A) Ascorbic acid (B) Riboflavin  
 (C) Pyridoxin (D) Thiamine
- (182) Which type of carbohydrate when heated with water forms colloidal sol. ?  
 (A) Mono saccharide (B) Polysaccharide  
 (C) Oligo saccharide (D) All of these
- (183) Which compound exists as iso - electric ion ?  
 (A) Glycine (B) Anthranilic acid  
 (C) Sulphanilic acid (D) Phenol
- (184) Fructose is :  
 (A) Aldohexose (B) Ketohexose  
 (C) Oligo saccharide (D) Polysaccharide

- (185) Backbone of DNA consists of :  
 (A) Phosphate and Saccharide (B) C and T  
 (C) T and A (D) G and C
- (186) Which colour is imparted by alizarine in presence of  $\text{Sr}^{2+}$  ion ?  
 (A) Pink-red (B) Blue  
 (C) Brown (D) Red
- (187) How much Mg in miligram is present in a body of adult ?  
 (A) 50 (B) 25  
 (C) 12.5 (D) 75
- (188) ..... is an important pheromone ?  
 (A) Disparlure (B) Polyurathane  
 (C) Polyacrylonitrile (D) Linalul
- (189) Ceramics are derived from :  
 (A) Gypsum (B) Kaoline  
 (C) Mica (D) Quick lime
- (190) Which of the following is a sulpha drug ?  
 (A) Sulphanilamide (B) Sulphapyridine  
 (C) Sulphadiazine (D) All of these
- (191) Which of the following dye is having anthraquinone structure unit ?  
 (A) Aniline Yellow (B) Magenta  
 (C) Methyl orange (D) Alizarine
- (192) Which structural unit is present in methyl orange ?  
 (A) Nitro (B) Azzo  
 (C) Anthraquinone (D) Triphenyl methane
- (193) Which of the following is a natural dye ?  
 (A) Alizarine (B) Congo-red  
 (C) Melachite green (D) Aniline yellow
- (194) The substance which is used as deodourant :  
 (A) Dichlorometa xylenol (B) Boric acid  
 (C) Sodium benzoate (D) Linalul
- (195) Which detergent is used in making of cosmetics and as cleaning agent in Hospitals ?  
 (A) Cetyl trimethyl ammonium chloride (B) LAS  
 (C) DDBS (D) ABS

- (196) Which substance is used in making of ice cream ?  
 (A) Carotene (B) Alitame  
 (C) Caramel (D) Tetrazine
- (197) Which colour is imparted by alizarine in presence of  $Mg^{2+}$  ion ?  
 (A) Red (B) Purple  
 (C) Brown-red (D) Pink-red
- (198) Which of the following substance is added in order to preserve the food for long time ?  
 (A) Formalin (B) Vinegar  
 (C) Glucose (D) Acetone
- (199) Which of the following colour is imparted by alizarine in presence of  $Ba^{2+}$  ?  
 (A) Blue (B) Violet  
 (C) Red (D) Brown
- (200) Which colour is imparted by alizarine in presence of  $Al^{+3}$  ion ?  
 (A) Pink-red (B) Blue  
 (C) Brown (D) Red
- (201) Which transitional metal oxide is insulator ?  
 (A)  $Ti_2O_3$  (B)  $CrO_2$   
 (C)  $TiO$  (D)  $TiO_2$
- (202) For a reaction :  $A \rightarrow B$  if the concn. of A is increased four times, its rate of reaction becomes double. What would be the order of reaction ?  
 (A) 2 (B) 1  
 (C)  $1/2$  (D) 0
- (203) Which halide of silver is used in photography ?  
 (A)  $AgF$  (B)  $AgBr$   
 (C)  $AgCl$  (D)  $AgI$
- (204) Which of the following does not exhibit geometrical isomerism ?  
 (A)  $[Co(NH_3)_3(NO_2)_3]$  (B)  $[Cr(OX)_3]^{3-}$   
 (C)  $[Fe(NH_3)_2(CN)_3]$  (D)  $[Co(NH_3)_4Cl_2]^+$
- (205) Which of the following is not consistent with one another ?  
 (A) Carotene (B) Tetrazine  
 (C) Alitame (D) Caramel
- (206) From which of the following, Al is extracted by Hall-Heroult process ?  
 (A)  $AlCl_3$  (B)  $Al_2O_3 + Na_3AlF_6$   
 (C)  $Na_3AlF_6$  (D)  $Al_2O_3$

- (207) What type is the terelene ?  
(A) HDP (B) LDP  
(C) Polyamide (D) Polyester
- (208) Which of the following possesses  $d^2sp^3$  hybridisation ?  
(A)  $[Fe(CO)_5]$  (B)  $[Ni(CO)_4]$   
(C)  $[Ni(CN)_4]^{2-}$  (D)  $[Co(NH_3)_6]^{3+}$
- (209) Crystal structure of MgO is like that of NaCl. What would be the co-ordination number of ions present in them respectively ?  
(A) 8 and 8 (B) 6 and 6  
(C) 4 and 4 (D) 2 and 2

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## SECTION-B

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Very short questions - answer (Each of 1 mark)

- (1) Define : Hydrogen bond
- (2) Define : Metallic bond
- (3) Give E.C. of  $O_2$  molecule and mention its bond order.
- (4) State Hund's rule
- (5) Write Schrodinger wave equation and mention the meaning of terms in it.
- (6) What is known as one Einstein energy ?
- (7) State De-broglie's equation.
- (8) Why does density decreases due to Schottky defects ?
- (9) What can be known from the value of ionic radius ratio ( $r^+/r$ ) ?
- (10) Which transitional metal oxides possesses the same conductivity as that of metal ?
- (11) In which substances Larmor circulation is found ?
- (12) Draw the structure of  $(Si_3O_9)^{6-}$  ion.
- (13) What is called electronic imperfection ?
- (14) What is called co-ordination number ?
- (15) What is the value of  $r^+/r$  for ZnS ?
- (16) On which factors the physical and chemical properties of molecules depend ?
- (17) State two important factors determining the stability of crystal structure of ionic solid ?
- (18) By which equation, Bragg's law is represented ?
- (19) What are called diamagnetic substances ?
- (20) State the value of  $r^+/r$  and co-ordination number in octahedral face centered cube ?
- (21) Give structure of  $(Si_6O_{18})^{12-}$  ion
- (22) Mention the unit of molal depression constant (Kf)
- (23) How many grams of NaOH will be needed to prepare 2 molal NaOH from 200 grams of water ?
- (24) State two uses of Henry's law.
- (25) What is called substitutional solid solution ? Give one illustration.
- (26) Which is the best semi permeable membrane ?
- (27) What is called Osmotic pressure ?
- (28) State limitations of Henry's law.
- (29) Calculate molefraction of KCl in 3 M having 1000 ml volume
- (30) Find out the molarity of 10 % w/v NaOH (Molar mass of NaOH = 40 g/mol)
- (31) Define : Normality
- (32) State Henry's law.

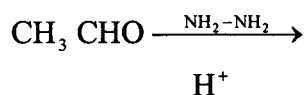
- (33) State the unit of Molar Entropy.
- (34) Mention third law of thermodynamics.
- (35) How does internal energy of the system change ?
- (36) Write equation showing relationship between  $\Delta G$  with cell potential.
- (37) Give the relation of  $\Delta G$  with spontaneity of reaction.
- (38) What would be the value of  $\Delta G$  out of +ve or -ve for ice at 260 K and 280 K ?
- (39) The absolute value of free energy of any substance is not measured. Why ?
- (40) State limitation of second law of thermodynamics.
- (41) What is called concentration cell ?
- (42) State Kohlrausch's law.
- (43) What is called electronic conductivity ?
- (44) Give uses of cell potential.
- (45) Write Nernst's equation.
- (46) Give cell representation for the electrodes having  $E^\circ_{\text{Zn/Zn}^{+2}} = 0.76 \text{ V}$  and  $E^\circ_{\text{H}_2/\text{H}^+} = 0.0$  volt.
- (47) Write the reactions occurring at anode and cathode during electrolysis of  $\text{CuSO}_4$  between graphite electrodes.
- (48) Write reactions taking place at anode and cathode in fuel cell.
- (49) Write the products obtained at anode and cathode by electrolysis of  $\text{KHF}_2$  in anhydrous HF.
- (50) Write the unit of Molar conductivity.
- (51) State use of standard H-electrode.
- (52) What is called resistivity ?
- (53) By which particles, the electric current is conducted through electrolytic solution ?
- (54) With increase in temperature rate of reaction increases. Why ?
- (55) Define : Half-life of reaction.
- (56) State the unit of K for second order reaction.
- (57) What is known as activated complex ?
- (58) Give structural formula of O-hydroxy amino ethyl benzoate.
- (59) Write exponential equation of rate constant for first order reaction.
- (60) State use of ZSM-5
- (61) What is called Tyndall effect ?
- (62) What is known as Demulsification ?
- (63) What is called selectivity of catalysis ?
- (64) State the type of colloidal Sol and give one example in which dispersed phase is liquid and dispersion medium is gas.
- (65) Write the formula of Langmuir adsorption isotherm.

- (66) Which tests are used to detect the emulsion ?
- (67) Explain types of Emulsion with illustrations.
- (68) State the uses of Zeolites.
- (69) Define : Colloid
- (70) Write the equation of Freundlich adsorption isotherm.
- (71) What is called Kraff temperature ?
- (72) What is known as ultrafilter paper ?
- (73) Which metal is present in pepta bismol ?
- (74) Write S.F. of triphosphoric acid.
- (75) What are Teflon and Freons ? State their uses.
- (76) What are called chalcogens ?
- (77) Write Mol formula of super phosphate of lime.
- (78) Complete the reaction :  $\text{H}_2\text{S}_2\text{O}_7 + \text{H}_2\text{O} \rightarrow$
- (79) Complete the reaction :  $\text{SnCl}_4 + 2\text{H}_2\text{O} \rightarrow$
- (80) How is diphosphoric acid dotained ?
- (81) Give str. formula of thiosulphuric acid and phosphorous acid.
- (82) Write the equation of preparation of triple supher phosphate.
- (83) Write the equations taking place in Moissan's process.
- (84) By which method highly pure silicon is obtained ?
- (85) What is carborundum ? How is it obtained ?
- (86) Write the equation of potassium dichromate as an oxi. agent in volumetric analysis ?
- (87) State the constituent elements of phyrophoric mish metal.
- (88) What is called d-d transition of electron ?
- (89) State the percentage of elements present in bronze alloy.
- (90) State the uses of Pyrophoric mish metal.
- (91) State uses of copper sulphate.
- (92) Write the theoretical value of magnetic moment of E.C. having  $d^7$
- (93) State any two factors responsible for formation of transitional metal ions.
- (94) Which elements are present in crude tin ?
- (95) Out of Sc and  $\text{Sc}^{3+}$  which has smaller size ?
- (96) State most stable oxi-state of vanadium.
- (97) Which metals are present in german silver alloy ?
- (98) Steel is an alloy of which metals ?
- (99) What is called Chetate ?
- (100) Write IUPAC name of  $[\text{Co}(\text{en})_3] \text{Cl}_3$

- (101) Write IUPAC name of  $[\text{Fe}(\text{CO})_5]$
- (102) Draw the geometrical shapes and mention its types of  $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$
- (103) How the growth of tumor in our body can be inhibited ?
- (104) Write name and structure of tridentate ligand.
- (105) The bombardment of deuteron on  $^{96}_{42}\text{Mo}$  gives Technetium. Give its equation.
- (106) What is called K-electron capture ?
- (107) What is used as coolant in breeder reactor ?
- (108) Complete the nuclear reaction :  $^{27}_{13}\text{Al} + ^4_2\text{He} \rightarrow \dots\dots\dots + ^1_0\text{n}$
- (109) Complete the nuclear reaction :  $^{35}_{17}\text{Cl} + ^1_0\text{n} \rightarrow \dots\dots\dots + ^4_2\text{He}$
- (110) What is called optical resolution ?
- (111) State optically active isomers and types of Lactic acid.
- (112) State type isomers and formula of products when trans-2 butene is reacted with  $\text{Br}_2$
- (113) State name and structure of a compound having chiral carbon ?
- (114) Draw all possible optical isomers of  $\alpha$  - hydroxy propanoic acid.
- (115) Which compound is useful in contraction of blood vessels ?
- (116) Write IUPAC name of ethylene glycol and phenetol.
- (117) Write the equation of : Reiman-Tieman reaction.
- (118) Write IUPAC of p-cresol.
- (119) State the value of bond angle in ether.
- (120) Write the equation of acetylation of phenol.
- (121) Write the structure of salicylic acid. Give its two uses.
- (122) Write the equation of bromination of methoxy benzene and give the name of products.
- (123) Write structures and name of X and Y.



- (124) Complete the reaction and write name and structure of product.



- (125) Write the equation of aldol condensation of acetone.
- (126) Write equation of Cannizzaro reaction.
- (127) Write the equation of preparation of Tollen's reagent.
- (128) Write the equation of direct reduction of acetic anhydride.
- (129) Write equation of Wolf-Kishner's reduction.
- (130) What is called Hofmann's reaction ?

- (131) Propane  $\xrightarrow{\text{Fuming HNO}_3 / 400^\circ\text{C}}$  complete the reaction
- (132) On what base the amines are classified ?
- (133) What are the boiling points of alkyl isocyanides in comparison with isomeric alkyl cyanides? Why ?
- (134) Write structure and IUPAC name of vinyl cyanide.
- (135) Write the eqn. of diazotization of aniline.
- (136) Complete the following reaction.
- Methyl cyanide + Ethanol + Water  $\xrightarrow[\Delta]{\text{CONC. H}_2\text{SO}_4}$
- (137) Write electronic structure of methyl cyanide.
- (138) Why are the boiling points of alcohols higher than corresponding amines ?
- (139) Why is BDAC salt cannot be obtained in dry state ?
- (140) Give the structure of acrylonitrile.
- (141) Give complete name of PSLV.
- (142) What are called fillers ? Give illustrations.
- (143) By which monomers, the SBR copolymer is obtained ?
- (144) Which linear polymer when heated with excess formaldehyde gives bakelite ?
- (145) Define : Plastisizers with illustration.
- (146) What are called oligomers ? Give illustration.
- (147) Write only names of monomers used in preparation of Nylon 66.
- (148) Give one illustration of each of homopolymer and co-polymer.
- (149) Which catalyst is used in preparation of PVC ?
- (150) What is known as Rubber Latex ?
- (151) Write the name and structure of monomer used in preparation of Nylon 6.
- (152) Give difference between : HDP and LDP.
- (153) Write structure of cis isoprene.
- (154) What are called antioxidants ? Give examples.
- (155) Write monomers present in Nylon-2-Nylon-6 polymer.
- (156) What are called Elastomers ?
- (157) Write complete name and use of PHBV.
- (158) What are called essential and non essential amino acids ?
- (159) Write the eqn. of hydrolysis of protein.
- (160) Write equation of glucose which proves the six carbons in linear structure.
- (161) Write the formula of  $\alpha$ -amino acid.
- (162) What is the pH value of amino acid at their iso electric point ?

- (163) Which are the three main parts of nucleic acids ?
- (164) By which reaction it is proved that glucose contains five -OH groups ?
- (165) Give the names of vitamins which are fat soluble.
- (166) What is caremel ? Give its use.
- (167) State the reaction condition for industrial production of glucose from starch.
- (168) Which synthetic dipeptide is 160 times as sweet as sucrose ?
- (169) What product is obtained on hydrolysis of Lactose ?
- (170) What is called Leuco salt ?
- (171) What are called four colours ? Give illustrations.
- (172) Write structural formula of DDBS.
- (173) Write the constituents of Talcum powder ?
- (174) How are super conducting ceramics obtained ?
- (175) Give illustrations of two important pheromones.
- (176) Which substance is used as fuel as well as oxidizing agent in hybrid fuel ?
- (177) Give the examples of reversible colloidal sol ?
- (178) Write structural formula :
- (1) Methoxy benzene                      (2) Ethylene glycol
- (179) Write the equation of Fries rearrangement of phenyl acetate.
- (180) State the uses of acetone.
- (181) Why is phenol not neutralized by  $\text{NaHCO}_3$  ?
- (182) Give classification solids.
- (183) Give the structure showing H-bond between ketone and water molecules.
- (184) What is called aromatic acid ? Give illustration.

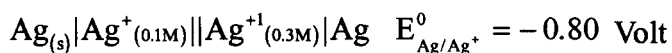
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## SECTION-C

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- (1) Give M.O. diagram of  $O_2$  Molecule.
- (2) Give M.O. diagram of  $N_2$  Molecule
- (3) Write the Schrodinger wave equation moving around nucleus. Give the meaning of terms involved.
- (4) An electron has kinetic energy  $1.64 \times 10^{-10}$  erg. Calculate its wave length in  $\text{\AA}$  unit.
- (5) Explain : Quantum number which does not exist in Schrodinger equation.
- (6) State importance of H-bond (four points)
- (7) Explain : Electron sea model of metallic bond.
- (8) A particle having 1.0 mg. weight is moving with a velocity of 3600 km/hour. Calculate the wave length associated with its motion.
- (9) Calculate energy of photons having 9000  $\text{\AA}$  wave length.
- (10) Write E.C. of  $B_2$  molecule and calculate its bond order.
- (11) When a cricket ball having the weight 240 gram is thrown at a speed of 120 km/hour, what would be its wavelength ?
- (12) What will be the wave length of a particle having  $1 \times 10^{-10}$  gram weight and velocity 100 km/minute ?
- (13) Which information are obtained on the basis of bond order value ? (Give any four points)
- (14) Give accepted conditions of solution of  $\psi$
- (15) Calculate energy of photons having 6000  $\text{\AA}$  wave length.
- (16) Explain : Frenkel defects.
- (17) What is called co-ordination number ? Mention co-ordination number of  $Na^+$  and  $Cs^+$  in NaCl and CSCI.
- (18) Write short note : Ferro magnetic substances
- (19) Explain : Bragg's equation.
- (20) Explain : Larmor circulation.
- (21) Explain : Schottky defects.
- (22) Give an account of Ferrimagnetic substance.
- (23) Write short note on : Network solids.
- (24) What is called unit cell ? Calculate number of atoms per unit cell in Body centered cubic structure ?
- (25) Explain crystal structure of zinc sulphide.
- (26) Give the difference between Schottky and Frenkel defects. (two points of each)
- (27) What is called unit cell. Find the number of atoms per unit cell of body centered cubic structure.
- (28) Derive the value of  $\frac{r_+}{r_-}$  for octahedral void.
- (29) Derive the value of  $r^+/r^-$  for octahedral void.

- (30) Calculate molarity of 10%  $\frac{w}{w}$   $H_2SO_4$  (Density = 1.84 g/ml.)
- (31) Calculate depression in freezing point of solution when 3.42 g. sugar is dissolved in 1 kg. of water.  $K_f = 1.5^\circ C \text{ kg./mol.}$
- (32) With the change in temperature the value of molarity changes while that of molality does not change. Why ?
- (33) Explain : Molar elevation in boiling point constant.
- (34) Give the relation between free energy and equilibrium constant.
- (35) Give importance and limitation of chemical thermodynamics.
- (36) Mention the importance of second law of thermodynamics.
- (37) Explain : Entropy change in expansion of ideal gas in vacuum.
- (38) What is called Entropy ? How is spontaneity of the reaction predicted on the basis of entropy?
- (39) At  $100^\circ C$ , 2 mole of water is converted into vapour having the same temperature. What would be the change in entropy of system ? Molar enthalpy of water = 9720 cal.
- (40) Explain Mathematical form of entropy.
- (41) The equilibrium constant at  $25^\circ C$  of following reaction is 4.0. Calculate  $\Delta G^\circ$  of this reaction.
- $$C_2H_5OH_{(l)} + CH_3COOH_{(l)} \rightleftharpoons CH_3COOC_2H_5_{(l)} + H_2O_{(l)}$$
- (42) Write two main reactions occurring at cathode during corrosion.
- (43) Write the reactions taking place at cathode in dry cell and in fuel cell.
- (44) Calculate cell potential at  $25^\circ C$ .



- (45) Write the reactions at anode and cathode in hydrogen Fuel Cell. Give advantages of this cell.
- (46) Give information obtained from EMF series.
- (47) Write fundamental laws of electrolysis of Faraday.
- (48) What is called cell potential ? Give its applications.
- (49) Explain : Electrolysis of  $CuSO_4$  between Cu electrodes.
- (50)  $E^\circ_{ox}$  of  $Cu / Cu^{+2}_{(1M)}$  and  $Zn / Zn^{+2}_{(1M)}$  are -0.34 V and +0.76 V respectively. Give symbolic representation of this cell and calculate its  $E^\circ_{Cell}$ .
- (51) How many gram of Cu will be obtained on cathode when conc.  $CuCl_2$  is electrolysed by passing 8A current for 5 hours. ( $Cu=63.5 \text{ g/mol.}$ )
- (52) At  $25^\circ C$  the potential of cell is 0.80 V calculate pH of HCl solution.
- $$Pt / H_{2(1atm)} / HCl_{(xm)} // Ag^+ (0.001 M) / Ag.$$
- $$E^\circ_{Ag/Ag^+} = -0.80 \text{ volt}$$
- (53) Calculate equilibrium constant of the cell reaction at  $25^\circ C$  of the cell.
- $$Sn | Sn^{+2}_{(1M)} || Pb^{+2}_{(1M)} | Pb \quad \text{Write cell reaction}$$
- $$E^\circ_{Sn/Sn^{2+}} = 0.14 \text{ Volt} \quad E^\circ_{Pb/Pb^{2+}} = 0.13 \text{ Volt}$$

- (54) Explain : Modern Law of Electrolysis of Faraday with example.
- (55) Explain : Electrolysis of conc. NaCl aq. solution.
- (56) Calculate cell potential at 25° C.
- $$\text{Al}_{(s)}|\text{Al}^{3+}_{(1M)}||\text{Cu}^{2+}_{(0.02M)}|\text{Cu}_{(s)} \quad E^0_{\text{Al}/\text{Al}^{3+}}=1.66\text{v} \quad E^0_{\text{Cu}/\text{Cu}^{2+}} = -0.34\text{v}$$
- (57) The electrolysis of aqu. Na<sub>2</sub>SO<sub>4</sub> is actually the electrolysis of water. Justify the statement.
- (58) At 25° C write cell reactions when following electrodes are combined. Also calculate its cell potential.
- $$E^0\text{Mg}^{2+}/\text{Mg} = -2.37 \text{ volt}$$
- $$E^0\text{CO}^{2+}/\text{CO} = -0.28 \text{ volt}$$
- (59) Explain : Ostwald's isolation method.
- (60) Explain the factors affecting the rate of chemical reaction.
- (61) The rate constant of a certain reaction becomes double when temp. is increased from 298 K to 308 K. Calculate its Eact.
- (62) Explain different methods used for determining order of reaction.
- (63) Define : Half life of reaction and Molecularity.
- (64) Explain : Pseudo first order reaction.
- (65) Derive the formula of rate constant of a first order reaction.
- (66) A certain reaction is a second order with respect to reactant A
- (1) Write rate law equation.
  - (2) If concn. of A and B are doubled then what would be the effect on rate of reaction ?
- (67) Explain effect of temperature on rate constant.
- (68) For a certain first order reaction its rate constant is 60 second<sup>-1</sup>. What time will be needed for the reaction to occur till the concn. of reactant is left 25 % of initial concentration.
- (69) Give an account on Energy of activation.
- (70) Explain : Mechanism of Miscelle formation.
- (71) Give difference of four points between lyzophillic and lyophobic colloids.
- (72) Explain : Dialysis.
- (73) Explain : Shape selectivity of catalysis by zeolite.
- (74) Explain : Hetrogeneous catalysis.
- (75) What is known as Emulsion ? Write the tests used for detection of Emulsion.
- (76) Explain : Peptization.
- (77) Give the formula of Freundlich adsorption isotherm. Give its limitations.
- (78) Explain : Dialysis for purification of colloidal sol.
- (79) Mention the uses of adsorption.
- (80) State Hardy and Schulz's rules.
- (81) Explain two chemical methods of preparation of colloidal sols.

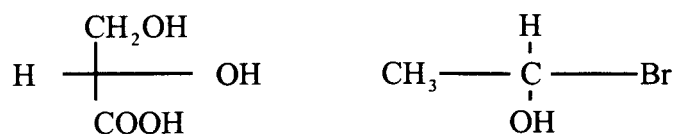
- (82) Explain : Tyndall effect
- (83) Explain : Lyophilic colloids.
- (84) Explain any two factors affecting adsorption.
- (85) Write short note : Brownian motion.
- (86) State four uses of adsorption.
- (87) Explain Heterogeneous and Homogeneous catalysis with one illustration of each.
- (88) Give any four uses of colloids and Emulsions.
- (89) Write the equations of  $\text{H}_2\text{SO}_4$  with Cu and C.
- (90) Write the equations of reaction of  $\text{PCl}_3$  and  $\text{PCl}_5$  with water.
- (91) Mention the shape of  $\text{H}_2\text{SO}_4$  molecule and give its electronic structure.
- (92) Give structural formula of para periodic acid and metaperiodic acid.
- (93) Explain : Halides of phosphorous.
- (94) Explain allotropes of selenium.
- (95) Write molecular formula and structural formula of cyclotrimeta phosphoric acid.
- (96) Give str. of phosphinic acid and pyrophosphoric acid.
- (97) Complete the following reaction :
- (1)  $\text{H}_5\text{IO}_6 \xrightarrow{100^\circ\text{C} / 12\text{mm}}$
- (2)  $\text{Pb}_3\text{O}_4 + 4 \text{HNO}_3 \rightarrow$
- (98) Write short note : Silicones
- (99) Write name, symbol, atomic number and electronic configuration of group-15 elements.
- (100) Write equation of preparation and structures of  $\text{XeF}_4$  and  $\text{XeF}_6$ .
- (101) State uses of inert gases.
- (102) Give equation of preparation of super phosphate of lime and  $\text{XeF}_6$ .
- (103) Give str. of  $\text{P}_4\text{O}_6$  and  $\text{P}_4\text{O}_{10}$
- (104) Complete the following reactions :
- (1)  $\text{PCl}_5 + 4\text{H}_2\text{O} \rightarrow$
- (ii)  $2 \text{NaClO}_3 + \text{SO}_2 \rightarrow$
- (105) Explain allotropes of sulphur.
- (106) Give classification of steel.
- (107) Write short note : Inter halogen compounds.
- (108) Mention the percentage of metals in nitinol and German silver. Give their uses.
- (109) Transitional metal ions are coloured. Explain.
- (110) Write the reactions involved in blast furnace for reduction of haematite by carbon monoxide step wise.
- (111) Explain Cyanide method used for extraction of silver.
- (112) Explain catalytic property of transitional metals.

- (113) Give the equation of preparation of potassium permanganate.
- (114) Give the equation of preparation of potassium dichromate.
- (115) State percentage of metals in Nitinol alloy and give its uses.
- (116) State Hume and Rothery's rules.
- (117) Explain Fixing and Printing in Chemistry of Photography.
- (118) The energy of 4s orbital is less than 3d orbital . Explain.
- (119) On what factors oxidation states of transitional metals depends ?
- (120) The efficiency of formation of complex compounds of transitional metals ions is more than that of other elements. Give reasons.
- (121) Explain : expouser and developing in Chemistry of Photography.
- (122) E.C. of Cr. is different from ideal arrangement. Explain.
- (123) Give uses of actinide elements.
- (124) State one use of each of German Silver and Cupro nickel.
- (125) Explain : Lanthanide contraction.
- (126) Define : Transitional elements. Why is Copper not considered as transition elements ?
- (127) Give preparation of  $\text{CuSO}_4$ . Give its two uses.
- (128) Give preparation of  $\text{AgNO}_3$ . Give its two uses.
- (129) State principal ores of Zn and write their molecular formula.
- (130) Explain the method of preparation of photographic film.
- (131) Give two preparation of mercuric chloride.
- (132) Give preparation and uses of Silver halides.
- (133) The E.C. of Cr is  $[\text{Ar}] 4s^1 3d^5$  and not  $[\text{Ar}] 4s^2 3d^4$  Why ?
- (134) Explain : Hexadentate ligand.
- (135) Give applications of complex compounds (any four)
- (136) Give IUPAC Name  
(i)  $\text{Na}_2 [\text{Fe} (\text{NO}) (\text{CN})_5]$  (ii)  $[\text{Co} (\text{NH}_3)_4 (\text{NO}_3) \text{Cl}] \text{Cl}$
- (137) Give IUPAC Name  
(i)  $\text{Na}_2 [\text{Fe} (\text{CO}) (\text{CN})_5]$  (ii)  $[\text{Co} (\text{NH}_3)_3 (\text{NO}_3)_3]$
- (138) The magnetic moment of  $[\text{Fe}(\text{CN})_6]^{3-}$  is greater than that of  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  Give reason.
- (139) What is called ligand ? Give name and structure of Tridentate ligand.
- (140) Give IUPAC Name :  
(I)  $\text{Na}_3 [(\text{Fe} (\text{Ox})_3]$  (ii)  $[\text{Cr}(\text{NH}_3)_4 \text{CO}_3] \text{NO}_3$
- (141) Explain importance of Complex Compounds.
- (142) Give Basic requirements for formation of Complex Compounds.
- (143) Stability of  $[\text{Co} (\text{NH}_3)_6]^{2+}$  is less than that of  $[\text{Co} (\text{NH}_3)_6]^{3+}$  Give reasons.
- (144) Explain the principle of Breeder reactor. Give its usefulness.

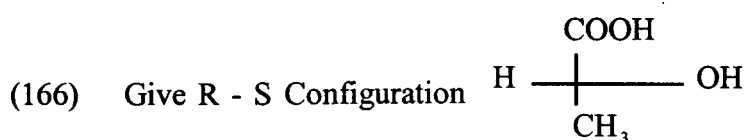
- (145) When one  $\alpha$  particle is emitted from  ${}^{238}_{92}\text{U}$  What would be the neutron proton ratio in new element ?
- (146) Explain Carbon radiometric dating method.
- (147) Explain : Decay constant.
- (148) What is called particle accelerators ? Give two examples.
- (149) Explain : Rutherford, Soddy's Rules of Group displacement with illustrations.
- (150) Which different particles are used in artificial Radio activity ?
- (151) Mention four Radio isotopes. Give their uses.
- (152) How are Bk and Cf derived. Give their equations.
- (153) What is called tracer technique ? How it is useful in reaction mechanism of a chemical reaction?
- (154) Give two different equation of artificial nuclear reactions carried out by Bombardment of neutron.
- (155) Calculate number of  $\alpha$  and  $\beta$  particles during conversion of  ${}^{232}_{90}\text{Th}$  to  ${}^{208}_{82}\text{Pb}$
- (156) A fresh sample of Carbon emits 25.5 counts per minute. An old sample of same condition emits 20.5 counts per minutes per gram. If half life of  $\text{C}^{14}$  is 5770 years. How many years the sample would be old ?
- (157) Atomic mass of  ${}^{19}_9\text{F}$  is 18.998 4 amu. If mass of proton and neutron are 1.0018 and 1.0087 amu. calculate binding energy per nucleon.
- (158) Write following nuclear reactions :
- (i) One  $\alpha$  particle is emitted by  ${}^{238}_{92}\text{U}$
- (ii) One  $\beta^+$  particle is emitted by  ${}^{239}_{92}\text{U}$
- (159) How many  $\alpha$  and  $\beta$  particles are emitted during conversion of  ${}^{239}_{92}\text{U}$  into  ${}^{206}_{82}\text{Pb}$
- (160) Give structures of d and l isomers of Lactic acid.
- (161) Find R and S configuration



- (162) Explain steps involved in nomenclature of R and S configuration.
- (163) Write short note : Absolute configuration and D, L nomenclature.
- (164) Based on R - S nomenclature, find original configuration of following compounds :



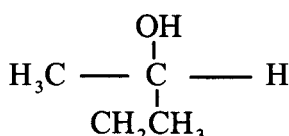
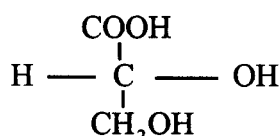
- (165) Explain : Conformation and configuration analysis.



(167) Explain : Geometrical isomers

(168) Explain : Importance of stereochemistry.

(169) Give R and S nomenclature of :



(170) Explain : Asymmetric molecules.

(171) Give conversion : Sodium phenoxide to o+p nitro anisol.

(172) Give conversion : Salicyldehyde from chlorobenzene.

(173) Write the equation of Friedel - Craft alkylation and acylation of anisole.

(174) Give conversion : Chlorobenzene into benzene.

(175) Explain : Fries Rearrangement.

(176) Give conversion : Di ethyl ether into ethane.

(177) Give two equations of industrial production of ethanol.

(178) Give conversion : *p*-hydroxy acetophenone from phenol.

(179) Give conversion : Phenol into anisol.

(180) Give conversion : Diethyl ether into ethene.

(181) Give conversion : Ethanol into acetaldol.

(182) Give conversions : 2-me-2-propanol into acetic acid.

(183) Give conversions : Ethanamide into ethyl acetate.

(184) Give conversion : Acetyl chloride into ethyl amine.

(185) Give conversion : Acetamide into methanol.

(186) Explain detection of aldehyde by silver mirror test.

(187) Write one reaction of each of Wolf-Kishner and Clemenson reduction.

(188) Write short note on Hofmann reaction.

(189) Explain : Acetylation of ethyl amine.

(190) Write the equations of industrial production of amino benzene (any two)

(191) Give equation of conversion of : Phenylacetate from benzene diazonium chloride.

(192) Give conversion : Aniline into phenyl hydrazine.

(193) Give conversion : ethyl amine into ethene

(194) Explain : Carbylamine test with equation.

(195) Explain : Classification of amines.

(196) Give conversion : Amino ethane into ethane.

- (197) Give preparation and uses of polystyrene.
- (198) Give preparation of PHBV and its uses.
- (199) Write short note : Vulcanised rubber.
- (200) Explain : Preparation of Bakelite.
- (201) Explain : Addition polymerisation.
- (202) Give difference between : Thermoplastic polymer - thermosetting polymer (two points each)
- (203) Give preparation of Nylon 6. Give its uses.
- (204) Explain : Elastomers and Fibers
- (205) Give complete name of : PTFE, PAN, PHBV, SBR
- (206) Give equation of preparation of butyl rubber.
- (207) Give complete name of SBR. Give its use.
- (208) Give preparation and uses of Nylon 66.
- (209) Explain classification of polymers based on molecular forces.
- (210) Write complete name of Teflon and give its use.
- (211) Explain : Peptide bond
- (212) Explain : Free radical addition polymerisation reaction with illustration.
- (213) Explain Classification of polymers based on structure.
- (214) Explain : Classification of Lipids.
- (215) Write short note on Double helix structure of DNA.
- (216) Explain : Preservatives and deodorants.
- (217) Explain classification of detergents based on existence in aqueous medium. (any two type)
- (218) Write short note : Pheromones
- (219) State uses of carbon fibers.

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## SECTION-D

- (1) Derive De-broglie mass wave equation. Why is this principle not applicable to a aeroplane flying in air ?
- (2) What are called quantum numbers ? Explain angular momentum quantum number and magnetic quantum number.
- (3) What is called bond order ? Give M.O. diagram of  $N_2$  molecule. Calculate its bond order and predict magnetic properly.
- (4) Explain : Heisenberg uncertainty principle.
- (5) Write short note : H-bond
- (6) Explain :  $sp^3d^2$  hybridisation in  $SF_6$
- (7) What is called hybridisation of orbitals ? Explain  $sp^3d$  hybridisation in  $PCl_5$
- (8) Explain : Molecular Orbital theory with example.
- (9) Write Schrodinger wave equation. State conditions of  $\psi$  for acceptable solution.
- (10) What are called  $\sigma$ ,  $\sigma^*$  and  $\pi$ ,  $\pi^*$  molecular orbitals ? Explain its construction and symmetry with figures.
- (11) Define metallic bond and explain electron sea model.
- (12) Explain : Schottky and Frenkel defects.
- (13) Write note on silicates and their structures.
- (14) At  $25^\circ C$ , 5.13 g of sugar ( $C_{12}H_{22}O_{11}$ ) is dissolved in 200 g of water. If elevation in boiling point is  $0.33^\circ C$ , calculate molal elevation constant ( $K_b$ ) ( $C = 12$ ,  $H = 1$ ,  $O = 16$ )
- (15) State Raoult's law. Give its proof and state its limitations.
- (16) Explain : Abnormal molecular weight and Vant-Hoff factor.
- (17) At  $25^\circ C$  when 6 g unknown substance is dissolved in 180 g of water its vapour pressure decreases from 18.5 mm to 18 mm. Calculate molecular weight of unknown substance.
- (18) Calculate molarity and Normality of 10% w/v NaOH solution.
- (19) Explain depression in freezing point and derive the formula of molal depression constant.
- (20) Derive the formula of molal elevation constant  $K_b$ .
- (21) Explain Henry's law in detain. Give its usefulness.
- (22) Derive the formula for osmotic pressure.
- (23) You are given 12% w/w  $H_2SO_4$  aqueous solution. Calculate its molality and molefraction of solute. (Density = 1.85 g/ml)
- (24) What is called molal depression constant ? Derive the formula of molal depression constant  $K_f$ .
- (25) What is known as molal depression constant ? Derive the formula to determine the molecular weight of non volatile non ionic solute based on this.
- (26) At  $25^\circ C$  2 g of unknown substance is dissolved in 90 g of water. The vapour pressure of this solution decreases from 27.5 mm to 27.1 mm. Calculate molecular weight of unknown substance.

- (27) At 100° C. 2 moles of water are converted into vapours having same temperature. What would be the entropy change of system ? Molar heat of vapourization of water = 9720 cal.
- (28) Calculate  $\Delta G^\circ$  of the reaction  $\text{Zn}_{(s)} + \text{Cu}_{(aq)}^{+2} = \text{Zn}_{(aq)}^{+2} + \text{Cu}_{(s)}$  At 25° C standard potential of this cell is 1.10 V (4.184 j = 1.0 cal )
- (29) At 25° C. the values of  $\Delta G^\circ_f$  of  $\text{SO}_2$  (g) and  $\text{SO}_3$  (g) are -71.79 and -88.52 Kcal/mol respectively. Calculate  $K_p$  of the reaction  $2 \text{SO}_{2(g)} + \text{O}_{2(g)} \rightleftharpoons 2 \text{SO}_{3(g)}$
- (30) At 25° C, the  $K_p = 1.8 \times 10^{-7}$  of following reaction. Calculate  $\Delta G^\circ$
- $$\text{PCl}_{5(g)} \rightleftharpoons \text{PCl}_{3(g)} + \text{Cl}_{2(g)}$$
- (31) At 25° the equilibrium constant of following reaction is 0.5 mole litre. If standard free energy of formation of A and B are -20 and -25 kcal/mol respectively, calculate standard free energy of formation of C.  $\text{A} + \text{B} \rightleftharpoons \text{C}$
- (32) For the reaction :  $\text{A} + \text{B} \rightleftharpoons \text{C} + \text{D}$  the value of enthalpy change and entropy change at 27° C are +40 kcal/mol and 6.0 cal/kelvin. Will this reaction be spontaneous ?
- (33) What is known as entropy ? Explain how is the spontaneity be predicted on the basis of this property ?
- (34) The boiling point of water is 100° C. At this temperature the heat absorbed in conversion of 1 g of water into vapour is 540 cal. If 9 g of water is to be converted into vapour. What would be the enthalpy change, entropy change and free energy change of the process ?
- (35) The standard free energy of formations of  $\text{NO}_{2(g)}$ ,  $\text{NO}_{(g)}$  and  $\text{O}_{3(g)}$  are 12.39, 20.72 and 39.6 kcal/mol respectively. Calculate equilibrium constant at 25° C of the reaction :  $\text{NO}_{(g)} + \text{O}_{3(g)} \rightarrow \text{NO}_{2(g)} + \text{O}_{2(g)}$  If their heat of formations are 8.09, 21.6 and 34.0 kcal/mol respectively, calculate entropy change of the reaction.
- (36) At 25° C the free energy change  $\Delta G^\circ$  of the reaction is -74266 cal. Calculate standard potential of the cell (1F = 96500 C., 4.184 j = 1 cal)  $\text{Mg}_{(s)} + \text{Zn}^{2+}_{(aq)} \rightarrow \text{Mg}^{2+}_{(aq)} + \text{Zn}_{(s)}$
- (37) Explain electrolysis of followings between graphite electrodes : (1) Fused NaCl (2) Dilute aqueous NaCl (3) Concentrated aqueous NaCl.
- (38) How many gram of Cu will be obtained on a cathode when 3A current is passed for 45 minutes through aqueous  $\text{CuSO}_4$  solution ? What would be the volume of gas evolved on anode at 25° C and 740 mm pressure ? (Cu = 63.5)
- (39) Write only the equations at anode and cathode in Dry Cell, fuel cell and Lead storage cell.
- (40) Explain corrosion of metal. Give the methods of its prevention.
- (41) Calculate cell potential at 25° C.
- $$\text{Al} | \text{Al}^{3+}_{(aq)} (0.02\text{M}) || \text{Pb}^{2+}_{(aq)} (0.03\text{M}) | \text{Pb}_{(s)} \quad E^\circ_{\text{Pb}|\text{Pb}^{2+}} = 0.13\text{V}, \quad E^\circ_{\text{Al}|\text{Al}^{3+}} = 1.66\text{V}$$
- (42) State Kohlrousch's law. By using this law How is equivalent conductance of  $\text{CH}_3\text{COOH}$  calculated ?
- (43) Explain : Hydrogen fuel cell. Give its advantages.

- (44) How many grams of Na will be produced on cathode when 10 A current is passed for 24 hours through molten NaCl ? What would be the volume of  $\text{Cl}_2$  gas at  $20^\circ\text{C}$  and 745 mm evolved at anode ?
- (45) Explain principle, construction and uses of Dry cell.
- (46) At  $25^\circ\text{C}$  the potential of the cell is 1.04 V. Calculate pH of HCl solution in following cell :  
 $\text{Pt} \mid \text{H}_2 (\text{g}) (1 \text{ atm}) \mid \text{HCl} (\text{aq}) (x\text{M}) \parallel \text{Ag}^+ (0.01 \text{ M}) \mid \text{Ag}_{(\text{s})}$   
 $E^\circ_{\text{Ag}/\text{Ag}^+} = -0.80\text{V}$
- (47) How much current in ampere is needed to pass through water to obtain 150 ml  $\text{O}_2$  gas per minute at  $25^\circ\text{C}$  and 1 atm pressure ?
- (48) At  $25^\circ\text{C}$  the potential of following cell is 0.59 volt. Calculate ionic product of water.  
 $\text{Pt} / \text{H}_2 (1\text{atm}) / \text{KOH} (0.011 \text{ M}) // \text{HCl} (0.011 \text{ M}) / \text{H}_2 (1\text{atm}) / \text{Pt}$
- (49) The electrolysis of water between Pt. electrodes produces  $\text{H}_2$  and  $\text{O}_2$  gases. If 10A current is passed for 2 hours through water, what will be the volumes of gases evolved on each electrode at  $25^\circ\text{C}$  and 1 atm. ? If the current efficiency is 95 % , what will be the volumes of these gases ? (At  $25^\circ\text{C}$  and 1 atm. the volume of 1 mole  $\text{H}_2$  and  $\text{O}_2 = 24.5 \text{ L}$ )
- (50) Derive the equation of integrated rate law for first order reaction. (graph is essential)
- (51) In a first order reaction the concn. of reactant changes from 0.08 M to 0.06 M in 45 minutes. Calculate  $t_{1/2}$ .
- (52) Write Short Note : Energy of activation.
- (53) Explain : Freundlich adsorption isotherm.
- (54) Differentiate between Freundlich and Langmuir adsorption isotherm. (three points of each)
- (55) What is called Emulsion ? Explain types and tests of emulsion.
- (56) Explain method of extraction of Pb.
- (57) Give name molecular formula and structural formula of oxoacids of sulphur.
- (58) What is called Miscelle ? Explain the mechanism of formation of miscelle.
- (59) Describe Holl - Heroult process.
- (60) Explain industrial production of sulphuric acid (fig. is not essential)
- (61) Explain the method of extraction of Si and mention the properties of silicon.
- (62) How are following compound obtained from elemental sulphur ? Give only the equation with reaction conditions :  
 (i)  $\text{H}_2\text{SO}_4$  (ii)  $\text{SCl}_2$  (iii)  $\text{SF}_6$
- (63) Write balanced equation for :  
 (i)  $\text{C} + \text{H}_2\text{SO}_4 \rightarrow$   
 (ii)  $\text{KMnO}_4 + \text{HCl} \rightarrow$   
 (iii)  $\text{NaClO}_3 + \text{SO}_2 \rightarrow$
- (64) Write short note on silicate compounds.
- (65) Explain allotropes of phosphorous and give the uses of phosphorous.
- (66) Discuss the oxides and oxyacids of phosphorous.

- (67) Write the occurrence, preparation and uses of phosphorous.
- (68) Give equations of preparation of pyrophosphoric acid and polymeta phosphoric acid. Also give the structures of phosphinic acid and cyclo trimetaphosphoric acid.
- (69) Explain different methods of extraction of sulphur. Give cyclic structure of  $S_6$  and  $S_8$ .
- (70) Give two equations of  $H_2SO_4$  in which it acts as an oxidizing agent. Give uses of  $H_2SO_4$ .
- (71) Explain : Chemistry of photography and describe its various steps involved.
- (72) Explain the methods used for preparation of highly pure Si.
- (73) State the points for the efficiency of transitional metal ions of formation of complex compounds.
- (74) Describe Interstitial compounds.
- (75) Explain : Organo metallic compounds.
- (76) Explain : Postulates of Werner's theory.
- (77) Explain importance of complexes occurring in nature.
- (78) Explain geometrical shape and magnetic property of  $[Ni(CN)_4]^{2-}$ .
- (79) Explain : Type of hybridisation, magnetic property and geometrical shape of  $[Co(NH_3)_6]^{2+}$ .
- (80) Explain type of hybridisation, magnetic property and geometrical shape of  $K_4[Fe(CN)_6]$ .
- (81) What is called Ligand ? Explain classification of ligands by suitable illustration.
- (82) Explain geometrical shape and magnetic property of  $[(Fe(H_2O)_6)]^{3+}$ .
- (83) State types of radiations. Give their characteristic properties.
- (84) Draw the structures of geometrical isomers and optical isomers of  $[CoCl_2(en)_2]^+$  and  $[CoCl_2(en)(NH_3)_2]^+$ .
- (85) Explain : Principle of breeder reactor.
- (86) Explain different decay series.
- (87) Describe the nuclear fission in brief. Which bomb is made on the basis of this concept. Where it was used for destructive purpose ?
- (88) Give difference : Chemical reactions and nuclear reactions.
- (89)  $^{241}_{95}Am$  emits  $1.2 \times 10^{11}$   $\alpha$  particles per second. Calculate  $t_{\frac{1}{2}}$  of this element.
- (90) A fresh sample of carbon gives 25.5 counts per minute per gram. If an old sample under same conditions gives 20.5 counts per minute per gram. What would be age of old sample ?  $t_{\frac{1}{2}}$  of  $C^{14}$  is 5770 years.
- (91) Explain : Tracer technique with illustration.
- (92) Draw all possible optical isomers of Tartaric acid and explain its mesoform.
- (93) Explain in detail the optical isomers of tartaric acid having chiral centers more than one.
- (94) What are called optical isomers ? What is the difference between geometrical isomers and optical isomers ? trans. and cis-2-butene is not having optical property. Why ?
- (95) Give structures of all possible isomers of product when 2-butene is reacted with  $Br_2$ .
- (96) Explain : Principle of Polarimeter.
- (97) Explain : D and L nomenclature.

- (98) Explain : R and S nomenclature.
- (99) Explain in detail the optical isomers of 2,3-dihydroxy butanoic acid which is having chiral centers more than one.
- (100) Explain : Fisher projection method with illustration.
- (101) Explain : Importance of stereo chemistry.
- (102) Give Fisher projection formula of bromo chloro fluoro methane and glyceraldehyde.
- (103) Define : (1) Meso form (2) Chiral atom. (3) Diastereomer (no mirror images)
- (104) Explain : Oxidation of 1<sup>o</sup>, 2<sup>o</sup> and 3<sup>o</sup> alcohols by giving equations.
- (105) Explain : Kolbe - Schmitt process to obtain salicylic acid from phenol.
- (106) Explain : Dehydration of alcohol.
- (107) Explain : Reaction of alcohol with conc. H<sub>2</sub>SO<sub>4</sub>
- (108) Explain : Cross aldol condensation.
- (109) Give the name, formula and reaction of the formation of product by direct reduction of ester, nitro compound and anhydride.
- (110) Describe any one method of production of phenol.
- (111) Write Short Note : Cannizzaro reaction.
- (112) Explain : (1) Carbylamine test  
(2) Fries rearrangement
- (113) Write short note : (1) Hofmann reaction (2) Fehling test
- (114) Give conversion : Nitrobenzene into phenyl hydrazine.
- (115) Explain preparations of anhydride and ester by giving reactions.
- (116) Explain reduction of aldehyde and ketone.
- (117) Explain oxidation of aldehyde and ketone.
- (118) Explain the reactions of aldehyde and ketone with HCN and Grignard reagent.
- (119) Describe the reactions of preparation and property of amide.
- (120) Give only the equations of obtaining 1<sup>o</sup>, 2<sup>o</sup> and 3<sup>o</sup> alcohols from aldehydes and ketones.
- (121) Give the reactions of preparation and property of ester.
- (122) Write Short Note : Clemmensen reduction and Fehling test.
- (123) Give the equation of preparation of acetamide from acetic acid. Write the following reactions of acetamide. (1) Hydrolysis (2) Dehydration.
- (124) Explain aldol condensation by giving illustration.
- (125) Give the equation of preparation of acetic acid, ethyl acetate and acetamide from acetyl chloride.
- (126) Explain : Physical properties of amine compounds.
- (127) Explain industrial production of aniline with equations.
- (128) Describe the reaction of conc. H<sub>2</sub>SO<sub>4</sub> with ethanol.
- (129) What is known as diazotization reaction ? Write the equations of Sandmeyer reactions of benzene diazonium chloride.

- (130) Write the reactions of ethyl amine with (1) Methyl iodide (2) Acetic anhydride (3) Nitrous acid.
- (131) Explain isolation of 1°, 2° and 3° amines.
- (132) Explain Carbylamine test and azocoupling reaction.
- (133) Explain : Sandmeyer reaction.
- (134) Give conversions : (1) Benzene diazonium chloride into acetophenone phenyl hydrazone (2) Nitrobenzene into N-acetyl aniline.
- (135) Explain the reactions of aniline with : (1) Methyl iodide (2) Acetyl chloride (3) Bromine water.
- (136) Explain : (i) LDP and HDP (ii) plasticizers (iii) Homopolymer and copolymer.
- (137) Explain classification of polymers based on their sources.
- (138) Explain preparation and uses of : Terylene.
- (139) Explain :  
(a) Thermosetting polymer - thermoplastic polymer. (b) Addition and condensation polymer.
- (140) Write short note : Carbohydrates and its types.
- (141) Write short note : Protein and amino acid.
- (142) Explain : Classification of Lipids.
- (143) What are called Vitamins ? Explain Vitamin B and C.
- (144) What are called vitamins ? State the sources and diseases due to deficiency of vitamin C and K.
- (145) Explain : Nucleic acid.
- (146) Explain different types of cosmetics used in day to day life.
- (147) Define vitamins and give its classification. Which diseases are caused due to deficiency of vitamins A, C and K.
- (148) Give names of Vitamin B, H and E. Give their sources and diseases caused due to their deficiency.
- (149) Write short note on Rocket Fuel.
- (150) Explain classification of dyes on the basis of their applications.
- (151) Explain classification of detergents.
- (152) State classification and uses of carbon fibers.
- (153) Explain physical properties of  $\alpha$  amino acids.
- (154) Write short note on microalloys.
- (155) Write short note : Sucrose.

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