

UP - PGT CHEMISTRY

PGT | GIC | KVS | NVS | BPSC | DSSSB

MOCK TEST

- The halogen having metallic character is**
(a) Bromine (b) Chlorine (c) Iodine (d) Fluorine
- The cell constant of a conductivity cell**
(a) Remains constant for a cell
(b) Changes with a change of electrolyte
(c) Changes with change in temperature
(d) Changes with a change of concentration of electrolyte
- When the salt bridge is removed from a cell, its voltage**
(a) Will increase (b) Will decrease to zero
(c) Will decrease to half (d) Will not change
- In $\text{Fe}(\text{CO})_5$, the Fe-C bond possesses**
(a) pi character (b) Sigma character
(c) Ionic character (d) Both sigma and pi characters
- Which one of the following elements shows the maximum number of different oxidation states in its compound?**
(a) Am (b) Cd (c) Eu (d) La
- The oxidation state of oxygen in O_2F_2 is :**
(a) +1 (b) +2 (c) +4 (d) -2
- In a crystal, atoms are located at the positions of**
(a) Maximum potential energy (b) Minimum potential energy
(c) Zero potential energy (d) Indefinite potential energy
- Wilson's disease arises from :**
(a) Excess accumulation of Calcium in the body
(b) Excess accumulation of Copper in the body
(c) Excess accumulation of Selenium in the body
(d) Excess accumulation of Vanadium in the body

THE RASAYANAM

9. **Electrophoresis refers to :**
 (a) Separation (b) Identification (c) Digestion (d) Amalgamation
10. **The decreasing order of boiling points of alkyl halides is**
 (a) $RF > RCl > RBr > RI$ (b) $RBr > RCl > RCl > RF$
 (c) $RI > RBr > RCl > RF$ (d) $RCl > RF > RI > RBr$
11. **$LaH_{2.76}$ is an example of**
 (a) Molecular hydrides (b) Metallic hydrides
 (c) Covalent hydrides (d) Ionic hydrides
12. **What is the ratio of the atomic radius of the 5th orbit in chlorine atom and 3rd orbit in Helium atom?**
 (a) 153:50 (b) 50:153 (c) 153:100 (d) 100:153
13. **The major product of following reaction is $R-C\equiv N \xrightarrow[(ii) H_2O]{(i) AlH (iBu)_2} ?$**
 (a) $RCHO$ (b) $RCONH_2$ (c) $RCOOH$ (d) RCH_2NH_2
14. **When more and more water is diluted with acids its H^+ ion concentration will**
 (a) Increase (b) Decrease
 (c) Remains the same (d) Depends on the type of acids
15. **From the following, which is more covalent?**
 (a) Al_2S_3 (b) AlN (c) Al_2Cl_6 (d) Al_2O_3
16. **Using VSEPR model, the shape of the following molecules IF_5^{2-} (A), XeF_4 (B), IO_3^- (C), BrF_3 (D) are**
 (a) (A) pentagon shape, (B) square planar, (C) trigonal pyramid, (D) T-shape
 (b) (A) trigonal bipyramid, (B) square planar, (C) trigonal pyramid, (D) T-shape
 (c) (A) square pyramid, (B) tetrahedral, (C) trigonal pyramid, (D) planar
 (d) (A) pentagonal pyramid, (B) tetrahedral, (C) trigonal pyramid, (D) Planar
17. **Calculate the ionic strength of 0.2 M solution of Calcium chloride?**
 (a) 0.9 M (b) 0.06 M (c) 0.6 M (d) 6.0 M

18. What is the value of rate constant k if the value of the activation energy E_a and the frequency factor A are 49 kJ/mol and $9 \times 10^{10} \text{ s}^{-1}$ respectively? ($T = 313 \text{ K}$)
 (a) $6 \times 10^2 \text{ s}^{-1}$ (b) $9 \times 10^2 \text{ s}^{-1}$ (c) $6 \times 10^{-2} \text{ s}^{-1}$ (d) $3 \times 10^2 \text{ s}^{-1}$
19. The rate law for inversion of cane sugar is $R = k [\text{C}_{12}\text{H}_{22}\text{O}_{11}] [\text{H}_2\text{O}]$. Find the concentration of sucrose if the rate of the reaction is 0.032 s^{-1} and rate constant $k = 0.005$.
 (a) 5.8 M (b) 6 M (c) 6.2 M (d) 6.4 M
20. Which of the mentioned relation is not correct?
 (a) $A = U - TS$ (b) $H = G + PV$ (c) $G = H - TS$ (d) $S = dQ/T$
21. $[\text{Zr}(\text{CH}_3)_6]$ exists in :
 (a) Octahedral geometry (b) Trigonal prismatic geometry
 (c) Square pyramidal geometry (d) Distorted trigonal bipyramidal geometry
22. The complex $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ absorbs the wavelength of light corresponding to orange colour. Predict the color of the coordination compound based on this information.
 (a) Red (b) Yellow (c) Blue (d) Colourless
23. As the crystal field splitting energy in octahedral field increases, the wavelength of light absorbed _____.
 (a) Increases (b) Decreases
 (c) Remains the same (d) May increase or decrease
24. If Pt in $\text{PtCl}_4 \cdot 2\text{HCl}$ has a secondary valence of 6, how many moles of AgCl will 1 mol of the compound precipitate with excess AgNO_3 ?
 (a) 0 (b) 1 (c) 2 (d) 4
25. Which of the following is a complex salt?
 (a) Potassium aluminium sulphate (b) Ammonium iron(II) sulphate
 (c) Carnallite (d) Potassium ferrocyanide
26. Find the compound which is more basic than aniline
 (a) Diphenylamine (b) Triphenylamine (c) Benzylamine (d) p-Nitroaniline

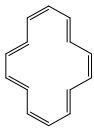
THE RASAYANAM

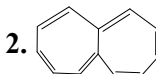
27. The resistance of the cell containing KCl solution at 23°C was found to be 55 Ω . Its cell constant is 0.616 cm^{-1} . The conductivity of KCl solution ($\Omega^{-1} \text{cm}^{-1}$) is
(b) 1.21×10^{-3} (b) 1.12×10^{-2} (c) 1.12×10^{-3} (d) 1.21×10^{-2}
28. Molar conductivities (Λ_m°) at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.0 $\text{S cm}^2 \text{mol}^{-1}$ respectively. Λ_m° for CH_3COOH will be
(a) 425.5 $\text{S cm}^2 \text{mol}^{-1}$ (b) 180.5 $\text{S cm}^2 \text{mol}^{-1}$
(c) 290.85 $\text{S cm}^2 \text{mol}^{-1}$ (d) 390.5 $\text{S cm}^2 \text{mol}^{-1}$
29. Which of the following is a reagent used in the preparation of benzene diazonium chloride from aniline?
(a) Sodium hydroxide (b) Sodium chloride
(c) Sodium nitrite (d) Sodium nitrate
30. Which of the following carbonyl compounds can be prepared from Rosenmund reaction?
(a) Methanal (b) Acetone (c) Butanone (d) Benzaldehyde
31. 99% completion of a first order reaction takes place in 32 min. The time taken in 99.9% completion of the reaction will be
(a) 48 min (b) 52 min (c) 56 min (d) 44 min
32. Which of the following reactions does not give benzaldehyde?
(a) Rosenmund reaction (b) Etard reaction
(c) Gatterman-Koch reaction (d) Friedel-Craft acylation reaction
33. 5 moles of an ideal gas at 100 K are allowed to undergo reversible compression till its temperature becomes 200 K. If $C_v = 28 \text{ JK}^{-1} \text{mol}^{-1}$, calculate ΔU and ΔPV for this process. ($R = 8.0 \text{ JK}^{-1} \text{mol}^{-1}$)
(a) $\Delta U = 2.8 \text{ kJ}$; $\Delta (PV) = 0.8 \text{ kJ}$ (b) $\Delta U = 14 \text{ J}$; $\Delta (PV) = 0.8 \text{ J}$
(c) $\Delta U = 14 \text{ kJ}$; $\Delta (PV) = 4 \text{ kJ}$ (d) $\Delta U = 14 \text{ kJ}$; $\Delta (PV) = 18 \text{ kJ}$
34. Ln^{2+} ions are largely colored while Ln^{3+} ions are not colored. The color of Ln^{2+} compounds are due to transition
(a) $4f \rightarrow 5d$ (b) $4f \rightarrow 4f$

- (c) Charge transfer from liquid to metal ion (d) $5d \rightarrow 5d$ transition
35. The change in entropy for the fusion of 1 mole of ice is [melting point ice = 273 K, molar enthalpy of fusion for ice = 6.0 kJ mol^{-1}]
(a) $11.73 \text{ JK}^{-1} \text{ mol}^{-1}$ (b) $18.84 \text{ JK}^{-1} \text{ mol}^{-1}$
(c) $21.97 \text{ JK}^{-1} \text{ mol}^{-1}$ (d) $24.47 \text{ JK}^{-1} \text{ mol}^{-1}$
36. There is no d-d transition in $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ (d^5 system). This is high spin complex. The absence of any transition in the visible region is due to breaking of
(a) Laporte rule
(b) Parity selection rule ($g \rightarrow g$ and $u \rightarrow u$ not allowed)
(c) Spin selection rule (spin of the electron cannot be changed during transition)
(d) All the above three rules
37. Which one of the following pair shows variable valence?
(a) Zr, Ti (b) Bi, In (c) Lu, Gd (d) Pd, Cd
38. “Yellow when hot and white when cold” is one of the characteristics observed for ZnO. It is due to :
(a) Distortions (b) Cation defects (c) Anion defects (d) Deformations
39. A compound is formed by atoms of elements A occupying the corners of the unit cell and an atom of element B present at the center of the unit cell. Deduce the formula of the compound.
(a) AB_2 (b) AB_3 (c) AB_4 (d) AB
40. Which of the following statements is correct regarding the conductivity of solutions of electrolytes?
(a) It is independent of the size of the ions
(b) It is independent of the viscosity of the solution
(c) It depends on the salvation of ions present in solution
(d) It decreases with temperature
41. For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ J K}^{-1} \text{ mol}^{-1}$. The reaction is spontaneous at (Assume that ΔH and ΔS do not vary with temperature)

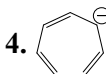
THE RASAYANAM

- (a) $T > 425\text{ K}$ (b) All temperature (c) $T > 298\text{ K}$ (d) $T < 425\text{ K}$
42. Which of the following is ionic mobility independent on?
(a) Size of ion
(b) Charge on ion
(c) Distance of separation between the electrodes
(d) Concentration of electrolyte
43. When CO_2 is introduced into aerated drinks and sealed, what is the nature of the graph between partial pressure of CO_2 and its concentration in the drink?
(a) Exponentially increasing (b) Positive slope
(c) Negative slope (d) Constant
44. What is the concentration of N_2 in a fresh water stream in equilibrium with air at 298 K and 1 atmosphere? Given the value of K_H for $\text{N}_2 = 0.00060\text{ mole/kg bar}$.
(a) 0.0474 g/kg (b) 0.0005 g/kg (c) 1316.7 g/kg (d) 13.3 g/kg
45. Addition of bismuth chloride to excess of water produces :
(a) Clear solution (b) Yellow solution (c) White precipitate (d) Orange red precipitate
46. When phenol is treated with excess bromine water it gives
(a) m-bromophenol (b) o,p-bromophenol
(c) 2,4-dibromophenol (d) 2,4,6-tribromophenol
47. Which of the following is formed when glycerol is heated with oxalic acid at 503K?
(a) Glyceric acid (b) Acrolein (c) Allyl alcohol (d) Methanoic acid
48. Which of the following isomeric alcohols is the most soluble in water?
(a) n-Butyl alcohol (b) Isobutyl alcohol (c) sec-Butyl alcohol (d) tert-Butyl alcohol
49. Which one of the following plays a major role in EDTA complexometric titrations?
(a) Concentration of metal ion (b) Concentration of ligand
(c) Nature of buffer (d) Temperature of the reaction
50. The sum of coordination number and oxidation number of the metal M in the complex $[\text{M}(\text{en})_2(\text{C}_2\text{O}_4)]\text{Cl}$ (where (en) is ethylenediamine) is

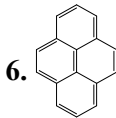
- (a) 9 (b) 6 (c) 7 (d) 8
51. Which reagent is used for detecting Ni^{2+} ions in solution?
 (a) EDTA (b) Dimethylglyoxime
 (c) α -nitroso- α -naphthol (d) Cupron
52. How many geometrical isomers are possible in $[\text{Al}(\text{C}_2\text{O}_4)_3]^{3-}$?
 (a) 0 (b) 2 (c) 3 (d) 4
53. Which dye are leather used for dyeing
 (a) Vat dye (b) Tryarylmethane dye
 (c) Mordant dye (d) Indican dye
54. Which one of the following statements is FALSE?
 (a) In an octahedral crystal field, the d electrons on a metal ion occupy the e_g set of orbital's before they occupy the t_{2g} set of orbital's.
 (b) Diamagnetic metal ions cannot have an odd number of electrons.
 (c) Low spin complexes can be paramagnetic.
 (d) In high spin octahedral complexes, octahedral is less than the electron pairing energy, and is relatively very small.
55. The correct spinel structure of Co_3O_4 is :
 (a) $(\text{Co}^{2+})_t (\text{Co}^{3+})_o \text{O}_4$ (b) $(\text{Co}^{3+})_t (2\text{Co}^{2+} \text{Co}^{3+})_o \text{O}_4$
 (c) $(\text{Co}^{2+} \text{Co}^{3+})_t (\text{Co}^{3+})_o \text{O}_4$ (d) $(2\text{Co}^{3+})_t (\text{Co}^{2+})_o \text{O}_4$
56. What type of interparticle forces holds liquid N_2 together?
 (a) Ionic bonding (b) London forces
 (c) Hydrogen bonding (d) Dipole-dipole interaction
57. Which of the following are aromatic?
1. 

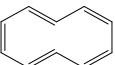
2. 

3. 

4. 

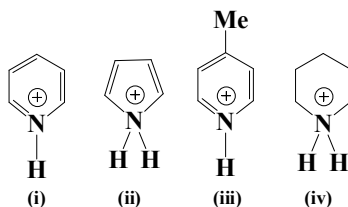
5. 

6. 

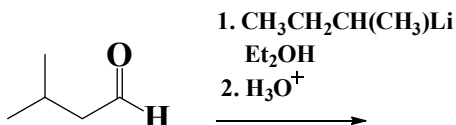
7. 
- (a) 7, 1, 3, 5, 2 (b) 7, 1, 4, 5, 3 (c) 6, 1, 3, 5, 2 (d) 6, 7, 1, 3, 5
58. Which of the following is the most basic oxide?

THE RASAYANAM

59. (a) N_2O_3 (b) N_2O_5 (c) P_4O_6 (d) Bi_2O_5
 The correct order of acidity among

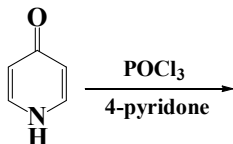


- (a) (i) < (ii) < (iii) < (iv) (b) (iv) < (iii) < (i) < (ii)
 (c) (ii) < (i) < (iii) < (iv) (d) (ii) < (iv) < (i) < (iii)
60. Calculate the pH of a solution prepared by mixing 300 mL of 0.10 M HF and 200 mL of 0.10 M KOH.
 (a) 2.82 (b) 2.96 (c) 3.32 (d) 3.44
61. What is the reduction potential for the half-reaction at 25° C :
 $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$, if $[\text{Al}^{3+}] = 0.10 \text{ M}$ and $E^0 = -1.66 \text{ V}$?
 (a) -1.84 V (b) -1.60 V (c) -1.68 V (d) -1.66 V
62. The P^5 electronic configuration is equivalent to the term :
 (a) ^3P (b) ^2P (c) ^3F (d) ^4P
63. Which one molecule does not undergo hydrolysis?
 (a) TeF_6 (b) SeF_6 (c) SiCl_4 (d) SnCl_4
64. Which of the following is the major organic product obtained from the following reaction?



- (a) 3,5-dimethyl-3-heptanol
 (b) 3,5-dimethyl-4-heptanol
 (c) 4,7-dimethyl-4-heptanol
 (d) 2,4-dimethyl-4-heptanol

65. What will be the product of the following reaction?



- (a) 3-chloropyridine (b) 2-dichloropyridine
(c) 3,5-dichloropyridine (d) 2,5-dichloropyridine

66. Match List (I) with List (II) :

<u>List (I)</u>	<u>List (II)</u>	<u>List (I)</u>	<u>List (II)</u>
P. Claisen condensation	1. Nitrene	Q. Friedal carft	2. Free redical
R. Hofmann	3. Carbanion	S. Allylic bromination	4. Arenium ion

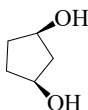
Choose the correct option :

- (a) P-3, Q-4, R-2, S-1 (b) P-2, Q-3, R-4, S-1
(c) P-2, Q-3, R-1, S-4 (d) P-3, Q-4, R-1, S-2

67. What will be the reactivity of chlorobenzene in an electrophilic substitution reaction with benzene?

- (a) Reacts very slowly than benzene (b) Reacts in the same way as benzene
(c) Reacts faster than benzene (d) Does not react with benzene

68. How many enantiomers are there of the molecule shown below?

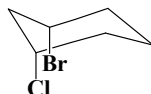


- (a) 6 (b) 2 (c) 0 (d) 1

69. Which of the following is not true of enantiomers?

- (a) Boiling point (b) Melting point (c) Specific rotation (d) Density

70. What is the relationship between the two groups in the following molecules?

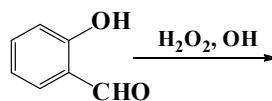


- (a) They are equatorial to one another (b) They are axial to one another

THE RASAYANAM

- (c) They are cis to one another (d) They are trans to one another

71. Product of the following reaction is :



- (a) Catechol (b) Salicylic acid (c) Phthalaldehyde (d) Salicyl alcohol

72. Match List (I) with List (II) :

List (I)

P. S_N2

Q. S_N1

R. E^2

S. E^1CB

List (II)

1. Walden inversion

2. Carbanion intermediate

3. Antiperiplanar configurations

4. Carbocation intermediate

Codes :-

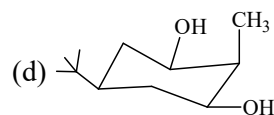
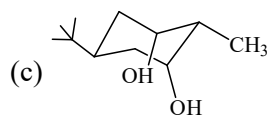
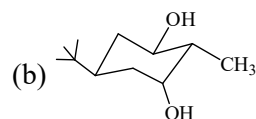
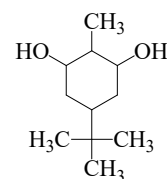
(a) P-1, Q-4, R-2, S-3

(b) P-1, Q-4, R-3, S-2

(c) P-4, Q-1, R-3, S-2

(d) P-4, Q-1, R-2, S-3

73. The optically active stereoisomer of the following compound is



74. Which among the following is a powerful oxidizer?

(a) F_2

(b) Cl_2

(c) Br_2

(d) I_2

75. Which of the following biologically important coordination compounds has a magnesium central atom?

- (a) Chlorophyll (b) Haemoglobin (c) Vitamin B12 (d) Carboxypeptidase-A

76. The coordination complex chloridotris (triphenylphosphine) rhodium (I) is used in the hydrogenation of alkenes. It is also known as _____ catalyst.

- (a) Grubb (b) Pearlman (c) Wilkinson (d) Ziegler-Natta

77. The structure of hyponitrous acid molecule ($\text{H}_2\text{N}_2\text{O}_2$) is

- (a) Linear (A-B-C-D type) (b) Bent ( type)
(c) Square planar ( type) (d) Triangular ( type)

78. Consider the following statements about methylene:

1. Methylene is formed by the photolysis of diazomethane.
2. Methylene can exist in two different forms, the singlet and triplet states.
3. Singlet methylene is a diradical and stable than the triplet state.
4. When methylene is reacted in the presence of alkenes then cyclopropane are formed.

Which of the statements given above are correct?

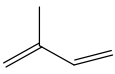
- (a) 1, 2 and 4 (b) 1, 2 and 3 (c) 3 and 4 (d) 1, 3 and 4

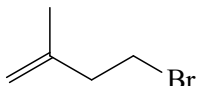
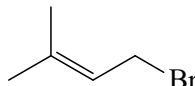
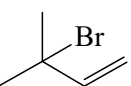
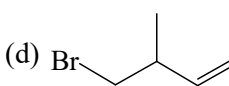
79. What is the product of Clemmensen reduction on acetophenone?

- (a) Benzaldehyde (b) Methyl benzene (c) Ethyl benzene (d) Benzophenone

80. Which of the following is Tollen's reagent?

- (a) Ammoniacal silver nitrate solution
(b) Aqueous copper sulphate
(c) Alkaline sodium potassium tartarate
(d) Mixture of sodium carbonate, sodium citrate and Cu^{2+} complex

81. The major product of the reaction  $\xrightarrow[\Delta]{\text{HBr}}$ is

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

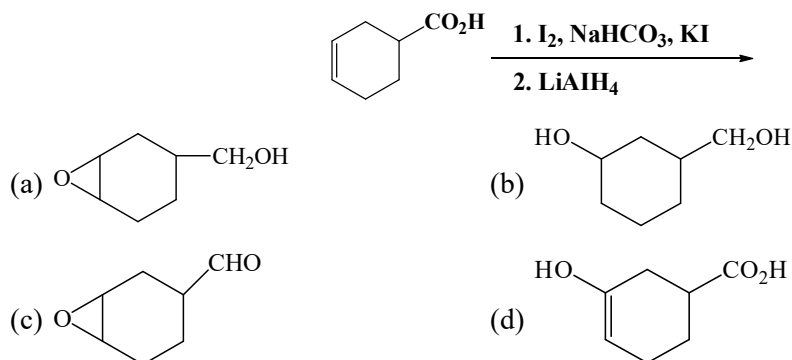
82. Sanger's method is used to identify

- (a) C-terminal amino acid (b) N-terminal amino acid
(c) Side chain (d) Molecular weight of protein

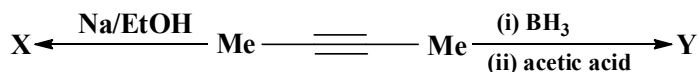
83. How many products are formed from the aldol condensation reaction between ethanal and propanal?

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

84. The major product in the following reactions is:



85. Indicate the structures of X and Y in the following reaction



- (a) (E)-2-butene and (Z)-2-butene (b) (Z)-2-butene and (E)-2-butene
(c) (E)-2-butene and 2-propanone (d) (Z)-2-butene and 2-propanone

86. How many non-equivalent protons are present in $\text{CH}_3\text{CHClCH}_2\text{CONH}_2$?

- (a) 6 (b) 5 (c) 4 (d) 3

87. Which of the following is associated with decrease in pK_b value of amines?

- (a) Increase in acidic strength (b) Increase in basic strength
(c) Better proton donation (d) Better electron acceptor

88. What is the correct order of basicity of aliphatic amines purely on the basis of solvation effect of the ammonium cation?

- (a) $1^\circ > 2^\circ > 3^\circ$ (b) $3^\circ > 2^\circ > 1^\circ$ (c) $2^\circ > 1^\circ > 3^\circ$ (d) $2^\circ > 3^\circ > 1^\circ$

89. The basic strength of alkylamines does not depend on which of the following?

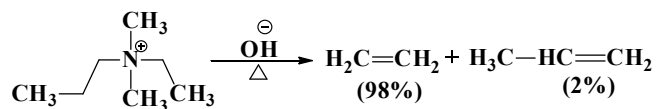
- (a) Number of alkyl groups (b) Size of alkyl groups
(c) Physical state of the amine (d) Presence of an aromatic ring

90. To check that a secondary alcohol has been completely oxidized to a ketone you can :
- Check that the IR spectrum has absorptions at 3500 cm^{-1} and 1650 cm^{-1}
 - Check that the IR spectrum has no absorptions around 3500 cm^{-1}
 - Check that the IR spectrum has no absorptions around 1650 cm^{-1}
 - Check that the IR spectrum no absorptions at 3500 cm^{-1} and 1650 cm^{-1}
91. How many atoms surround the central atom present in a unit cell with the least free space available?
- 4
 - 6
 - 8
 - 12
92. If a crystal lattice has 6 closed-pack spheres, what the number of tetrahedral voids in the lattice?
- 12
 - 6
 - 36
 - 3
93. The pH of a 2M solution of a weak monobasic acid (HA) is 4. What is the value of the Van't Hoff factor?
- 0.00005
 - 1.005
 - 1.0005
 - 1.00005
94. In the reaction
- how is product formed?
- Michael addition followed by Aldol condensation
 - Aldol condensation followed by Michael addition
 - Mannich reaction
 - Knoevenagel reaction followed by Aldol condensation
95. Which of the following statements is NOT true in relation to the triple point on a single component phase diagram?
- The point at which the solid, liquid and gaseous phases for a substance co-exist
 - The triple point exists at a single temperature and is independent of pressure
 - The triple point exists for a substance occurs at a specific temperature and pressure

THE RASAYANAM

- (d) The system must be enclosed so that n vapour can escape
96. The equilibrium constant for a cell reaction,
 $\text{Cu(g)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{Ag(s)}$ is 4×10^{16} . Find E° (cell) for the cell reaction.
(a) 0.63 V (b) 0.49 V (c) 1.23 V (d) 3.24 V
97. Find the number of electrons transferred in the equation
 $\text{Cu(g)} + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{Ag(s)}$
(a) 4 (b) 3 (c) 2 (d) 1
98. Which of the following is not similar between a first order and pseudo first order reaction?
(a) The molecularity is one in both the reactions
(b) Both follow first order kinetics
(c) The unit of rate constant is s^{-1}
(d) The rate of the reaction depends only on one reactant
99. Which of the following conditions would improve the yield of ammonia production from Bosch-Haber process?
(a) High temperature, high pressure (b) High temperature, low pressure
(c) Low temperature, low pressure (d) Low temperature, high pressure
100. Nitrogen in plants is taken in what form?
(a) Ammonia (b) Amide (c) Nitrate (d) Nitrite
101. Which of the following vitamins are soluble in water?
(a) A (b) C (c) D (d) E
102. Two monosaccharides are joined through a _____ bond to form a disaccharide.
(a) Ionic (b) Peptide (c) Glycosidic (d) Phosphodiester
103. The configuration description of the C2 epimer of D-glucose is :
(a) 2R, 3S, 4R, 5R (b) 2S, 3S, 4R, 5R
(c) 2S, 3R, 4S, 5R (d) 2R, 3S, 4R, 5S

104. The below reaction is an example of :



(a) Hofmann's rule (b) Saytzeff's rule (c) Cope reaction (d) Curtius reaction

105. Which of the following statements is incorrect with respect to physisorption?

- (a) It is reversible (b) It is spontaneous
(c) $\Delta H < 0$ (d) $\Delta S > 0$

106. The standard potentials at 25°C for the half reactions given against them below



When zinc dust is added to a solution of MgCl_2

- (a) Magnesium is precipitated (b) Zinc dissolves in the solution
(c) Zinc chloride is formed (d) No reaction takes place

107. What are the factors that determine an effective collision?

- (a) Translational collision and energy of activation
(b) Threshold energy and proper orientation
(c) Proper orientation and steric bulk of the molecule
(d) Collision frequency, threshold energy and proper orientation

108. If complex $[\text{W}(\text{Cp})_2(\text{CO})_2]$ follows 18e- rule. What is Hapticity of Cp?

- (a) 5 and 5 (b) 3 and 5 (c) 3 and 3 (d) 1 and 5

109. How many M — M bonds are present in $[\text{C}_p\text{Mo}(\text{CO})_3]^{2+}$?

- (a) 1 (b) 2 (c) 0 (d) 4

110. Which of the following is the incorrect statement about Zeise's salt?

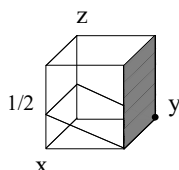
- (a) Zeise's salt is diamagnetic
(b) Oxidation state of Pt in Zeise's salt is +2
(c) All the Pt-Cl bond length in Zeise's salt are equal

THE RASAYANAM

- (d) C-C bond length of ethylene moiety in Zeise's salt longer than that of free ethylene molecule
111. The reaction of ethyl format with an excess of CH_3MgI followed by hydrolysis gives
(a) Ethanol (b) n-propyl alcohol
(c) Propanal (d) Isopropyl alcohol
112. The experimental value of HE for Co^{2+} ion is -540 kJ mol^{-1} . Theoretical value of HE is $-435.4 \text{ kJ mol}^{-1}$. What will be the CFSE? (approximate value)
(a) 8738 cm^{-1} (b) -9600 cm^{-1} (c) -1200 cm^{-1} (d) -114.6 cm^{-1}
113. Rate constant for the substitution reaction $\text{C}_4\text{H}_9\text{Cl} + \text{H}_2\text{O} \rightarrow \text{C}_4\text{H}_9\text{OH} + \text{HCl}$ increases by a factor of 10.6 when the temperature is increased from 298 K to 308 K. Calculate the activation energy of the reaction.
(a) 78.2 kJ mol^{-1} (b) 180 kJ mol^{-1} (c) 809 kJ mol^{-1} (d) 2.14 kJ mol^{-1}
114. At 20°C , Ag^+ ion concentration in a saturated solution Ag_2CrO_4 in water is $1.5 \times 10^{-4} \text{ M}$. At 20°C , the solubility product of Ag_2CrO_4 will be :
(a) 3.3750×10^{-12} (b) 1.6875×10^{-10} (c) 1.6875×10^{-12} (d) 1.6875×10^{-11}
115. Of the following, which is a low expansion one?
(a) Sodalime (b) Quartz (c) Vycor (d) Borosilicate
116. The thermodynamics Gibb's function G in an isothermal, isobaric, reversible process
(a) Varies linearly (b) Varies non-linearly
(c) Is zero (d) Remains constant but not zero
117. The compound which exhibits Jahn-Teller distortion in their complexes is
(a) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ (b) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ (c) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ (d) $[\text{Fe}(\text{CN})_6]^{4-}$
118. d orbital used in back donation of electron from $\text{M} \rightarrow \text{L}$ in $[\text{Fe}(\text{CN})_6]^{3-}$ is
(a) d_{xy}, d_{yz}, d_{zx} (b) $d_{x^2-y^2}$ (c) d_{z^2} (d) Can't be predicted
119. When aluminium ions replace silicon ions and silicon dioxide what is it called?

- (a) Silicanes (b) Silicates
(c) Silicons (d) Zeolites

120. What miller indices plane is shown below?



- (a) (0 2 1) (b) (0 4 1) (c) (0 1 2) (d) (0 0 0)
- 121. What is the range of the oxidation states shown by nitrogen in its oxides?**
 (a) +1 to +3 (b) +2 to +4 (c) +1 to +2 (d) +1 to +5
- 122. Which of the following is the most popular oxoacid of sulfur?**
 (a) Sulfurous acid (b) Sulfuric acid
 (c) Peroxodisulfuric acid (d) Pyrosulfuric acid
- 123. What is the basicity of oleum?**
 (a) 1 (b) 7 (c) 2 (d) 3
- 124. Polarizing power of cation is inversely proportional to.**
 (a) Magnitude of positive charge (b) Magnitude of negative charge
 (c) Size of positive charge (d) All of these
- 125. During compression of a spring, the work done is 10 kJ and 2 kJ escaped to the surrounding as heat. The change in internal energy ΔU (in kJ) is**
 (a) -8 (b) 12 (c) 8 (d) -12

THE RASAYANAM

ANSWER KEY

1 (c)	11 (b)	21 (b)	31 (a)	41 (a)	51 (b)	61 (c)	71 (a)	81 (b)	91 (d)	101(b)	111(d)	121(d)
2 (a)	12 (b)	22 (c)	32 (d)	42 (c)	52 (a)	62 (a)	72 (a)	82 (b)	92 (a)	102(c)	112(a)	122(b)
3 (b)	13 (a)	23 (b)	33 (c)	43 (b)	53 (b)	63 (b)	73 (b)	83 (d)	93 (d)	103(a)	113(b)	123(c)
4 (d)	14 (d)	24 (a)	34 (a)	44 (d)	54 (a)	64 (a)	74 (a)	84 (d)	94 (a)	104(a)	114(c)	124(c)
5 (a)	15 (c)	25 (d)	35 (c)	45 (a)	55 (a)	65 (b)	75 (a)	85 (a)	95 (d)	105(d)	115(b)	125(c)
6 (a)	16 (a)	26 (c)	36 (d)	46 (d)	56 (b)	66 (d)	76 (c)	86 (a)	96 (b)	106(d)	116(d)	
7 (b)	17 (c)	27 (b)	37 (a)	47 (c)	57 (d)	67 (a)	77 (b)	87 (b)	97 (c)	107(d)	117(d)	
8 (b)	18 (a)	28 (d)	38 (b)	48 (d)	58 (d)	68 (c)	78 (c)	88 (a)	98 (a)	108(b)	118(a)	
9 (a)	19 (d)	29 (c)	39 (d)	49 (a)	59 (b)	69 (c)	79 (c)	89 (d)	99 (d)	109(a)	119(d)	
10 (c)	20 (b)	30 (d)	40 (c)	50 (a)	60 (d)	70 (c)	80 (a)	90 (a)	100(c)	110(c)	120(a)	

Solution

- | | |
|--|--|
| <p>1. (c) Halogen having metallic character – I_2</p> <p>2. (a) The cell constant of a conductivity all depends on – Remain constant</p> <p style="margin-left: 40px;">* Cell constant $G^* = \frac{l}{A}$, where l = length between the electrode
 A = area of electrode.</p> <p style="margin-left: 40px;">* Relation = $[G.G^* = k]$</p> <p style="margin-left: 40px;">So the cell constant only depends on distance between electrodes and area of electrodes.</p> | <p>3. (b) When salt bridge is removed from a cell, its voltage: - Will decrease to zero.</p> <p style="margin-left: 40px;">The function of salt bridge in an electrolyte cell is to maintain electrically neutrality in solutions and prevent voltage drop, but if we removed salt bridge, voltage decrease to zero.</p> <p>4. (d) In $Fe(CO)_5$, the Fe–C bond possess = both σ and π character</p> <p style="margin-left: 40px;">So Fe–C has both sigma and pi bonds and there is $d\pi - P\pi$ metal and shows sigma bonding.</p> |
|--|--|

5. (a)

6. (a) Oxidation state of oxygen in O_2F_2 =
we know oxidation state of F is -1 .
So $2x + 2(-1) = 0$
 $2x - 2 = 0$
 $x = +1$ Ans

7. (b) In a crystal, atoms are located at the position of :- **Minimum potential energy**. As we know when two atoms approaches each other, the potential energy gradually decrease and reaches a minimum value.

8. (b) **Wilson's disease**: - Excess accumulation of copper in body
Too much accumulation of copper, especially in the liver and brain.
Our body needs a small amount of copper, but when high level of copper increase in body, that causes life threatening organ damage.

9. (a) **Electrophoresis** refer to –
'Separation of charges'
Electrophoresis is the motion of charge dispersal particle or dissolved charge molecule relative to a fluid under the influence of spatially uniform electric field.

10. (c) Boiling points of Alkyl halide – $RI > RBr > RCl > RF$

This is due to their polarity and strong dipole – dipole attractive interaction between haloalkane molecules.

Among isomeric Alkyl halides, the boiling point decreases with increase in branching in the alkyl group, because with branching the molecule attains a spherical shape with less surface area.

11. (b)

12. (b) Atomic radius $\Rightarrow r = 0.529 \frac{n^2}{Z}$

$$\text{so } r \propto \frac{n^2}{Z}$$

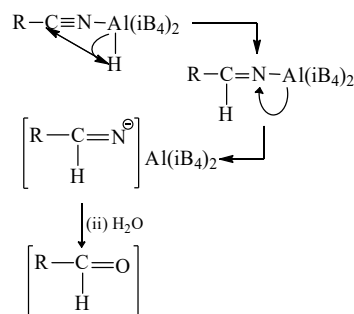
$$\text{so } \frac{r_{Cl}}{r_{He}} = \frac{n_{Cl}^2}{n_{He}^2} \times \frac{Z_{He}}{Z_{Cl}}$$

$$\frac{r_{Cl}}{r_{He}} = \frac{5^2}{3^2} \times \frac{2}{17} = \frac{50}{153}$$

$$\text{so } r_{Cl} : r_{He} = 50 : 153$$

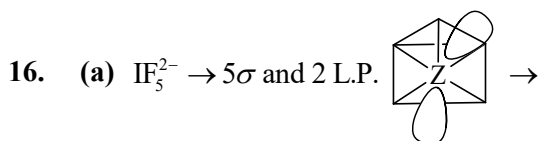
13. (a) $R-C \equiv N \xrightarrow[(ii) H_2O]{(i) AlH(BH_3)_2} R-CHO$

Mech. $R-C \equiv N \xrightarrow{(i) Al-H-(iB_4)_2}$

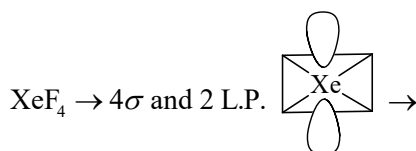


14. (d) According to the definition of Bronsted Lowry concept, Acids donate, H^+ when we dilute it so as we increase concentration of water or dilute the acid, H^+ concentration increase.

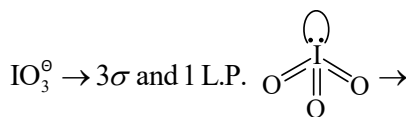
15. (c) According to Fajan's Rule – for covalent nature = cation's size decrease and Anion's size increase.



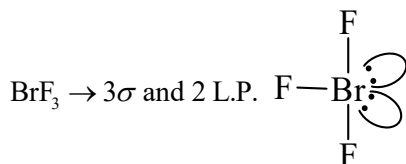
Pentagonal Shape



Squareplaner



'Triangular Pyramid'



$\rightarrow$ T-shape

17. (c) Ionic strength, $I = \frac{1}{2} \sum C_i Z_i^2$, Where
 C_i = Concentration & Z_i = Charge on species so for $CaCl_2 \rightleftharpoons Ca^{+2} + 2Cl^-$

$$\begin{array}{ccc} 0.2 \text{ m} & (0.2) & [2 \times (0.2)] \\ \downarrow & & \downarrow \\ Z = +2 & & Z = -1 \end{array}$$

$$\begin{aligned} \text{So } I &= \frac{1}{2} [C_1 Z_1^2 + C_2 Z_2^2 + C_3 Z_3^2 + \dots] \\ I &= \frac{1}{2} [0.2 \times (+2)^2 + (2 \times 0.2) \times (-1)^2] \\ \left[I &= \frac{1}{2} [0.8 + 0.4] = 0.6 \text{ m} \right] \end{aligned}$$

18. (a) given $E_a = 49 \text{ kJ} = 49 \times 10^3 \text{ Joule}$
 $A = 9 \times 10^{10} \text{ sec}^{-1}$

19. (d) The given rate $R = K[C_{12}H_{22}O_{11}][H_2O]$
 It is a pseudo order reaction of sucrose, so in these type of reaction, rate and order of reaction do not depend on the concentration of water. So It is a first order kinetic reaction.

Given rate $R = 0.032 \text{ sec}^{-1}$, $K = 0.005$

So $r = K.[C_{12}H_{22}O_{11}]$

$0.032 = 0.005(H)$ Let the conc. of

$C_{12}H_{22}O_{11}$ is = H

$$H = \frac{0.032}{0.005} = \frac{32}{5} = 6.2$$

20. (b) Thermodynamic equation = Internal energy $U = [TdS - PdV + \sum \mu_i dN_i]$
 Helmholtz free energy $A = U - TS$
 Enthalpy $H = U + PV$
 Gibbs free energy $G = H - TS$
 Entropy $S = \frac{dQ}{T}$

21. (b) $[Zr(CH_3)_6]$ exist in $\rightarrow$ 'Trigonal Prismatic geometry'

22. (c) When a compound absorbed any particular wavelength of a particular colour. Then it shows, its complementary colour.

Colour cycle of complementary colour



If compound absorbed orange colour, the colours of compound will be **Blue**.

23. (b) Increasing the energy of C.F.S. increase, wavelength of absorb light decrease

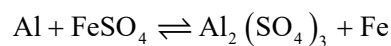
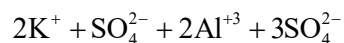
$$\therefore E = \frac{h.c}{\lambda} \rightarrow E \propto \frac{1}{\lambda}$$

24. (a) **Primary valency** :- Valency out of coordination sphere.
Secondary valency :- Valency inside coordination sphere. So $PtCl_4, 2HCl =$

have secondary valance '6'. So compound will be $H_2[PtCl_6]$ or $[PtCl_6]^{2-}$
 "Here we see, there is No 'Cl' atom outside of sphere so "Not any precipitate of $AgCl$ will be found."

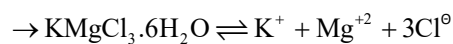
25. (d) Complex salts – are the salt have non-ion sable primary valency inside a coordination sphere –

So in $K_2SO_4 Al_2(SO_4)_3 \cdot 24H_2O \rightleftharpoons$

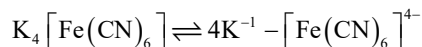


$\hookrightarrow$ Not form complex

Carnellite



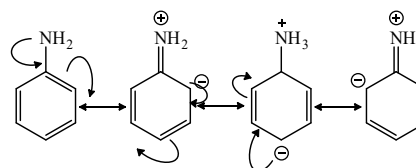
$\hookrightarrow$ Not form complex



$\hookrightarrow$ Secondary valance is non-ionisable

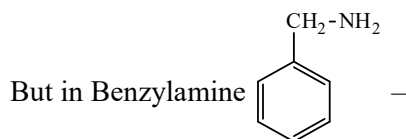
So it is a complex salt

26. (c) Compound more basis than Aniline

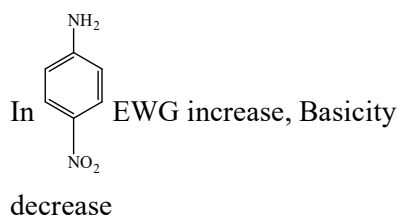


If the lone pair of Nitrogen is in the conjugation of Benzene ring, than it

is not fully available for donation of lone pair so it shows less basicity.



lone pair do not take part in conjugation so it is more basic than Aniline.



27. (b) given $\rightarrow R = 55 \Omega$, cell constant $G^* = 0.616 \text{ cm}^{-1}$
Conductivity of cell $K = G.G$, where $G = \frac{1}{R} \rightarrow \text{Resistance}$
So $K = \frac{G^*}{G} = \frac{0.616}{55} = 1.12 \times 10^{-2}$

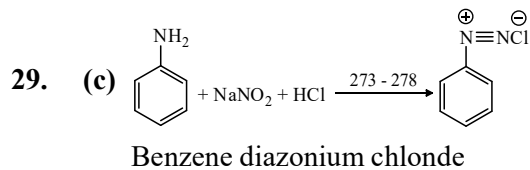
28. (d) given - $\lambda_{m(\text{NaCl})}^{\circ} = 12.64 \text{ Scm}^2 \text{ mol}^{-1}$,
 $\lambda_{m(\text{HCl})}^{\circ} = 425.9 \text{ Scm}^2 \text{ mol}^{-1}$,
 $\lambda_{m(\text{CH}_3\text{COONa})}^{\circ} = 91.0 \text{ Scm}^2 \text{ mol}^{-1}$ the reaction will occur such as -
 $\text{CH}_3\text{COOH} + \text{NaCl} \rightleftharpoons \text{CH}_3\text{COONa} + \text{HCl}$

According to Kohlrausch law $\rightarrow$

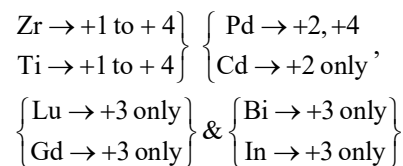
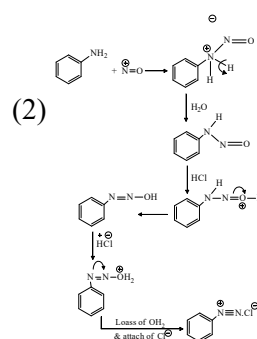
$$\left[\lambda_{m(\text{CH}_3\text{COOH})} = \lambda_{m(\text{CH}_3\text{COONa})} + \lambda_{m(\text{HCl})} - \lambda_{m(\text{NaCl})} \right]$$

$$\lambda_{m(\text{CH}_3\text{COOH})} = (91.0 + 425.9) - 126.4$$

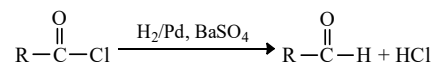
$$= 390.5 \text{ Scm}^2 \text{ mol}^{-1}$$



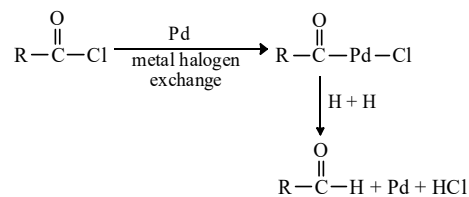
Mechanism $\rightarrow$



30. (d) Rosenmund reaction:-



Mech:-



31. (a) for first kinetic $\rightarrow$

$$K = \frac{2.303}{t} \cdot \log \frac{[A_0] \rightarrow \text{Initial concentration}}{[A] \rightarrow \text{Final concentration}}$$

So When for 99% completion of reaction $\rightarrow [A_o] = 100$ (let) so

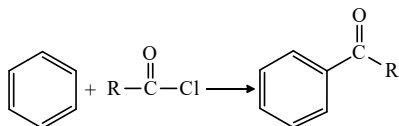
$$[A] = 100 - 99 = 1$$

$$\text{So } K = \frac{2.303}{32} \times \log \frac{100}{1} = \frac{2.303}{32} \times \log 10^2$$

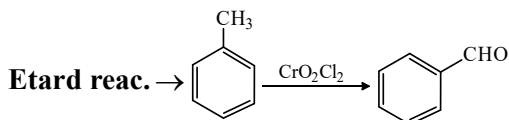
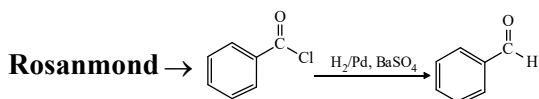
$$= \left[K = \frac{2.303 \times 2}{32} \right] \text{sec}^{-1} \text{ (I)}$$

$$\because \log 10^2 = 2 \log 10 \text{ and } [\log 10 = 1]$$

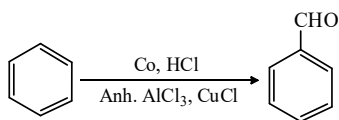
32. (d) Friedel craft acylation:-



Always form keton/ ester but aldehyde not formed.



Gatter mann koh $\rightarrow$



33. (c)

34. (a)

35. (c) given -

$$\Delta S = \frac{\Delta H_{\text{fusion}}}{T} = \frac{6 \times 10^3 \text{ J.mol}^{-1}}{273 \text{ K}}$$

$$= 21.97 \text{ J.K}^{-1} \text{ mol}^{-1}$$

36. (d) Any crystal shows colour, by following these selection rules (a) Lapart ($-l = +1$), (b) spin selection $\{-S = 0\}$.

The compound $[\text{Mn}(\text{H}_2\text{O})_6]^{+2}$ (d^5) – do transition by breaking there laws.

37. (a) Both the Zr and Ti are the transition metal elements, these have rough surface, due to which, these shows variable valancy.

38. (b) The excess Zn^{+2} ions moves to the interstitial state and electron to the neighboring interstitial sites. This give rise to colour hence, **At high temperature** – It forms a non-stoichiometric compound so shows yellow colour and at low temperature – white colour.

This type of Defect is known as – Cation defect (Generated due to Zn^{+2} ions)

39. (d) $\because A$ is the corner so $\rightarrow A = 8 \times \frac{1}{8} = 1$

B is the body center $\rightarrow B = 1 \times 1 = 1$

Compound will be $\rightarrow [A_1B_1] = AB$

40. (c) • Solvation increase, conductivity decrease

THE RASAYANAM

45. (c) $\text{BiCl}_3 + \text{H}_2\text{O} \rightleftharpoons \text{BiOCl} + 2\text{HCl}$
 excess 'white ppt' (Bismuth oxychloride)

47. (d)

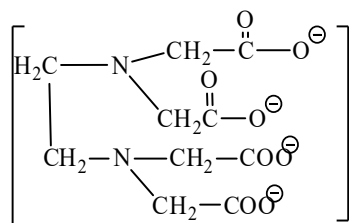
$$\begin{array}{c} \text{CH}_2 - \text{O} \boxed{\text{H} \quad \text{HO}} - \text{C} \begin{array}{l} \text{O} \\ \parallel \\ \text{O} \end{array} \\ | \\ \text{CH} - \text{O} \boxed{\text{H} + \text{HO}} - \text{C} \begin{array}{l} \text{O} \\ \parallel \\ \text{O} \end{array} \\ | \\ \text{CH}_2\text{OH} \\ \text{(glucerosol)} \end{array}$$

$$\begin{array}{c} \text{CH}_2 - \text{O} - \text{C} \begin{array}{l} \text{O} \\ \parallel \\ \text{O} \end{array} \\ | \\ \text{CH} - \text{O} - \text{C} \\ | \\ \text{CH}_2\text{OH} \end{array}$$

$$\begin{array}{c} \text{CH}_2 + 2\text{CO}_2 \text{ increase} \\ \parallel \\ \text{CH} \\ | \\ \text{CH}_2\text{OH} \text{ (Acrolein)} \end{array}$$

48. (d) [Surface area decrease, solubility in water increase] so for a particular volume, sphere has minimum surface area. So 3° Alcohol - due to bulyness, form aspherical shape. So these are moare soluble.

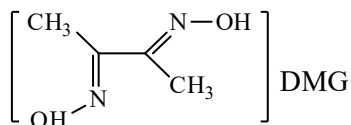
49. (a) EDTA complex metric titration is used to determine the concentration of metal ion is a sample. EDTA is a complex metric indicator made up of two amine group and Lewis bases (Carboxylic group)



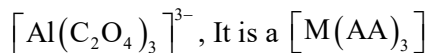
EDTA, hexadented complex.

50. (a) In $[M(en)_2(C_2O_4)]Cl$, where
 $en \rightarrow$ bidented, $C_2O_4^{2-} \rightarrow$ bidented
 So C.N. $\rightarrow (2 \times 2 + 2) = 6$
 O.S. $\rightarrow x - 2 - 1 = 0$
 $x = 3$
 Total $\rightarrow CN + OS = 3 + 6 = 9$

51. (b) Reagent is used for the detecting Ni^{+2} ions in solution - **Dimethyl glyoxine**



52. (a) Geometrical Isomer in



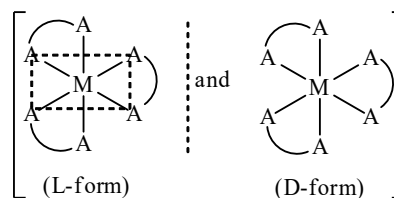
type structure so $\rightarrow$ this

can not be show Geometrical Isomers.

But It is optically active.

Because all ligand are Identical and have same orientation around the metal ion that lead to a symmetric structure.

Optical Isomers



53. (b) Dye, which are used for leather dyeing is - **Triethyl methane dye** but for leather dyeing = **Alcohol based Dyeing is the best.**

Vat dye :- These dyes are water insoluble, so cannot be used directly in the textiles.

We treat this dye with $Na_2S_2O_4$ in basic medium and **Levco compound.**

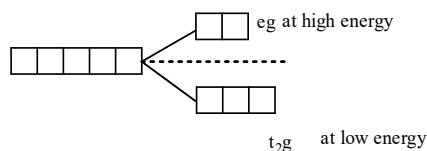
Eg:- Indigo, Anthraquinon, dye.

Moderant dye :- It is an intermediate compound, which is used for fixing of dye on the clothes, these are the groups, which makes the stable complexes with metal.

* Hydroxide of Cr, Al, Fe and Co are - **Basic moderate.**

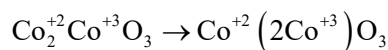
* Tanin or tanin acid are - **acidic moderate**.

54. (a) In an octahedral crystal field =



t_{2g} orbitals are in lower energy level so the d-electron occupied t_{2g} set d-orbital.

55. (a) for spinel structure = $\text{Co}_3\text{O}_4 \rightarrow$

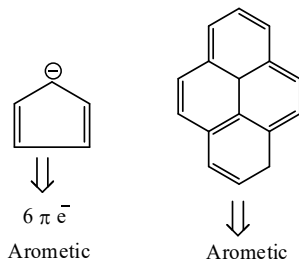
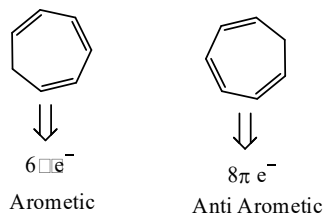
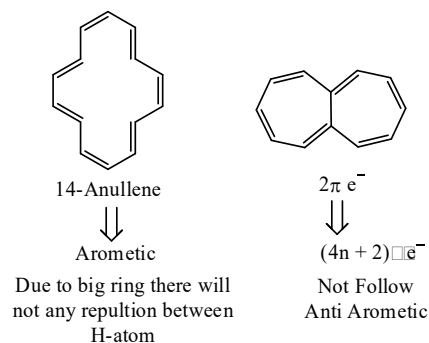


here $\text{Co}^{+2} \rightarrow$ occupied tetrahedral void.

$\text{Co}^{+3} \rightarrow$ occupied octahedral void.

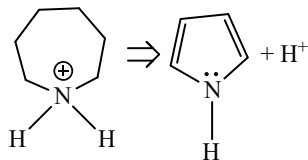
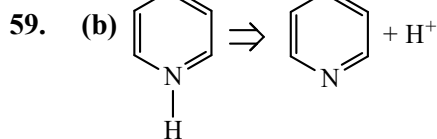
56. (b)

57. (d)



due to this 'H' repulsion
 $\rightarrow$ molecule is non planar so $\rightarrow$ **Non Aromatic**
Aromatic $\rightarrow$ (I, III, V, VI)

58. (d)



Lone pair is not available for Donation so most acidic.

So order will be $\rightarrow \text{II} > \text{I} > \text{III} > \text{IV}$

60. (d) No. of H^+ ion $\rightarrow 0.1 \times 300 \times 10^{-3}$
 {from HF}

No. of OH^- ion $\rightarrow 0.1 \times 200 \times 10^{-3}$
 {from KOH}

After mixing, remainder H^+ will be
 $\rightarrow \text{H}^+ = (30 \times 10^{-3} - 20 \times 10^{-3})$

So concentration =

$$\frac{\text{moles of H}^+}{\text{total volume}} = \frac{10 \times 10^{-3}}{(300 + 200)}$$

$$[\text{H}^+] = \frac{10 \times 10^{-3}}{500} = 0.02 \times 10^{-3} = 2 \times 10^{-5}$$

pH will be $\rightarrow -\log \text{H}^+$

$$= -[\log 2 \times 10^{-5}] = (5 - \log 2)$$

$$\text{pH} = 5 - 0.3010 = 4.69$$

61. (c) $\text{Al}^{+3} + 3\text{e}^- \rightarrow \text{Al}$, so

$$E = E^\circ - \frac{0.0591}{n} \cdot \log \frac{[\text{Al}]}{[\text{Al}^{+3}]}$$

$$E = -1.66 - \frac{0.0591}{3} \cdot \log \frac{1}{(0.1)}$$

$$E = -1.66 - 0.0197$$

$$E = -1.6797 \approx -1.68 \text{ volt}$$

62. (b) $p^5 \rightarrow \begin{array}{|c|c|c|} \hline +1 & 0 & -1 \\ \hline \uparrow & \uparrow & \uparrow \\ \hline \end{array}$

$$S = +\frac{1}{2} - \frac{1}{2} + \frac{1}{2} - \frac{1}{2} + \frac{1}{2}$$

$$S = \frac{1}{2}$$

spin multicity

$$(2S+1) = \left(2 \times \frac{1}{2} + 1\right) = 2$$

$$l = 2 \times (+1) + 0 \times 2 + (+1) \times 1$$

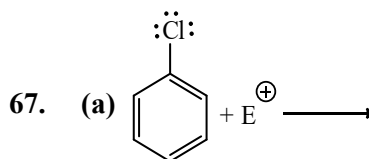
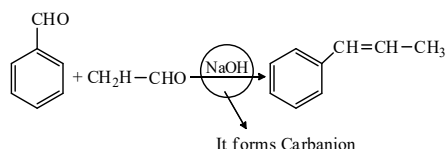
$$l = 1 \rightarrow P \quad \therefore \begin{array}{|c|c|c|c|} \hline S & P & d & f \\ \hline 0 & 1 & 2 & 3 \\ \hline \end{array}$$

63. (b)

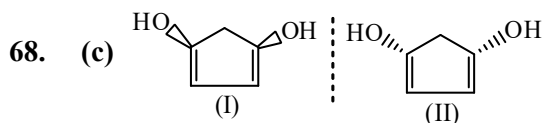
64. (a)

65. (b)

66. (d) Claisen condensation:-



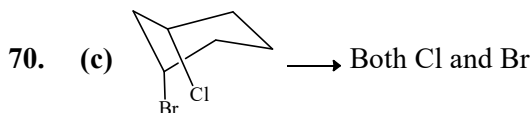
Due to E.N. of Cl, it decrease the electron density on benzene, than attack of electrophile will not be easy, or the presence of Cl-atom decrease the reactivity of compound.



- both the compound are super impossible to each other so both are identical. So [No. of Enantiomer = 0]

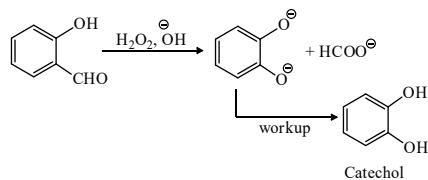
69. (c) Two enantiomers have similar property of $\rightarrow$ **Boiling point, Similar melting point & same density.**

“But they are differ in only optical specific rotation.”

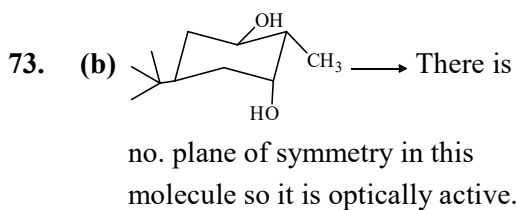


are “Cis to each other”

71. (a)

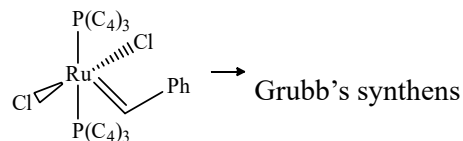


72. (a) $SN^2 \rightarrow$ Walden inversion
 $SN^1 \rightarrow$ Carbocation intermediate
 $E^2 \rightarrow$ Carbanion Intermediate formed
 $E^1CB \rightarrow$ Antiperiplanar configuration



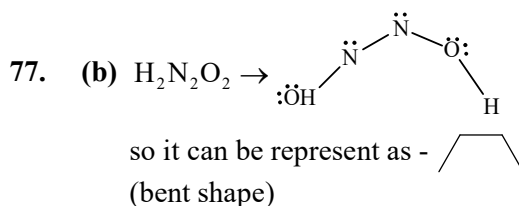
74. (a) **Oxidising power order**
 $\rightarrow F_2 > Cl_2 > Br_2 > I_2$
 Carboxypeptidase-A $\rightarrow$ Zn

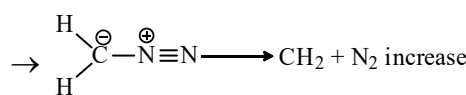
76. (c) $Rh(PPh_3)_3Cl \rightarrow$ is a wilkinson catalyst

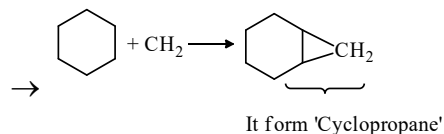


$TiCl_4 + Al(C_2H_5)_3 \rightarrow$ Zeigleer natta catalyst

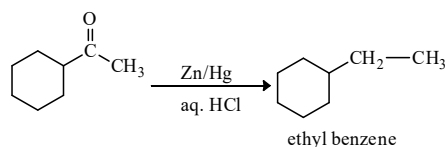
$Pd(OH)_2 / C \rightarrow$ Pearlman's catalyst



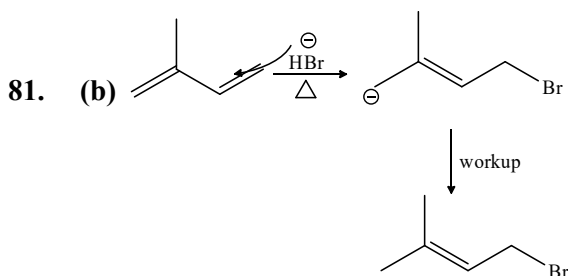
78. (a) About methylene $\rightarrow CH_2$
 $\rightarrow$ 
 $\rightarrow$ If find in two form, singlet & triplet in which singlet is less stable than triplet.



79. (c) **Demention Reduction $\rightarrow$**

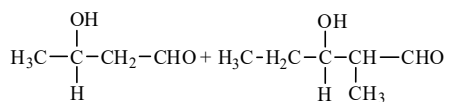


80. (a) Tollen reagent:- Amoniated silver nitrate solution ($\text{Ag}_2\text{O} + \text{NaNO}_3$).



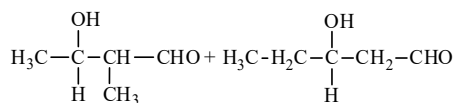
82. (b) Sanger's method:- It is used to identified N-Terminal amino acid. Basically it is used in DNA.

83. (d) $\text{CH}_3 - \text{CH}_2\text{O} + \text{CH}_3 - \text{CH}_2 - \text{CHO} \rightarrow$



(I)

(II)



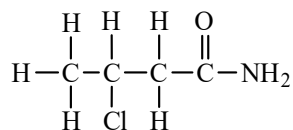
(III)

(IV)

84. (d)

85. (a)

86. (a) Non equivalent protons in $\rightarrow$

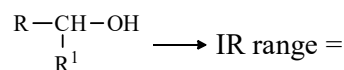


87. (b) $\left[P^{k_b} \propto \frac{1}{\text{Basisity}} \right]$ so P^{k_b} decrease, Basisity increase

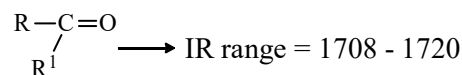
88. (a) Order of basisity on the basis of solvation effect - $[1^\circ > 2^\circ > 3^\circ]$ amines

89. (d)

90. (a) To check a secondry alcohol has been completly oxidies to keton -



3600 cm^{-1}



cm^{-1} so we should check the IR spectrum has absorption 3500 cm^{-1} and 1600 cm^{-1} .

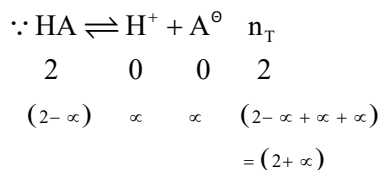
91. (d) For least free space $\rightarrow$ Central Atom is surrounding by 12 atom in FCC unit.

92. (a) $Z = 6$

Tetrahedral void $= 2Z = 2 \times 6 = 12$

Octahedral void $= Z = 6$

93. (d) given $\rightarrow \text{pH} = 4, [\text{H}^+] = 10^{-4}$



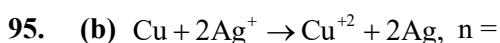
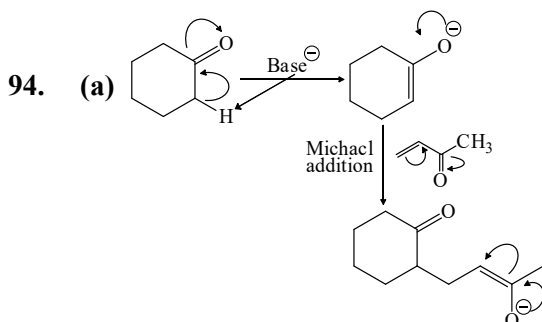
$$i = \frac{\text{amount after time } t (\text{total})}{\text{amount present initially}} = \frac{(2+\alpha)}{2} = \left(1 + \frac{\alpha}{2}\right)$$

$\therefore$ It is given $[\text{H}^+] = \alpha = 10^{-4}$ so

$$i = \left(1 + \frac{10^{-4}}{2}\right) = (1 + 5 \times 10^{-5})$$

$$= (1 + 0.00005)$$

$$\boxed{i = 1.00005}$$



$2e^-$

transfer so At

$$\text{equilibrium} \rightarrow E^\circ = \frac{0.0593}{n} \cdot \log K_c$$

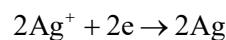
$$E^\circ = \frac{0.0593}{2} \times \{\log 4 \times 10^{16}\}$$

$$= \frac{0.0593}{2} \{\log 10^{16} + \log 4\}$$

$$E^\circ = \frac{0.0593}{2} \times \{16 + 2 \log 2\}$$

$$= \frac{0.0593}{2} (16 + 2 \times 0.3010) = 0.49\text{V}$$

96. (d)



$\text{Cu} + 2\text{Ag}^+ \rightarrow \text{Cu}^{+2} + 2\text{Ag}$, here we see, number of transfer electron are = 2

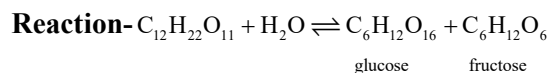
98. (a) In Pseudo order kinetic

→ Molecularity is more than one.

→ Follow first order kinetics so

value of K is in sec^{-1}

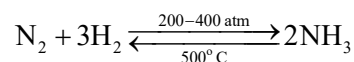
→ rate depend only on one reactant



It is a Pseudo order reaction

$$\text{Rate} \propto [\text{C}_{12}\text{H}_{22}\text{O}_{11}]$$

99. (a) Habern process of NH_3 formation →



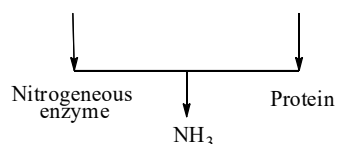
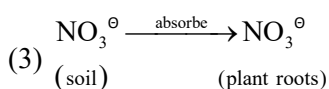
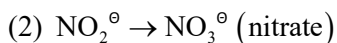
It occurs in high temperature and high pressure. But in the Le Chatelier

→ NH_3 production is favour by Low temperature and High pressure.

100. (c) In plants, N_2 is in the form of →

Nitrate ($\text{NO}_3^\ominus$).

Nitrogen fixation in plants →



101. (b) FAT soluble vitamins → A,D,E,K
Water soluble vitamins → B and C

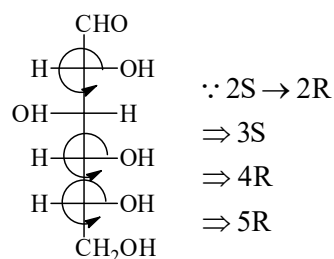
102. (c) **In a disaccharide** → two, monosaccharide are attached with Glycosidic linkage.

In Sucrose → α,1,2 glycosidic linkage

In Lactose → β-1,4 glycosidic linkage

In Maltose → α-1,4 glycosidic linkage

103. (a) D-glucose →



$\therefore$ 4th group is in Horizontal so
S → R

104. (a) **Hoffmann Rule** → Least substituted olefin is generally formed as major product.

105. (d) **In physisorption** →

- It is spontaneous { $\Delta G < 0$ }
- It is reversible
- $\Delta H < 0$
- $\Delta S > 0$

106. (d) For an spontaneous reaction
 $\Delta G = \text{Negative}$

$$\therefore \Delta G = -nF E_{\text{cell}}^\ominus$$

$\therefore$ for spontaneous reaction $E_{\text{cell}}^\ominus =$ positive

107. (d) Factors, that determine an effective collision →

- Collision frequency
- Threshold energy
- Proper orientation

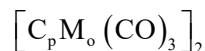
108. (b) $[W(Cp)_2(CO)_2] \rightarrow$ It follow 18 e⁻ Rule so let hapticity both Cp is ('x' and 'y') so VE = 6 + (x + y) + 4 =

$$18 e^-$$

$$x + y = 8$$

so hapticity should be → **3 and 5**

109. (a) Number of M-M bond in →



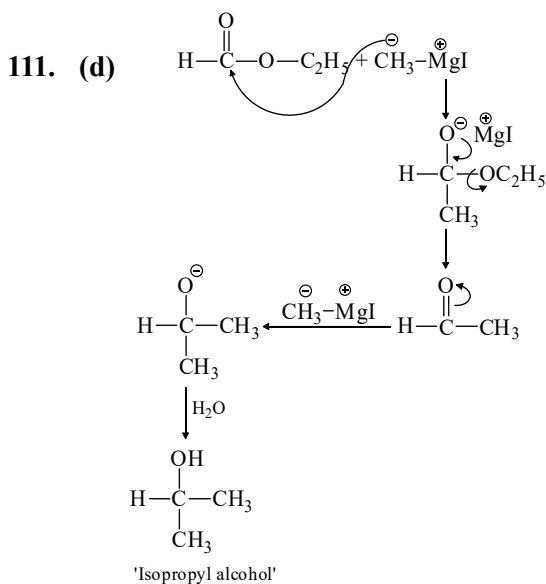
$$\text{M-M bond} \rightarrow \frac{18n - VE}{2}$$

$$= \frac{(18 \times 2) - (12 + 10 + 12)}{2} = \frac{36 - 34}{2}$$

$$\boxed{\text{M - M bond} = 1}$$

110. (c) Zeise salt:- $\text{K}[\text{PtCl}_3 \cdot \text{C}_2\text{H}_4]$

- It is diamagnetic in Nature
- Pt is in +2 O.S.
- All PtCl bond are not equal



[Experimental hydration energy = theoretical or expected hydration energy + CFSE]

112. (a) [Exp. hydration energy = theoretical or expected hydration energy + CFSE]

$$\text{CFSE} = -540 - (-435.4)$$

$$= -104.6 \text{ kJ mol}^{-1} = -104.6 \times 10^3 \text{ J mol}^{-1}$$

$$\therefore E = \frac{hc}{\lambda} \rightarrow \frac{104.6 \times 10^{-3} \text{ Jule}}{6.023 \times 10^{23}}$$

$$= -6.66 \times 10^{34} \times 3 \times 10^8 \times \left(\frac{1}{\lambda}\right)$$

So $\frac{1}{\lambda} = -8.738$

so $[\text{CFSE} = -8738 \text{ cm}^{-1}]$

113. (b) $\therefore$ Rate constant is increased by the factor of 10.6 so $K_2 = K_1 \times 10.6$ or

$$\frac{K_2}{K_1} = 10.6$$

So from Arrhenius equation

$$\rightarrow K = A_{\text{exp}} \left(\frac{-E_a}{RT} \right)$$

$$\text{and } \ln \frac{K_2}{K_1} = \frac{-E_a}{R} \left(\frac{1}{T_2} - \frac{1}{T_1} \right)$$

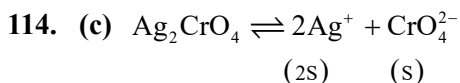
$$\ln 10.6 = \frac{-E_a}{8.314} \left[\frac{1}{308} - \frac{1}{298} \right]$$

$$= \frac{-E_a}{8.314} \left[\frac{-10}{308 \times 298} \right]$$

$$E_a = \frac{\log(10.6) \times 8.314 \times 308 \times 298}{10}$$

$$= 180154.92 \text{ Jule mol}^{-1}$$

$$[E_a = 180.15 \text{ kJ mol}^{-1}]$$



$$K_{sp} = (2S)^2 \times (S) \rightarrow 4S^3$$

$$\therefore M = 1.5 \times 10^{-4} \text{ mol L}^{-1}$$

$$(C) = \frac{1.5 \times 10^{-4}}{2} \{ \text{gm eq. L}^{-1} \}$$

$$K_{sp} = 4 \times \left(\frac{1.5 \times 10^{-4}}{2} \right) = \frac{13.500 \times 10^{-12}}{8}$$

$$[K_{sp} = 1.68 \times 10^{-12}]$$

115. (b) Due to very harness $\rightarrow$ Quartz has the property of Lowespansion.

116. (d)

117. (d) Symmetrical electronic configuration $\rightarrow$ No John-Teller distortion occur (t_{2g} and eg half filled or full filled)

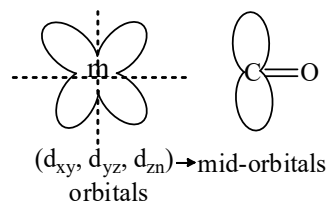
Example: $t_{2g}^3 eg^2 > t_{2g}^3 eg^2 > t_{2g}^6 eg^2$ etc.

Unsymmetrical electronic configuration $\rightarrow$ John-Teller distortion occur (t_{2g} and eg partially filled)

Example: $t_{2g}^2 eg^3 > t_{2g}^3 eg^1 > t_{2g}^6 eg^3$ etc.

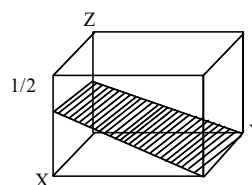
$\text{Cr}^{+3}(\text{d}^3)$	$\text{Cr}^{+4}(\text{d}^2)$	$\text{Fe}^{+3}(\text{d}^5)$	$\text{Ni}^{+2}(\text{d}^{10})$
A-	A-	AA	A
No JTD	JTD	No JTD	No JTD
	present		

118. (a) Basic bonding of D-electrons $\rightarrow$



119. (d) Anonium ions replace silicon ion and silicon dioxide $\rightarrow$ are called

120. (d) Zeohtes



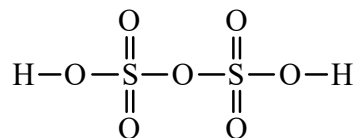
	X	Y
Z		
Incept	∞	1
1/2		
Reciprocal	0	1
2		
miller indiceis (0, 1, 2)		

121. (d) Range of oxidation state of Nitrogen in its oxide $\rightarrow +1$ to $+5$

Eg:- $\text{N}_2\text{O}_5 \rightarrow$ has O.S. = $+5$
 $\text{N}_2\text{O} \rightarrow$ has O.S. $\rightarrow +1$

122. (b) Popular oxoacid of sulphur $\rightarrow \text{H}_2\text{SO}_4$

123. (c) Olium $\rightarrow \text{H}_2\text{S}_2\text{O}_7$



$\therefore$ so It has the basisty of '2'.

124. (c) $\left[\text{Polarising power of cation (+ve)} \propto \frac{1}{(\text{size of cation})} \right]$

and

$$\left[\text{Polarising power of cation} \propto \frac{\text{size of cation}}{\text{Negative}} \right]$$

$$\left[\text{Polarising power of cation} \propto \frac{\text{magnitute of positive charge}}{\text{positive charge}} \right]$$

125. (c) $\Delta U = q + W \quad \therefore W = +10 (\text{compression})$
 $q = -2 \{ \therefore \text{escaping} \}$

So $[\Delta U = -2 + 10 = 8 \text{ kJ}]$