SOLVED PAPER	NEET (UG) 05th May 2024	Code T4

Total Time Duration: 200 Minutes **Maximum Marks: 720**

Important Instructions :

1. *The test is of **3 hours 20 minutes** duration and test booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into two **Section (A and B)** as per details given below:*
   - *(a) **Section A** shall consist of **35 (Thirty-five)** questions in each subject (Question Nos- 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.*
   - *(b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos- 36 to 50, 86 to 100, 136 to 150 and 80 to 200). In Section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.*

   Candidates are advised to read all 15 questions in each subject of Section B** before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.
2. *Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, one mark will be deducted from the total scores. **The maximum marks are 720.***
3. *Use **blue/black ball point pen only** for writing particulars on this page/marking responses on answer Sheet.*
4. *Use of electronic/manual calculator is prohibited.*
5. ***No part of the test booklet and answer sheet shall be detached under any circumstances.***
6. *The candidates will write the correct test booklet code as given in the test booklet/answer sheet in the attendance sheet.*
7. *Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of scribe or not.*

CHEMISTRY

Section A

Q. 51. Match **List - I** with **List - II:**

List - I (Process)	List-II (Conditions)
A. Isothermal process	I. No heat exchange
B. Isochoric process	II. Carried out at constant temperature
C. Isobaric process	III. Carried out at constant volume
D. Adiabatic process	IV. Carried out at constant pressure

Choose the **correct** answer from the options given below:

(1) A-I, B-II, C-III, D-IV
(2) A-II, B-III, C-IV, D-I
(3) A-IV, B-III, C-II, D-I
(4) A-IV, B-II, C-III, D-I

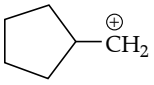
Q. 52. Match **List - I** with **List - II:**

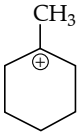
List - I (Complex)	List-II (Type of isomerism)
A. $\left[Co(NH_3)_5(NO_2)\right]Cl_2$	I. Solvate isomerism
B. $\left[Co(NH_3)_5(SO_4)\right]Br$	II. Linkage isomerism
C. $\left[Co(NH_3)_6\right][Cr(CN)_6]$	III. Ionization isomerism
D. $\left[Co(H_2O)_6\right]Cl_3$	IV. Coordination isomerism

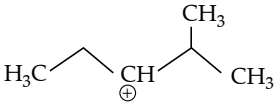
Choose the **correct** answer from the options given below:

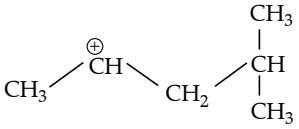
(1) A-I, B-IV, C-III, D-II
(2) A-II, B-IV, C-III, D-I
(3) A-II, B-III, C-IV, D-I
(4) A-I, B-III, C-IV, D-II

Q. 53. The most stable carbocation among the following is:

(1) 

(2) 

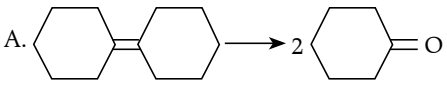
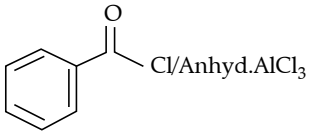
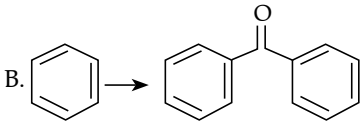
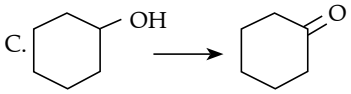
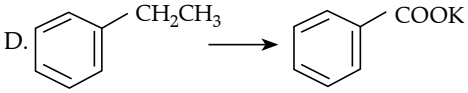
(3) 

(4) 

Q. 54. On heating, some solid substances change from solid to vapour state without passing through liquid" state. "The technique used for the purification of such solid substances based on the above principle is known as

(1) Distillation
(2) Chromatography
(3) Crystallization
(4) Sublimation

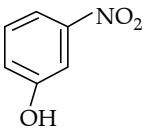
Q. 55. Match **List - I** with **List - II:**

List - I (Reaction)	List-II (Reagents/Condition)
A. 	I. 
B. 	II. CrO_3
C. 	III. $KMnO_4/KOH, \Delta$
D. 	IV. (i) O_3 (ii) Zn-H_2O

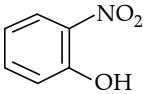
Choose the **correct** answer from the options given below:

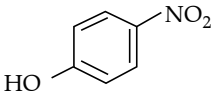
(1) A-IV, B-I, C-II, D-III
(2) A-I, B-IV, C-II, D-III
(3) A-IV, B-I, C-III, D-II
(4) A-III, B-I, C-II, D-IV

Q. 56. Intramolecular hydrogen bonding is present in

(1) 

(2) HF

(3) 

(4) 

Q. 57. The highest number of helium atoms is in

(1) 4 g of helium
(2) 2.271098 L of helium at STP
(3) 4 mol of helium
(4) 4 u of helium

Q. 58. For the reaction $2A \rightleftharpoons B + C$, $K_C = 4 \times 10^{-3}$. At a given time, the composition of reaction mixture is: $[A] = [B] = [C] = 2 \times 10^{-3}$ M

Then, which of the following is correct?

(1) Reaction has a tendency to go in backward direction.
(2) Reaction has gone to completion in forward direction.
(3) Reaction is at equilibrium.
(4) Reaction has a tendency to go in forward direction.

Q. 59. The E° value for the Mn^{3+}/Mn^{2+} couple is more positive than that of Cr^{3+}/Cr^{2+} or Fe^{3+}/Fe^{2+} due to change of:

(1) d^4 to d^5 configuration
(2) d^3 to d^5 configuration
(3) d^5 to d^4 configuration
(4) d^5 to d^2 configuration

Q. 60. Fehling's solution 'A' is

(1) Alkaline solution of sodium potassium tartrate (Rochelle's salt)
(2) Aqueous sodium citrate
(3) Aqueous copper sulphate
(4) Alkaline copper sulphate

Q. 61. Match **List - I** with **List - II:**

List-I Compound	List-II Shape/geometry
A. NH_3	**I.** Trigonal pyramidal
B. BrF_5	**II.** Square planar
C. XeF_4	**III.** Octahedral
D. SF_6	**IV.** Square pyramidal

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-I, D-II

(2) A-II, B-III, C-IV, D-I

(3) A-I, B-IV, C-II, D-III

(4) A-II, B-IV, C-III, D-I

Q. 62. Given below are two statements:

Statement I: Both $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral but differ in their magnetic behavior.

Statement II: $[Co(NH_3)_6]^{3+}$ is diamagnetic whereas $[CoF_6]^{3-}$ is paramagnetic

In the light of the above statements, Choose the correct answer form the options given below

(1) Statement I is true but Statement II is false.

(2) Statement I is false but Statement II is true.

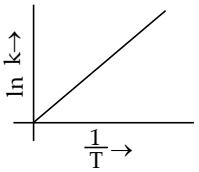
(3) Both Statement I and Statement II are true.

(4) Both Statement I and Statement II are false.

Q. 63. Among group 16 elements, which one does NOT show –2 oxidation state

(1) Te **(2)** Po **(3)** O **(4)** Se

Q. 64. Which plot of *ln* k vs $\frac{1}{T}$ is consistent with Arrhenius equation?

(1)


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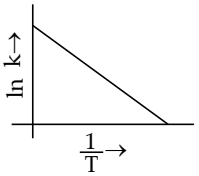

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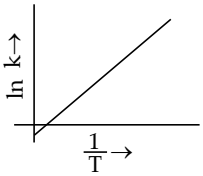

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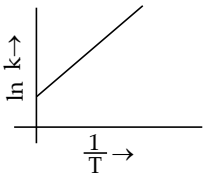


Q. 65. Arrange the following elements in increasing order of electronegativity:

N, O, F, C, Si

Choose the correct answer form the options given below

(1) O < F < N < C < Si

(2) F < O < N < C < Si

(3) Si < C < N < O < F

(4) Si < C < O < N < F

Q. 66. Given below are two statements:

Statement I: The boiling point of three isomeric pentanes follows the order

n-pentane > isopentane > neopentane

Statement II: When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak thereby lowering the boiling point.

In the light of the above statements, Choose the most appropriate answer form the options given below

(1) Statement I is correct but Statement II is incorrect

(2) Statement I is incorrect but Statement II is correct

(3) Both Statement I and Statement II are correct

(4) Both Statement I and Statement II are incorrect

Q. 67. Which reaction is **NOT** a redox reaction?

(1) $H_2 + Cl_2 \rightarrow 2HCl$

(2) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

(3) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

(4) $2KClO_3 + I_2 \rightarrow 2KIO_3 + Cl_2$

Q. 68. Arrange the following elements in increasing order of first ionization enthalpy:

Li, Be, B, C, N

Choose the correct answer from the options given below:

(1) Li < Be < C < B < N

(2) Li < Be < N < B < C

(3) Li < Be < B < C < N

(4) Li < B < Be < C < N

Q. 69. Which one of the following alcohols reacts instantaneously with Lucas reagent?

(1) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$

(2) $CH_3-\overset{\displaystyle CH_3}{\overset{|}{\underset{\displaystyle CH_3}{\underset{|}{C}}}}-OH$

(3) $CH_3-CH_2-CH_2-CH_2OH$

(4) $CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-OH$

Q. 70. Match **List - I** with **List - II:**

List - I (Molecule)	List-II (Number and types of bond/s between two Corbon atoms)
A. ethane	I. one σ-bond and two π-bonds
B. ethene	II. two π-bonds

C. carbon molecule, C_2	III. one σ-bond
D. ethyne	IV. one σ-bond and one π-bond

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-II, D-I

(2) A-III, B-IV, C-I, D-II

(3) A-I, B-IV, C-II, D-III

(4) A-IV, B-III, C-II, D-I

Q. 71. Given below are two statements:

Statement I: The boiling point of hydrides of Group 16 elements follow the order $H_2O > H_2Te > H_2Se > H_2S$.

Statement II: On the basis of molecular mass, H_2O is expected to have lower boiling point than the other members of the group but due to the presence of extensive H-bonding in H_2O, it has higher boiling point.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is true, but Statement II is false.

(2) Statement I is false, but Statement II is true.

(3) Both Statement I and Statement II are true.

(4) Both Statement I and Statement II are false.

Q. 72. Given below are two statements:

Statement I: Aniline does not undergo Friedel-Crafts alkylation reaction.

Statement II: Aniline cannot be prepared through Gabriel synthesis.

In the light of the above statements, choose the correct answer from the options given below:

(1) Statement I is correct, but Statement II is false.

(2) Statement I is incorrect, but Statement II is true.

(3) Both Statement I and Statement II are true.

(4) Both Statement I and Statement II are false.

Q. 73. Match **List - I** with **List - II:**

List - I (Conversion)	**List-II (Number of Faraday required)**
A. 1mol of H_2O to O_2	I. 3F
B. 1mol of MnO_4^- to Mn^{2+}	II. 2F
C. 1.5mol of Ca from molten $CaCl_2$	III. 1F
D. 1mol of FeO to Fe_2O_3	IV. 5F

Choose the **correct** answer from the options given below:

(1) A-II, B-III, C-I, D-IV

(2) A-III, B-IV, C-II, D-I

(3) A-II, B-IV, C-I, D-III

(4) A-III, B-IV, C-I, D-II

Q. 74. In which of the following equilibria, $\mathbf{K_P}$ and $\mathbf{K_C}$ are **NOT** equal?

(1) $CO(g) + H_2O_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$

(2) $2BrCl_{(g)} \rightleftharpoons Br_{2(g)} + Cl_{2(g)}$

(3) $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

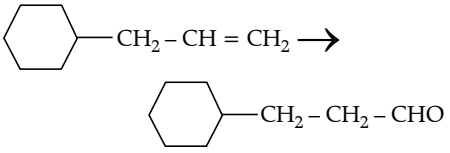
(4) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

Q. 75. The Henry's law constant **(K_H)** values of three gases (A, B, C) in water are 145, 2×10^{-5} and 35 kbar, respectively. The solubility of these gases in water follow the order:

(1) A > C > B **(2)** A > B > C

(3) B > A > C **(4)** B > C > A

Q. 76. Identify the correct reagents that would bring about the following transformation.



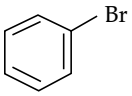
(1) (i) BH_3 (ii) $H_2O_2/\overset{\ominus}{O}H$
(iii) alk.$KMnO_4$ (iv) $H_3O^{\oplus}$

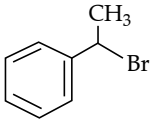
(2) (i) H_2O/H^+ (ii) PCC

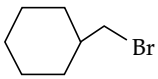
(3) (i) H_2O/H^+ (ii) CrO_3

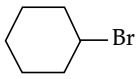
(4) (i) BH_3 (ii) $H_2O_2/\overset{\ominus}{O}H$
(iii) PCC

Q. 77. The compound that will undergo S_N1 reaction with the fastest rate is:

(1) 

(2) 

(3) 

(4) 

Q. 78. The energy of an electron in the ground state ($n = 1$) for $\mathbf{He^+}$ ion is $-x$J, then that for an electron in $n = 2$ state for $\mathbf{Be^{3+}}$ ion in J is :

(1) $-4x$ **(2)** $-\frac{4}{9}x$ **(3)** $-x$ **(4)** $-\frac{x}{9}$

Q. 79. A compound with a molecular formula of C_6H_{14} has two tertiary carbons. Its **IUPAC** name is:

(1) 2,3-dimethylbutane

(2) 2,2-dimethylbutane

(3) *n*-hexane

(4) 2-methylpentane

Q. 80. The reagents with which glucose does **not** react to give the corresponding tests/products are

A. Tollen's reagent

B. Schiff's reagent

C. HCN

D. NH_2OH

E. $NaHSO_3$

Choose the correct options from the given below:

(1) B and E **(2)** E and D

(3) B and C **(4)** A and D

Q. 81. 'Spin only' magnetic moment same for which of the following ions?

A. Ti^{3+} **B.** Cr^{2+}

C. Mn^{2+} **D.** Fe^{2+}

E. Sc^{3+}

Choose the most appropriate answer from the options given below:

(1) B and C only **(2)** A and D only

(3) B and D only **(4)** A and E only

Q. 82. Match **List-I** with **List - II:**

List-I Quantum Number	List-II Information provided
A. m_l	**I.** Shape of orbital
B. m_s	**II.** Size of orbital
C. l	**III.** Orientation of orbital
D. n	**IV.** Orientation of spin of electron

Choose the **correct** answer from the options given below:

(1) A-III, B-IV, C-II, D-I

(2) A-II, B-I, C-IV, D-III

(3) A-I, B-III, C-II, D-IV

(4) A-III, B-IV, C-I, D-II

Q. 83. 1 gram of sodium hydroxide was treated with 25 mL of 0.75 M HCl solution, the mass of sodium hydroxide left unreacted is equal to

(1) Zero mg **(2)** 200 mg

(3) 750 mg **(4)** 250 mg

Q. 84. In which of the following processes entropy increases?

A. A liquid evaporates to vapour.

B. Temperature of a crystalline solid lowered form 130 K to 0 K.

C. $2\,NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + CO_{2(g)} + H_2O_{(g)}$

D. $Cl_{2(g)} \rightarrow 2Cl_{(g)}$

Choose the correct answer from the options given below:

(1) A, C and D **(2)** C and D

(3) A and C **(4)** A, B and D

Q. 85. Activation energy of any chemical reactions can be calculated if one knows the value of

(1) Orientation of reactant molecules during collision.

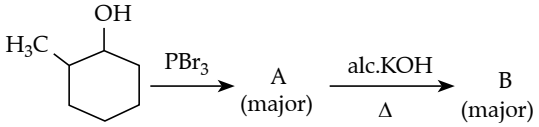
(2) Rate constant at two different temperatures.

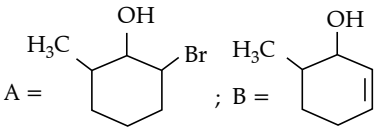
(3) Rate constant at standard temperatures.

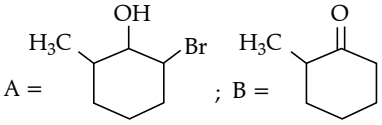
(4) Probability of collision.

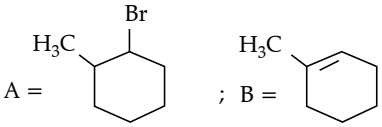
Section B

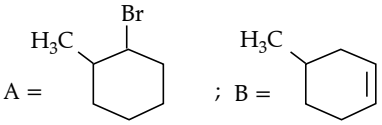
Q. 86. Major products A and B formed in the following reaction sequence, are



(1) 

(2) 

(3) 

(4) 

Q. 87. The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is:

(Given R = 2.0 cal $K^{-1}mol^{-1}$)

(1) 413.14 calories **(2)** 100 calories

(3) 0 calorie **(4)** -413.14 calories

Q. 88. Consider the following reaction in a sealed vessel at equilibrium with concentrations of

$N_2 = 3.0 \times 10^{-3}M$, $O_2 = 4.2 \times 10^{-3}M$ and

$NO = 2.8 \times 10^{-3}M$

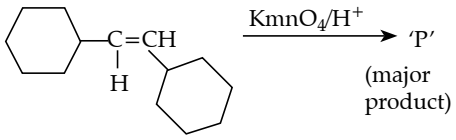
$2NO_{(g)} \rightleftharpoons N_{2(g)} + O_{2(g)}$

If 0.1 $molL^{-1}$ of $NO_{(g)}$ is taken in a closed vessel, what will be degree of dissociation (α) of $NO_{(g)}$ at equilibrium?

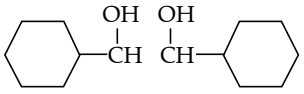
(1) 0.8889 **(2)** 0.717

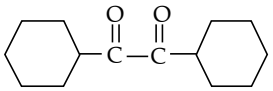
(3) 0.00889 **(4)** 0.0889

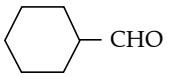
Q. 89. For the given reaction:

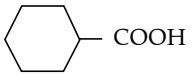


'P' is

(1) 

(2) 

(4) 

(4) 

Q. 90. The pair of lanthanoid ions which are diamagnetic is

(1) Gd^{3+} and Eu^{3+} **(2)** Pm^{3+} and Sm^{3+}

(3) Ce^{4+} and Yb^{2+} **(4)** Ce^{3+} and Eu^{2+}

Q. 91. Identify the major product C formed in the following reaction sequence:

$$CH_3-CH_2-CH_2-I \xrightarrow{NaCN} A \xrightarrow[\text{Partial hydrolysis}]{OH^-} B \xrightarrow[Br_2]{NaOH} \underset{\text{(major)}}{C}$$

(1) butanamide
(2) α-bromobutanoic acid
(3) propylamine
(4) butylamine

Q. 92. The products A and B obtained in the following reactions, respectively, are

$3ROH + PCl_3 \rightarrow 3RCl + A$

$ROH + PCl_5 \rightarrow RCl + HCl + B$

(1) H_3PO_4 and $POCl_3$
(2) H_3PO_3 and $POCl_3$
(3) $POCl_3$ and H_3PO_3
(4) $POCl_3$ and H_3PO_4

Q. 93. Given below are certain cations. Using inorganic qualitative analysis, arrange them in increasing group number from 0 to VI.

A. Al^{3+} **B.** Cu^{2+}
C. Ba^{2+} **D.** Co^{2+}
E. Mg^{2+}

Choose the correct answer from the options given below:

(1) E, C, D, B, A **(2)** E, A, B, C, D
(3) B, A, D, C, E **(4)** B, C, A, D, E

Q. 94. A compound X contains 32 % of A, 20% of B_2 and remaining percentage of C. Then, the empirical formula of X is:
(Given atomic masses of A = 64; B = 40; C = 32

(1) AB_2C_2 **(2)** ABC_4
(3) A_2BC_2 **(4)** ABC_3

Q. 95. The rate of a reaction quadruples where temperature changes from 27°C to 57°C calculate the energy of activation.
Given R = 8. 314 J K^{-1} mol^{-1}, log 4 = 0.6021

(1) 3.80 kJ/mol **(2)** 3804 kJ/mol
(3) 38.04 kJ/mol **(4)** 380.4 kJ/mol

Q. 96. The plot of osmotic pressure (π) vs concentration (mol L^{-1}) for a solution gives a straight line with slope 25.73 L bar mol^{-1}. The temperature at which the osmotic pressure measurement is done is
(Use R = 0.083 L bar mol^{-1} K^{-1})

(1) 25.73°C **(2)** 12.05°C
(3) 37°C **(4)** 310°C

Q. 97. During the preparation of Mohr's salt solution (Ferrous ammonium sulphate), which of the following acid is added to prevent hydrolysis of Fe^{2+} ion

(1) Dilute nitric acid
(2) Dilute sulphuric acid
(3) Dilute hydrochloric acid
(4) Concentrated sulphuric acid

Q. 98. Mass in grams of copper deposited by passing 9.6487 A current through a voltmeter containing copper sulphate solution for 100 seconds is:
(Given : Molar mass of Cu : 63 g mol^{-1}, 1F = 96487 C)

(1) 31.5 g **(2)** 0.0315 g
(3) 3.15 g **(4)** 0.315 g

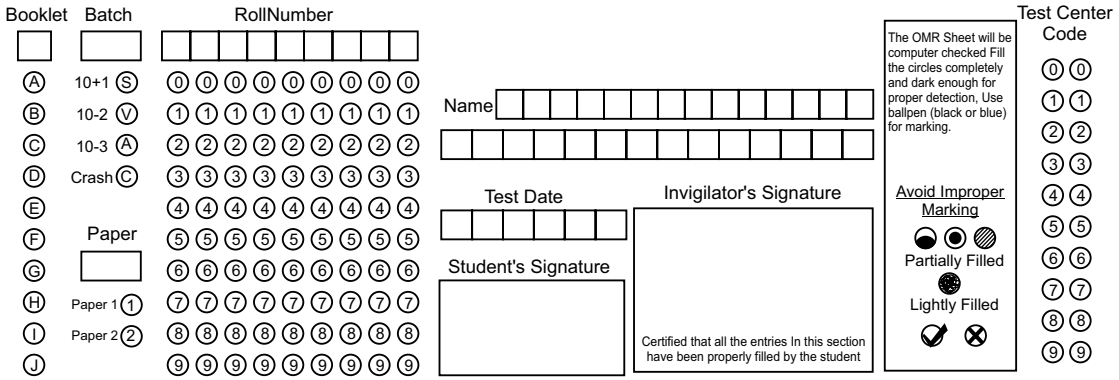
Q. 99. Identify the correct answer.

(1) Dipole moment of NF_3 is greater than that of NH_3.
(2) Three canonical forms can be drawn for CO_3^{2-} ion.
(3) Three resonance structures can be drawn for ozone
(4) BF_3 has non-zero dipole moment.

Q. 100. **Statement I:** $[Co(NH_3)_6]^{3+}$ is a homoleptic complex whereas $[Co(NH_3)_4Cl_2]^+$ is a heteroleptic complex.
Statement II: Complex $[Co(NH_3)_6]^{3+}$ has only one kind of ligands but $[Co(NH_3)_4Cl_2]^+$ has more than one kind of ligands.
In the light of the above statements, Choose the correct answer form the options given below

(1) Statement I is true but Statement II is false.
(2) Statement I is false but Statement II is true.
(3) Both Statement I and Statement II are true.
(4) Both Statement I and Statement II are false.

❑❑



51	1	2	3	4
52	1	2	3	4
53	1	2	3	4
54	1	2	3	4
55	1	2	3	4

56	1	2	3	4
57	1	2	3	4
58	1	2	3	4
59	1	2	3	4
60	1	2	3	4

61	1	2	3	4
62	1	2	3	4
63	1	2	3	4
64	1	2	3	4
65	1	2	3	4

66	1	2	3	4
67	1	2	3	4
68	1	2	3	4
69	1	2	3	4
70	1	2	3	4

71	1	2	3	4
72	1	2	3	4
73	1	2	3	4
74	1	2	3	4
75	1	2	3	4

76	1	2	3	4
77	1	2	3	4
78	1	2	3	4
79	1	2	3	4
80	1	2	3	4

81	1	2	3	4
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83	1	2	3	4
84	1	2	3	4
85	1	2	3	4

86	1	2	3	4
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88	1	2	3	4
89	1	2	3	4
90	1	2	3	4

91	1	2	3	4
92	1	2	3	4
93	1	2	3	4
94	1	2	3	4
95	1	2	3	4

96	1	2	3	4
97	1	2	3	4
98	1	2	3	4
99	1	2	3	4
100	1	2	3	4

Answer Key

Q. No.	Answer	Topic's Name	Chapter Name
CHEMISTRY			
51	2	Different types of processes	Chemical Thermodynamics
52	3	Isomerism	Co-ordination Compounds
53	2	Carbocation	Basic Principles of Organic Chemistry
54	4	Techniques of Purification	Purification and Chracterization of Organic Compounds
55	1	Oxidation	Hydrocarbons
56	3	Hydrogen Bonding	Atomic Structure
57	3	Mole Concept	Some Basic Concepts of Chemistry
58	1	Chemical Equilibria	Equilibrium
59	1	SRP	Chemical Bonding and Molecular Structure
60	3	Fehling's solution	Principles related to Practical Chemistry
61	3	Geometry	Atomic Structure
62	3	Magnetic Nature	Co-ordination Compounds
63	2	Oxidation State	Redox Reaction
64	2	Arrhenius Equation	Chemical Kinetics
65	3	Trends in Physical Properties	P-Block Elements
66	3	Physical Properties of Alkones	Hydrocarbons
67	2	Redox Reaction	Redox Reaction
68	4	Ionisation Enthalpy	Chemical Bonding and Molecular Structure.
69	2	Alcohol	Organic Compounds containing Oxygen
70	1	Types of Bonds	Chemical Bonding and Molecular Structure
71	3	Group-16 elements	Atomic Structure
72	3	Amines	Organic Compounds Containing Nitrogen
73	3	Conductance of Electrolytic Solution	Electrochemistry
74	3	Equilibrium Constants	Equilibrium
75	4	Henry's Law	Solution
76	4	Alkenes	Hydrocarbons
77	2	Substitution Nucleophilic Reaction	Organic compounds containing Halogen
78	3	Bohr's atomic model	Atomic Structure
79	1	IUPAC Nomenclature	Hydrocarbons
80	1	Carbohydrates	Biomolecules

Answer Key

Q. No.	Answer	Topic's Name	Chapter Name
81	3	Transition Elements	*d*- and *f*- Block Elements
82	4	Quantum Numbers	Atomic Structure
83	4	Mole concept	Some Basic Concepts of Chemistry
84	1	Entropy	Chemical Thermodynamics
85	2	Energy of Activation	Chemical Kinetics
86	3	Chemical Properties	Organic Compounds containing halogen
87	4	Concept of Work	Chemical Thermodynamics
88	2	Degree Of Dissociation	Equilibrium
89	4	Aldehydes and Ketones	Organic Compounds containing oxygen
90	3	Lanthanoides and Actinoides	*d*- and *f*- Block Elements
91	3	Amines	Organic compounds containing Nitrogen
92	2	Alcohol	Organic compounds containing oxygen
93	3	Qualitative Salt Analysis	Principles related to Practical Chemistry
94	4	Empirical and Molecular Formulae	Some Basic Concepts Of Chemistry
95	3	Arrhenius equation	Chemical Kinetics
96	3	Osmotic Pressure	Solution
97	2	Mohr's Salt	Principles related to Practical Chemistry
98	4	Faraday's first law of electrolysis	Electrochemistry
99	2	Dipole Moment	Chemical Bonding And Molecular Structure
100	3	Ligands	Co-ordination Compounds

NEET (UG)
Examination
5th May 2024

ANSWERS WITH EXPLANATION

CHEMISTRY

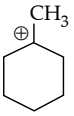
51. Option (2) is correct.
Explanation:

A. Isothermal Process	II. Carried out at constant temperature
B. Isochoric process	III. Carried out at constant volume
C. Isobaric process	IV. Carried out at constant pressure
D. Adiabatic process	I. No heat exchange

52. Option (3) is correct.
Explanation:

A. $[Co(NH_3)_5(NO_2)]Cl_2$	II. Linkage isomerism
B. $[Co(NH_3)_5(SO_4)]Br$	III. Ionization isomerism
C. $[Co(NH_3)_6][Cr(CN)_6]$	IV. Coordination isomerism
D. $[Co(H_2O)_6]Cl_3$	I. Solvate isomerism

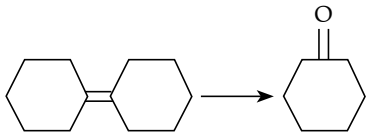
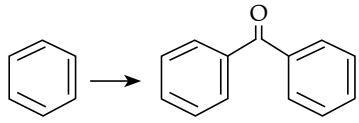
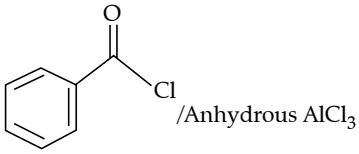
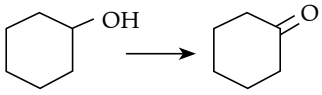
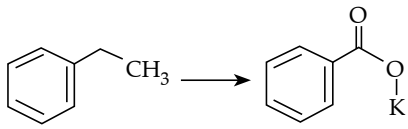
53. Option (2) is correct.
Explanation: Stability order of carbocation is as 3° Carbocation > 2° Carbocation >1° Carbocation



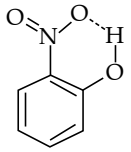
is a tertiary carbocation, while rest are secondary $C^{\oplus}$. Hence, it is most stable carbocation among the given compounds.

54. Option (4) is correct.
Explanation: On heating, if solid directly gets converted into gaseous form instead of liquid this process is known as sublimation. So, the technique used for the purification of such solid substances based on the above principle is known as sublimation.

55. Option (1) is correct.
Explanation:

Reaction	Reagents/Condition	Process involved
(A) 	IV. (i) O_3 (ii) Zn-H_2O	Ozonolysis
(B) 	I.  /Anhydrous $AlCl_3$	Friedal Craft Acylation
(C) 	II. CrO_3	Mild oxidation
(D) 	III. $KMnO_4/KOH, \Delta$	Strong oxidation

56. Option (3) is correct.
Explanation: Intramolecular hydrogen bonding takes place within the same molecule. This occurs only when two functional groups are present in a molecule.
In HF, intermolecular hydrogen bonding is possible but intramolecular hydrogen bonding is not possible.
In *m*-nitrophenol and *p*-nitrophenol both $-NO_2$ and -OH groups are far apart from each other so intramolecular hydrogen bonding is not possible.
In *o*-nitrophenol, $-NO_2$ and -OH groups are on adjacent carbon atoms so they can form hydrogen bonding and such hydrogen bonding is known as intramolecular hydrogen bonding.



o-nitrophenol

57. Option (3) is correct.

Explanation: 1. In 4g

Number of He atoms = No. Of moles × N_A
= (Mass/Molar mass) × N_A
= (4/4) × 6.022 × 10^{23}
= 6.022 × 10^{23} atoms

2. In 2.271098 L of helium at STP

Number of He atoms = (2.271098/22.4) × N_A
= 0.1013 × 6.022 × 10^{23}
= 0.6105 × 10^{23} atoms

3. In 4 mol of helium

Number of He atoms = Number of moles × N_A
= 4 × 6.022 × 10^{23}
= 24.088 × 6.022 × 10^{23} atoms

4. In 4u of Helium

Number of atoms = Number of moles × N_A
= (4u/4) × 6.022 × 10^{23}
= 6.022 × 10^{23}

Hence, the highest number of He atoms are in 4 mol He.

58. Option (1) is correct.

Explanation: For the reaction,

$$2A \rightleftharpoons B + C$$

quotient is given by

$$Q_c = \frac{[B][C]}{[A]^2}$$

$$= \frac{[2\times10^{-3}][2\times10^{-3}]}{[2\times10^{-3}]^2}$$

$$= 1$$

$K_c = 4 \times 10^{-3}$ (given)

On comparing, $K_c < Q_c$

Hence, reaction has a tendency to go in backward direction.

59. Option (1) is correct.

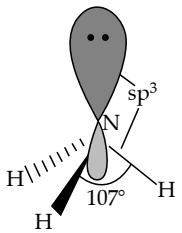
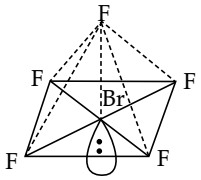
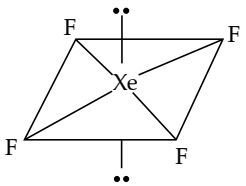
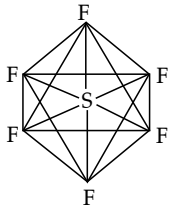
Explanation: The positive E° value for the couple Mn^{3+}/Mn^{2+} is due to the much higher third ionization energy of Mn (where the required change is half filled d^5 (extra stable) to d^4. As $Cr^{3+}(t_2g)$ is more stable than Cr^{2+}, therefore, E^0 value for couple Cr^{3+}/Cr^{2+} is negative.

60. Option (3) is correct.

Explanation: Fehling's solution 'A' is aqueous solution of copper sulphate. It is prepared by dissolving pentahydrated copper sulphate in distilled water and then adding some drops of dilute sulphuric acid.

61. Option (3) is correct.

Explanation:

Compound	Shape/Geometry
A. NH_3	(i) Trigonal pyramidal 
B. BrF_5	(iv) Square pyramidal 
C. XeF_4	(ii) Square planer 
D. SF_6	(iii) Octahedral 

62. Option (3) is correct.

Explanation: $[Co(NH_3)_6]^{3+}$ and $[CoF_6]^{3-}$ complexes are octahedral. In $[Co(NH_3)_6]^{3+}$ all electrons are in paired ($t_{2g}^6\ e_g^0$) form so it is diamagnetic. In $[CoF_6]^{3-}$ four electrons are unpaired ($t_{2g}^3 e_g^1$) so it is paramagnetic.

Hence, given both the statements are true.

63. Option (2) is correct.

Explanation: Down the group, electropositivity increases. Po is highly electropositive element so it does not show –2 oxidation state.

64. Option (2) is correct.

Explanation: Arrhenius equation is

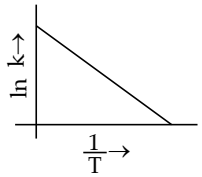
$k = Ae^{-Ea/RT}$

$ln(k) = ln\ (A) + ln(e^{-Ea/RT})$

$ln(k) = ln\ (A) + (-Ea/RT)$

$ln(k) = ln\ (A) + (-Ea/R)\ (1/T)$

Since $ln(A)$ is a constant, the equation corresponds to that of a straight line ($y = mx + c$) whose slope (m) is –Ea/R. When the logarithm of the rate constant (ln K) is plotted on the Y-axis and the inverse of the absolute temperature (1/T) is plotted on the X-axis, the resulting graph is called an Arrhenius plot.



65. Option (3) is correct.

Explanation: Electronegativity is the tendency of an atom to attract the shared pair of electrons towards itself.

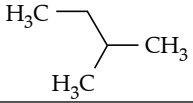
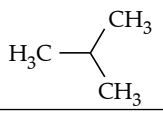
Number of electrons and size of atom are responsible for electronegativity.

Fluorine have 7 electrons in its outermost shell and it require only 1 electron for completion of its octet and its atomic size is vary small so it is highest electronegative element.

Electronegativity increases across the period and decreases down the group. So correct order of electronegativity is Si < C < N < O < F.

66. Option (3) is correct.

Explanation:

n-pentane	CH_3-CH_2-CH_2-CH_2-CH_3
Iso-pentane	
Neo-pentane	

When branching increases, the molecule attains a shape of sphere. This results in smaller surface area for contact, due to which the intermolecular forces between the spherical molecules are weak thereby lowering the boiling point.

Hence, both the statements are correct.

67. Option (2) is correct.

Explanation: The reaction in which reduction as well as oxidation takes place simultaneously is called redox reaction.

In the reaction

$BaCl_2 + Na_2SO_4 \longrightarrow BaSO_4 + 2NaCl$

Oxidation number of all elements in reactant and product are same that is there is no oxidation or reduction takes place so it is not redox reaction.

68. Option (4) is correct.

Explanation: The minimum amount of energy required to remove the most loosely bound electron in the isolated gaseous atom is known as ionisation enthalpy.

Li, Be, B, C, N all are the elements belonging to second period of modern periodic table. Across the period from left to right atomic size decreases and effective nuclear charge increases so ionization enthalpy also increases.

But in case of Be and B, Be has all paired electrons in its outermost shell and boron has 1 unpaired electron so ionization enthalpy of Be is more than B.

Hence correct order of ionization enthalpy is

Li < B < Be < C < N

69. Option (2) is correct.

Explanation: An alcohol and Lucas reagent gives two step reaction. In first step carbocation is formed and in second step alkyl chloride is formed.

Tertiary carbocation is more stable than primary and secondary so lucas reagent reacts instantaneously with tertiary alcohol.

70. Option (1) is correct.

Explanation:

Molecule	**Number and Types of Bonds**
A. Ethane (CH_3-CH_3)	III. one σ-bond
B. Ethene ($CH_2 = CH_2$)	IV. one σ-bond and one π-bond
C. Carbon molecule C_2	II. two π-bonds
D. Ethyne (HC ≡ CH)	I. one σ-bond and two π-bonds

71. Option (3) is correct.

Explanation: As the molecular mass increases boiling point increases. But in water, intermolecular hydrogen bonding is present which is not in another molecules. So, H_2O has higher boiling point than other.

Hence, both the statements are correct.

72. Option (3) is correct.

Explanation: Positive charge on nitrogen is strongly electron-withdrawing and thus deactivates the

ring for further acylation or alkylation reactions. So aniline does not undergo Friedel Craft alkylation. Aryl halides does not undergo nucleophilic substitution with phthalimide. So, aniline can not be synthesized by Gabriel phthalimide synthesis. So, both the statements are correct.

73. Option (3) is correct.

Explanation:

Conversion	Number of Faradays required
A. 1mol of H_2O to O_2	II. 2F
B. 1mol of MnO_4^- to Mn^{2+}	IV. 5F
C. 1.5mol of Ca from molten $CaCl_2$	I. 3F
D. 1mol of FeO to Fe_2O_3	III. 1F

(A) $H_2O \longrightarrow 2H^+ + 1/2O_2 + 2e^-$

$Q = nF$ (n = number of electrons given by Q

$= 2F$

(B) $MnO_4^- + 5e^- \longrightarrow Mn^{2+}$

$Q = nF$

$Q = 5F$

(C) $CaCl_2 \longrightarrow Ca^{2+} + 2Cl^-$

$Ca^{2+} + 2e \longrightarrow Ca$

$1\ mol = 2e^-$

$1.5mol = 3e^-$

$Q = nF$

$= 3F$

(D) Oxidation number of Fe in FeO is +2

Oxidation number of Fe in Fe_2O_3 is +3

1 electron is required to conversion

$Q = nF$

$= 1F$

74. Option (3) is correct.

Explanation: $K_p = K_c (RT)^{\Delta ng}$

If $\Delta n_g = 0$. Then $K_p = K_c$

(1) $\Delta n_g = 2 - 2 = 0$

(2) $\Delta n_g = 2 - 2 = 0$

(3) $\Delta n_g = 2 - 1 = 1$

(4) $\Delta n_g = 2 - 2 = 0$

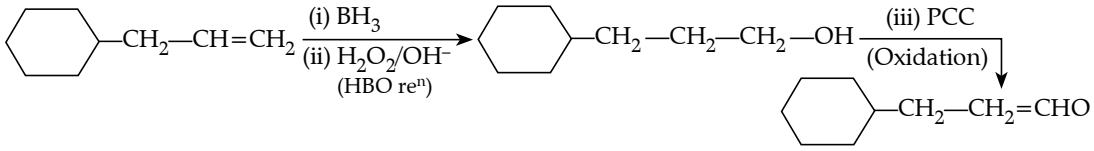
Hence K_p and K_c are not equal in reaction (4), i.e.,

$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$

75. Option (4) is correct.

Explanation: The Henry's law constant and solubility of gas in liquid are inversely proportional to each other hence, correct order of solubility is B > C > A.

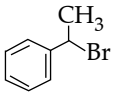
76. Option (4) is correct.



77. Option (2) is correct.

Explanation: The compound in which stable carbocation formation capacity is more gives S_N1 reaction with fastest rate.

In 2-Bromo-2-phynylethane, carbocation formed is tertiary and is more stable than other due to resonance so 2- Bromo-2-phenylethane gives S_N1 reaction with fastest rate.



78. Option (3) is correct.

Explanation: For He^+

$E_n = -13.6 (Z^2/n^2)$

$= -13.6 (2^2/1^2)$

$= -13.6 \times 4$

$= -54.4$

$= -xJ$

For Be^{+3}

$E_n = -13.6 (Z^2/n^2)$

$= -13.6 (4^2/2^2)$

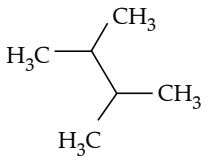
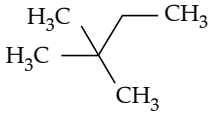
$= -13.6 \times 4$

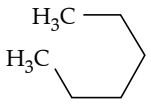
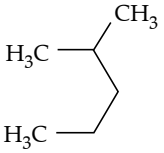
$= -54.4$

$= -xJ$

79. Option (1) is correct.

Explanation:

IUPAC name	Structure	No. of tertiary C atoms	Molcular Formula
2,3-dimethylbutane		2	C_6H_{14}
2,2-dimethylbutane		0	C_6H_{14}

n-hexane		0	C_6H_{14}
2-methylpentane		1	C_6H_{14}

80. Option (1) is correct.

Explanation: Glucose does not react with Schiff's reagent and $NaHSO_3$ due to absence of aliphatic aldehydes in the ring structure and absence of free aldehydic group.

81. Option (3) is correct.

Explanation: The species which have same number of unpaired electrons have same spin only magnetic moment.

Electronic configuration of

$Ti^{3+} = [Ar]3d^1$

Number of unpaired electrons = 1

$Cr^{2+} = [Ar]\ 3d^4$

Number of unpaired electrons =4

$Mn^{2+} = [Ar]3d^5$

Number of unpaired electrons =5

$Fe^{2+} = [Ar]\ 3d^6$

Number of unpaired electrons =4

$Sc^{3+} = [Ar]$

Number of unpaired electrons =0

Hence Cr^{2+} and Fe^{2+} have same spin only magnetic moment.

82. Option (4) is correct.

Explanation:

Quantum Number	Information Provided
A. m_l	(iii) Orientation of orbital
B. m_s	(iv) Orientation of spin electron
C. l	(i) Shape of orbital
D. n	(ii) Size of orbital

83. Option (4) is correct.

Explanation: Number of mole of NaOH in 1g = 1/40 = 0.025 moles

Number of mole of HCl in 25 mL = $\frac{(0.75\times 25)}{1000}$

= 0.01875

Number of moles of NaOH unreacted = 0.025 – 0.01875 = 0.00625

Mass of NaOH unreacted = Number of moles unreacted × Molar mass

= 0.00625 × 40

= 0.25g = 250mg

84. Option (1) is correct.

Explanation: Entropy increases with increase in disorder or randomness of the system.

Randomness increases with increase in temperature.

In system A, liquid evaporates to vapours i.e., randomness increases automatically entropy increases.

In system B, temperature is lowered i.e., randomness lowered and entropy also lowered.

In system C, solid reactant gets convert into gas i.e., randomness increases and entropy also increases.

In system D, molecule is converted into its corresponding atoms so randomness and entropy both increases.

So, option (1) is correct.

85. Option (2) is correct.

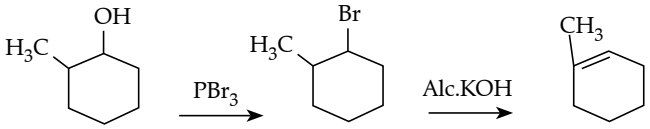
Explanation: Activation energy of a chemical reaction can be determined by evaluating rate constants at two different temperature.

By Arrhenius equation

$$\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\log\left(\frac{T_2 - T_1}{T_1T_2}\right)$$

86. Option (3) is correct.

Explanation:



87. Option (4) is correct.

Explanation: Work Done = –2.303 R T log (P_1/P_2)

= –2.303 × 2 × 298 × log (20/10)

= –2.303 × 2 × 298 × log 2

= –413.14K

88. Option (2) is correct.

Explanation: For the given reaction,

$$2NO(g) \rightleftharpoons N_2(g) + O_2(g)$$

$$k_{eq} = \frac{[N_2][O_2]}{[NO]^2}$$

$$= \frac{[3\times10^{-3}][4.2\times10^{-3}]}{[2.8\times10^{-3}]^2}$$

= 1.6

Now, $2NO = N_2 + O_2$

At t=0 0.1 0 0

At t=10. 1–k $\alpha/2$ $\alpha/2$

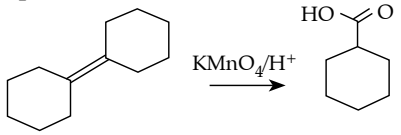
$$k_{eq} = \frac{(\alpha/2)^2}{(0.1-\alpha)^2}$$

$\alpha = 0.717$

Degree of dissociation = 0.717

89. Option (4) is correct.

Explanation:



90. Option (3) is correct.

Explanation: The electronic configuration of Ce^{4+} = [Xe]

The electronic configuration of Yb^{2+} = [Xe] $4f^{14}$

In above pair, all electrons are in paired form so this pair is diamagnetic.

91. Option (3) is correct.

Explanation:

$$CH_3-CH_2-CH_2-I \xrightarrow{NaCN} CH_3-CH_2-CH_2-CN$$ (Nucleophilic substitution reaction)

$$CH_3-CH_2-CH_2-CN \xrightarrow[\text{Partial Hydrolysis}]{OH^-} CH_3-CH_2-CH_2-CONH_2$$

$$CH_3-CH_2-CH_2-CONH_2 \xrightarrow{NaOH/Br_2} CH_3-CH_2 \text{ Propylamine} - CH_2-NH_2$$

Hoffmann Bromamids degradation reactions)

92. Option (2) is correct.

Explanation: Alcohol on reaction with PCl_3 and PCl_5 always gives permanent side product H_3PO_3 and $POCl_3$ respectively.

93. Option (3) is correct.

Explanation:

Group	Cations	Group Reagant
Group zero	NH_4^+	None
Group-I	Pb^{2+}	Dilute HCl
Group-II	Pb^{2+}, Cu^{2+}, As^{3+}	H_2S gas in presence of dil. HCl
Group-III	Al^{3+}, Fe^{3+}	NH_4OH in presence of NH_4Cl
Group-IV	Co^{2+}, Ni^{2+}, Mn^{2+}, Zn^{2+}	H_2S in presence of NH_4OH
Group-V	Ba^{2+}, Sr^{2+}, Ca^{2+}	$(NH_4)_2CO_3$ in presence of NH_4OH
Group-VI	Mg^{2+}	None

94. Option (4) is correct.

Explanation:

$$A = \frac{32}{64} = \frac{1}{2}$$

$2A = 1$

$$B = \frac{20}{40} = \frac{1}{2}$$

$2B = 1$

$$C = \frac{48}{32} = \frac{3}{2}$$

$2C = 3$

1 atom of A , 1 atom of B combines with 3 atoms of C to form a compound with empirical formula ABC_3

95. Option (3) is correct.

Explanation: $\log\frac{k_2}{k_1} = \frac{Ea}{2.303R} \times \log\left(\frac{T_2-T_1}{T_1T_2}\right)$

$$\log\frac{4}{1} = \frac{Ea}{2.303\times8.314} \times \log\frac{330-300}{330\times300}$$

$Ea = \log4 \times 2.303 \times 8.314/0.0003$

$= 0.6021 \times 2.303 \times 8.314/0.0003$

$= 38.04$ kJ/mol

96. Option (3) is correct.

Explanation: $\Pi = CRT$

Comparing with

$y = mx$

$m = RT$

Slope = RT

$$T = \frac{\text{Slope}}{R}$$

$$= \frac{25.73}{0.083}$$

= 310K
= (310 – 273) °C
= 37°C

97. Option (2) is correct.

Explanation: Fe^{2+} and Al^{3+} ions undergo hydrolysis, therefore, while preparing aqueous solutions of ferrous sulphate and aluminium sulphate in water, 2-3 mL dilute sulphuric acid is added to prevent the hydrolysis of these salts.

98. Option (4) is correct.

Explanation: $W = (E/96487) \times 9.6487 \times 100$

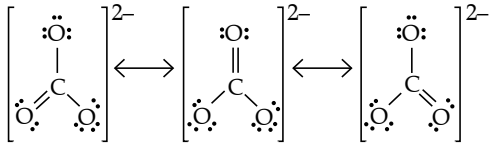
Putting $E = \frac{63}{2}$

$W = 0.315g$

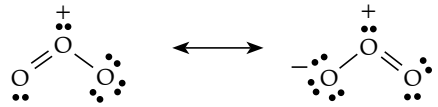
99. Option (2) is correct.

Explanation: (1) Dipole moment of NF_3 is less than that of NH_3

(2) Canonical forms of CO_3^{2-}



(3) Resonance structures of ozone



(4) Dipole moment of BF_3 is zero.

So only second statement is correct.

100. Option (3) is correct.

Explanation: Both statements are correct.

$[Co(NH_3)_4Cl_2]^+$ is a homoleptic complex and has only one type of ligands.

$[Co(NH_3)_4]^+$ is a heteroleptic complex and has more than one, i.e., two types ligands.

❑❑