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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

O.M.R. Serial No. | | | | | | | | |

प्रश्नपुस्तिका सीरीज
Question Booklet Series
C

B.Sc. (Biotechnology) First Semester, Examination, February/March-2022
BBT-1001
Chemistry-I

Time : 1:30 Hours **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

निर्देश : –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

महत्वपूर्ण : – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

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1. When acids react with metal oxide it produces :
   (A) Water and salt
   (B) Salts and hydrogen gas
   (C) Salts only
   (D) No reaction takes place
2. 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
3. The following salt is not hygroscopic in nature :
   (A) NaCl
   (B) MgCl
   (C) $CaCl_2$
   (D) KCl
4. In the Chlor-alkali process, the byproduct gases are :
   (A) Hydrogen only
   (B) Hydrogen and oxygen gas
   (C) Hydrogen and chlorine gas
   (D) Chlorine and nitrogen gas
5. When sulphuric acid reacts with eggshell it produces :
   (A) Hydrogen gas
   (B) Nitrogen gas
   (C) Carbon monoxide
   (D) Carbon dioxide gas
6. Ammonium sulphate salt is :
   (A) Basic salt
   (B) Acidic salt
   (C) Neutral salt
   (D) Complex salt

7. pH of neutral salt is :

(A) 7

(B) < 7

(C) > 7

(D) 0

8. Three unknown solutions are given with pH value of 6, 8 & 9.5 respectively. Which solution will contain the maximum OH-ion ?

(A) Solution sample-1

(B) Solution sample-2

(C) Solution sample-3

(D) Data are insufficient

9. Level of pH found in antacid solution :

(A) ≤ 6.5

(B) ≥ 7.0

(C) > 10

(D) > 14

10. Range of pH scale is :

(A) 7 to 10

(B) 0 to 10

(C) 0 to 14

(D) 7 to 14

11. The most stable conformation of ethylene glycol :

(A) Anti

(B) Gauche

(C) Fully eclipsed

(D) Partially eclipsed

12. Spin multiplicity value for triplet state is :

(A) 0

(B) 1

(C) 2

(D) 3

13. Spin inversion of electron takes place in the following process :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) All

14. On radiative process from the following is :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) All

15. A photochemical reaction takes place by the absorption of :

(A) Infrared radiation

(B) UV-VIS radiation

(C) Heat energy

(D) None

16. To express the relationship between the number of molecules reacting with the number of photons absorbed, the concept is known as _____.

(A) Photon analysis

(B) Quantum efficiency

(C) Quantum mechanics

(D) Photo degradation

17. The potential energy of cyclohexane is maximum for_____.

(A) Chair conformations

(B) Half chair conformations

(C) Boat conformations

(D) Twist-Boat conformations

18. In R/S nomenclature R & S stands for :

(A) Rectus & Sigmastar

(B) Right & Sigmastar

(C) Rectus & Sinistar

(D) Right &Sinistar

19. In gauche conformations, the methyl groups are _____.

(A) 60° apart

(B) 90° apart

(C) 180° apart

(D) 360° apart

20. The potential energy of n-butane is minimum for _____.

(A) Skew conformations

(B) Staggered conformations

(C) Eclipsed conformations

(D) Gauche

21. The energy required to rotate n-butane molecule about the carbon-carbon bond I is called _____.

(A) Rotational energy

(B) Torsional energy

(C) Enantiomeric

(D) Potential energy

22. According to perspective formula, the solid wedge indicates the group which is :

(A) Towards reader

(B) Away from reader

(C) In plane of paper

(D) None

23. Which of the following can make difference in optical isomers ?

(A) Heat

(B) Temperature

(C) Polarized light

(D) Pressure

24. If a reaction obeys Einstein law, quantum yield is _____.

(A) 0

(B) 1

(C) <1

(D) >1

25. Jablonski diagram is related with :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) All

26. Beer Lambert's law gives the relation between which of the following ?

(A) Reflected radiation and concentration

(B) Scattered radiation and concentration

(C) Energy absorption and concentration

(D) Energy absorption and reflected radiation

27. Which of the following has highestλ_{max} for $n -> \sigma^*$ transition ?

(A) $R - OH$

(B) $R - SH$

(C) $R - NH_2$

(D) All

28. The transition involve in ISC is :

(A) $V_0 - S_1$

(B) $V_1 - S_1$

(C) $S_1 - T_1$

(D) $T_1 - S_0$

29. The transition involve in Fluorescence is :

(A) $S_0 - S_1$

(B) $S_1 - S_0$

(C) $S_1 - T_1$

(D) $T_1 - S_0$

30. Hydrogen bond _____ IR stretching frequency.

(A) Increases

(B) Decreases

(C) Remains same

(D) None of them

31. For E_1 elimination reaction 1 stands for :

(A) One step

(B) First order

(C) One nucleophile

(D) One leaving group

32. Which carbocation is least stable :

(A) $(CH_3)_3C^+$

(B) $(CH_3)_2CH^+$

(C) $CH_3CH_2C^+$

(D) CH_3^+

33. Stereochemistry of SN2 reaction is :

(A) Racemization

(B) Inversion

(C) Retention

(D) Mixture

34. The r/d step of SN1reaction is :

(A) Carbocation formation

(B) Back side attack

(C) Nucleophile attack

(D) Product formation

35. Which electrophile is generated in nitration reaction :

(A) NO+

(B) NO_2

(C) NO_2+

(D) HNO_3

36. The catalyst used for halogenations reaction is :

(A) Li

(B) Fe

(C) Al

(D) Mg

37. The Lewis acid is used for Friedel craft reaction is :

(A) LiCl

(B) $FeCl_2$

(C) $AlCl_3$

(D) $MgCl_2$

38. Sul phonation of benzene is a _____reaction.

(A) Elimination

(B) Electrophilic substitution

(C) Nucleophilic substitution

(D) Addition

39. The reagent used for nitration reaction is :

(A) HNO_3

(B) $HCl + HNO_3$

(C) $H_2SO_4 + HNO_3$

(D) HNO_2

40. Emission without a change in spin multiplicity is called :

(A) ISC

(B) Phosphorescence

(C) Fluorescence

(D) Singlet state

41. Addition of bromine to an alkene is _____addition.

(A) $SN_2 \& TRANS$

(B) $SN_1 \& TRANS$

(C) $SN_2 \& CIS$

(D) $SN_1 \& CIS$

42. The lowest energy transition is :

(A) pi-pi*

(B) sigma-sigma*

(C) nonbonding-pi*

(D) nonbonding-sigma*

43. Which functional group has the highest CO stretching frequency :

(A) $-COOH$

(B) $-CONH_2$

(C) $-COCl$

(D) $-CHO$

44. The highest energy transition is :

(A) pi-pi*

(B) sigma-sigma*

(C) nonbonding-pi*

(D) nonbonding-sigma*

45. Which functional group has the lowest CO stretching frequency :

(A) $-COOR$

(B) $-CONH_2$

(C) $-COCl$

(D) $-CHO$

46. The wavelength range correspond to UV-Visible region :

(A) 100-200 nm

(B) 200-400 nm

(C) 400-800 nm

(D) 200-800 nm

47. _____has the highest nucleophilic character.

(A) I^-

(B) F^-

(C) Cl^-

(D) Br^-

48. For the synthesis of tertbutyl methyl ether, alkyl halides & alkoxide are :

(A) $CH_3 - Cl \,\&(CH_3)_3C - ONa$

(B) $(CH_3)_3C - Cl \,\& \,CH_3 - ONa$

(C) $CH_3 - Cl \,\&(CH_3)_3C - Cl$

(D) $CH_3 - CH_2 - Cl \,\&(CH_3)_3C - ONa$

49. The rate of hydrolysis reaction is faster for SN_1 reaction :

(A) Tertbutyl chloride

(B) Methyl chloride

(C) Ethyl chloride

(D) Isopropyl chloride

50. SN_2 reaction is a _____reaction.

(A) Unimolecular

(B) Bimolecular

(C) Trimolecular

(D) Zero

51. What is formed when zinc reacts with sodium hydroxide ?
(A) Zinc hydroxide sodium
(B) Sodium zincate and hydrogen gas
(C) Sodium zinc-oxide and hydrogen gas
(D) Sodium zincate and water

52. Which one of the following salts does not contain water of crystallization ?
(A) Blue vitriol
(B) Baking soda
(C) Washing soda
(D) Gypsum

53. A solution is 0.0010 M in both Ag^+ and Au^+. Some solid NaCl is added slowly until the solid AgCl just begins to precipitate. What is the concentration of Au^+ ions at this point ? K_{sp} for $AgCl = 1.8 \times 10^{-10}$ and for $AuCl = 2.0 \times 10^{-13}$.
(A) 2.0×10^{-10} M
(B) 4.5×10^{-7} M
(C) 1.8×10^{-7} M
(D) 1.1×10^{-6} M

54. Which solid will precipitate first if an aqueous solution of Na_2CrO_4 at 25°C is slowly added to an aqueous solution containing 0.001 M $Pb(NO_3)_2$ and 0.100 M $Ba(NO_3)_2$ at 25°C ?
(A) $BaCrO_4(s)$
(B) $NaNO_3(s)$
(C) $PbCrO_4(s)$
(D) $Pb(NO_3)_2(s)$

55. What is the pH of a saturated solution of $Mg(OH)_2$?
(A) 3.5
(B) 10.1
(C) 10.9
(D) 10.5

56. At what pH will $Cu(OH)_2$ start to precipitate from a solution with $[Cu^{2+}] = 0.0015$ M?
(A) 9.0
(B) 8.0
(C) 6.0
(D) 9.4

57. When equal volumes of the solutions indicated are mixed, precipitation should occur only for :

(A) 2×10^{-3} M $Mg^{2+} + 2 \times 10^{-3}$M OH^-

(B) 2×10^{-1} M $Ba^{2+} + 2 \times 10^{-3}$M F^-

(C) 2×10^{-3} M $Ca^{2+} + 2 \times 10^{-2}$M OH^-

(D) 2×10^{-3} M $Ca^{2+} + 2 \times 10^{-3}$M OH^-

58. A swimming pool was sufficiently alkaline so that CO_2 absorded from the Air produced in the pool a solution which was 2×10^{-4} M in CO_3^{2-} M. if the pool water was originally 4×10^{-3} M in Mg^{2+}, 6×10^{-4} M in Ca^{2+} and 8×10^{-7} M in Fe^{2+}, then a precipitate should form of :

(A) Only $MgCO_3$

(B) Only $CaCO_3$

(C) Only $FeCO_3$

(D) Only $CaCO_3$ and $FeCO_3$

59. Which of the following pairs of compounds gives a precipitate when aqueous solutions of them are mixed ? Assume that the concentrations of all compounds are 1.0 M immediately after mixing :

(A) $CuBr_2$ and K_2CO_3

(B) HNO_3 and NH_4I

(C) $BaCl_2$ and $KClO_4$

(D) Na_2CO_3 and H_2SO_4

60. SN_1 reaction is a _____ reaction.
(A) Unimolecular
(B) Bimolecular
(C) Trimolecular
(D) Zero

61. When we mix together, from separate sources, the ions of a slightly soluble ionic salt, the salt will precipitate if Q_{sp}_____K_{sp}, and will continue to precipitate until Q_{sp}_____K_{sp}.
(A) Is greater than; equals
(B) Is less than; is greater than
(C) Is less than; equals
(D) Equals; is less than

62. The molar solubility of $PbCl_2$ in 0.20 M $Pb(NO_3)_2$ solution is :
(A) 1.7×10^{-4} M
(B) 9.2×10^{-3} M
(C) 1.7×10^{-5} M
(D) 4.6×10^{-3} M

63. Ag_3PO_4 would be least soluble at 25°C in :
(A) 0.1 M $AgNO_3$
(B) 0.1 M HNO_3
(C) Pure water
(D) 0.1 M Na_3PO_4

64. Many lead salts are often used as pigments. If $PbSO_4$ were used in an Unglazed ceramic bowl, how many milligrams of lead (II) could dissolve per liter of later ?
(A) 43
(B) 35
(C) 11
(D) 28

65. For $Cu(OH)_2, K_{sp} = 1.6 \times 10^{-19}$. What is the molar solubility of $Cu(OH)_2$?
(A) 3.4×10^{-7} M
(B) 6.4×10^{-7} M
(C) 2.7×10^{-11} M
(D) 5.1×10^{-10} M

66. What is the molar solubility, s of $Ba_3(PO_4)_2$ in terms of K_{sp} ?

(A) $s = {K_{sp}}^{1/2}$

(B) $s = {K_{sp}}^{1/5}$

(C) $s = [K_{sp}/27]^{1/5}$

(D) $s = [K_{sp}/108]^{1/5}$

67. Concept of entropy change is applicable for thermodynamic law :

(A) I-law

(B) II-law

(C) Both

(D) None

68. The solubility of silver sulfate in water at 100°C is approximately 1.4 g per 100 ml. What is the solubility product of this salt at 100°C ?

(A) 5.7×10^{-8}

(B) 3.5×10^{-7}

(C) 8.3×10^{-6}

(D) 3.6×10^{-4}

69. The molar solubility of $PbBr_2$ is 2.17×10^{-3} M at a certain temperature. Calculate K_{sp} for $PbBr_2$:

(A) 6.2×10^{-6}

(B) 6.4×10^{-7}

(C) 4.1×10^{-8}

(D) 3.4×10^{-6}

70. Consider the following solubility data for various chromates at 25°C-

Salt	K_{sp}
Ag_2CrO_4	9.0×10^{-12}
$BaCrO_4$	2.0×10^{-10}
$PbCrO_4$	1.8×10^{-14}

The chromate that is the most soluble in water at 25°C on a molar basis is :

(A) Ag_2CrO_4

(B) $BaCrO_4$

(C) $PbCrO_4$

(D) None of these

71. The solubility product expression for silver(I), sulfide, using x to represent the molar concentration of silver(I) and y to represent the molar concentration of sulfide, is formulated as :

(A) xy

(B) x^2y

(C) xy^2

(D) x^2y^2

72. The solubility product expression for tin(II) hydroxide, $Sn(OH)_2$, is :

(A) $[Sn^{2+}][OH^-]$

(B) $[Sn^{2+}]^2[OH^-]$

(C) $[Sn^{2+}][OH^-]^2$

(D) $[Sn^{2+}]^3[OH^-]$

73. In which of the following cases does the reaction go farthest to completion ?

(A) $K = 1$

(B) $K = 10$

(C) $K = 10^{-2}$

(D) $K = 10^2$

74. The role of a catalyst in a reversible reaction is to :

(A) Alter the equilibrium constant of the reaction

(B) Increase the rate of the forward reaction

(C) Allow the equilibrium to be achieved quickly

(D) Decrease the rate of backward reaction

75. For a reversible reaction the concentration of the reactants is doubled, then the equilibrium constant :

(A) Becomes one-fourth

(B) Is doubled

(C) Is halved

(D) Remains the same

76. The equilibrium constant of a reaction is 300. If the volume of reaction flask is tripled the equilibrium constant is :

(A) 300

(B) 600

(C) 900

(D) 100

77. Le Chatelier Principle is applicable to :

(A) Heterogeneous reaction

(B) Homogeneous reaction

(C) Irreversible reaction

(D) System in equilibrium

78. The chemical equilibrium of a reversible reaction is not influenced by :

(A) Temperature

(B) Pressure

(C) Catalyst

(D) Concentration

79. A vessel at equilibrium contains SO_3, SO_2 and O_2 now some helium gas is added so that total pressure increases while temperature and volume remain constant. According to Le Chatelier Principle the dissociation of$SO_3{}^{2-}$:

(A) Decreases

(B) Remain constant

(C) Increases

(D) Change unpredictably

80. When a catalyst is added to a reversible reaction in equilibrium state the value of the equilibrium constant :

(A) Increases

(B) Decreases

(C) Does not change

(D) Becomes zero

81. The equilibrium between water and its vapor in an open vessel :

(A) Can be achieved

(B) Depends upon pressure

(C) Cannot be achieved

(D) Depends upon temperature

82. In what manner will increase of pressure affect the following equation:

$$C(s) + H_2O \rightarrow CO(g) + H_2(g)$$

(A) Shift in the reverse direction

(B) Shift in the forward direction

(C) Increase in the yield of hydrogen

(D) No effect

83. The application of law of thermodynamics to the enthalpy change was done by :

(A) Newton

(B) Hess's

(C) Lewis

(D) Sophocles

84. The standard condition for enthalpy changes are :

(A) The pressure of 100 kPa

(B) Temperature 298K

(C) Normal physical state

(D) All of above

85. To initiate a reaction the minimum energy which is required to break bonds is called :

(A) Bond energy

(B) Activation energy

(C) Breaking energy

(D) Ionization energy

86. The change in the energy between a chemical reaction and the surroundings at constant temperature is called :

(A) Enthalpy change

(B) Enthalpy

(C) Enthalpy profile

(D) Dynamic enthalpy

87. The standard enthalpy change of neutralization involves the reaction of an acid with an alkali to form 1 mol of :

(A) Water

(B) Oxygen

(C) Nitrogen

(D) Anhydrous salt

88. Hess's law states that a chemical reaction is independent of the route by which chemical reactions take place while keeping the same :

(A) Initial conditions only

(B) Final conditions only

(C) Mid-conditions

(D) Initial and final condition

89. The first law of thermodynamics states that energy cannot be :

(A) Created only

(B) Destroyed only

(C) Converted

(D) Created and destroyed

90. Changes in enthalpy in an exothermic reaction is :

(A) Positive

(B) Negative

(C) Constant

(D) Neutral

91. The energy required to brake a given covalent bond is :

(A) Bond energy

(B) Bond enthalpy

(C) Bond dissociation energy

(D) All of above

92. The variations in enthalpy that cannot be detected per calorimeter can be detected with the aid of :

(A) Newton's law

(B) Hess's law

(C) Krebs law

(D) Ohm's law

93. Thermodynamics is not concerned about :

(A) Energy changes involved in a chemical reaction

(B) The extent to which a chemical reaction proceeds

(C) The rate at which a reaction proceeds

(D) The feasibility of chemical reaction

94. The enthalpies of formation of all elements in their standard states is :

(A) Unity

(B) Zero

(C) Less than zero

(D) Different for each element

95. In an adiabatic process, no transfer of heat takes place between system and surroundings. The correct option for free expansion of an ideal gas under adiabatic condition from the following is :

(A) $q = 0, \Delta T \neq 0, W = 0$ $q = 0, \Delta T \neq 0, W = 0$

(B) $q \neq 0, \Delta T = 0, W = 0$ $q \neq 0, \Delta T = 0, W = 0$

(C) $q = 0, \Delta T = 0, W = 0$ $q = 0, \Delta T = 0, W = 0$

(D) $q = 0, \Delta T = 0, W \neq 0$ $q = 0, \Delta T = 0, W \neq 0$

96. Which among the following is not a state function ?

(A) Internal energy

(B) Free energy

(C) Work

(D) Enthalpy

97. Which one of the following statements is false ?

(A) Temperature is a state function

(B) Work is a state function

(C) Change in the state is completely defined when the initial and final states are specified

(D) Work appears at the boundary of the system

98. A necessary condition for adiabatic change is :

(A) $\Delta T = 0$

(B) $\Delta P = 0$

(C) $q = 0$

(D) $w = 0$

99. Consider the following diagram for a reaction :

$$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)} + 393.5\ kJ$$

The nature of the reaction is :

(A) Exothermic

(B) Endothermic

(C) Reaction at equilibrium

(D) None of the above

100. For conversion $C_{(graphite)} \rightarrow\rightarrow C_{(diamond)}$ the $\Delta S$is :

(A) Zero

(B) Positive

(C) Negative

(D) Unknown

******

Rough Work / रफ कार्य

Rough Work / रफ कार्य

DO NOT OPEN THE QUESTION BOOKLET UNTIL ASKED TO DO SO

1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet **(O.M.R ANSWER SHEET).**Answer marked anywhere else other than the determined place will not be considered valid.
5. Please read all the instructions carefully before attempting anything on Answer Booklet**(O.M.R ANSWER SHEET).**
6. After completion of examination please hand over the Answer Booklet **(O.M.R ANSWER SHEET)** to the Examiner before leaving the examination room.
7. There is no negative marking.

Note: On opening the question booklet, first check that all the pages of the question booklet are printed properly in case there is an issue please ask the examiner to change the booklet of same series and get another one.