PREVIOUS YEAR PAPER

UP PGT 2021 — Chemistry (Series A)

UP PGT · 17 or 18 August 2021

125 questions · +3.4 for a correct answer, −0 for a wrong one · 120 minutes

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Questions from the U.P. Secondary Education Services Selection Board's paper of 17 or 18 August 2021. Each question is followed by its answer, and the answer key is repeated on the last page.

Take it as a timed practice test: exambharo.com/up-pgt/previous-year-papers/up-pgt-2021-chemistry-series-a/

Chemistry

1. The work done, in dissolving one mole of zinc in an aqueous HCl in open beaker at 27°C is

(a) 8.314 kJ

(b) 2.494 kJ

(c) 24.94 J

(d) 8.314 J

Answer: (b)

2. The equation that represents the water gas shift reaction is

(a) $CH_4(g) + H_2O(g) \xrightarrow{(1270K,\ Ni)} CO(g) + 3H_2($

(b) $2C(s) + O_2(g) + 4N_2(g) \xrightarrow{(1273K)} 2CO(g) + \ 2(g)$

(c) $C(s) + H_2O(g) \xrightarrow{(1270K)} CO(g) + H_2(g)$

(d) $CO(g) + H_2O(g) \xrightarrow{(673K,\ Catalyst)} \ O_2(g) \ H_2(g)$

Answer: (d)

3. The synthesis of aromatic hydrocarbons can not be done by the process

(a) Fittig reaction

(b) Wurtz-Fittig reaction

(c) Wurtz reaction

(d) Friedal-Craft alkylation

Answer: (c)

4. The aqueous solution of a salt of one of the given lanthanide ions is used as a volumetric standard in redox reactions. Identify the lanthanide ion.

(a) Ce^{4+}

(b) Pr^{4+}

(c) Tb^{4+}

(d) Dy^{4+}

Answer: (a)

5. A Cobalt (II) complex is expected to have lowest value of magnetic moment when the ligand field in it is

(a) a weak octahedral field

(b) a strong octahedral field

(c) a weak tetrahedral field

(d) a strong tetrahedral field

Answer: (b)

6. "Photochemical equivalence can only be applied to primary processes". This statement was given by

(a) Stark

(b) Bodenstein

(c) Einstein

(d) Grotthus

Answer: —

7. Which one of the following has the highest melting point ?

(a) Tartaric acid

(b) Aminoacetic acid

(c) Succinic acid

(d) Oxalic acid

Answer: (b)

8. Ratio of molar heat capacities of diatomic gas molecules is

(a) 1.15

(b) 1.16

(c) 1.30

(d) 1.67

Answer: (c)

9. The unit of specific conductance in SI system is

(a) S cm^{-1}

(b) ohm^{-1} cm^{-1}

(c) S m^{-1}

(d) ohm^{-1} m^{-1}

Answer: (c)

10. Among the following complexes most stable species are

(a) $[AgI2]^{-}$, $[CoF6]^{3-}$, $[Co(NCS)4]^{2-}$

(b) $[AgF2]^{-}$, $[CoI6]^{3-}$, $[Pd(NCS)4]^{2-}$

(c) $[Co(CN)5F]^{3-}$, $[Co(NCS)4]^{2-}$, $[Pd(SCN)4]^{2-}$

(d) $[Co(NH3)5F]^{2+}$, $[CoF6]^{3-}$, $[Co(SCN)4]^{2-}$

Answer: (a)

11. In the three heterocyclic compounds, for example, furan, pyrrole and thiophene, the order of aromaticity is

(a) Thiophene > pyrrole > furan

(b) Pyrrole > thiophene > furan

(c) Pyrrole > furan > thiophene

(d) Furan > pyrrole > thiophene

Answer: (a)

12. Why presence of oxygen decreases the rate of chlorination of methane in the presence of sunlight ?

(a) $CH_3 - \dot{O}$ is formed

(b) $CH_3 - O - Cl$ is formed

(c) $CH_3 - O - \dot{O}$ is formed

(d) $CH_3 - O - \dot{C}H_2$ is formed

Answer: (c)

13. The glucose molecule reacts with X molecules of phenyl hydrazine to yield osazone. The value of X is

(a) 4

(b) 2

(c) 3

(d) 1

Answer: (c)

14. Which one of the following will have the highest coagulating power for As_2S_3 colloid ?

(a) PO_4^{3-}

(b) Al^{3+}

(c) SO_4^{2-}

(d) Na^+

Answer: (b)

15. $[Re_2Cl_8]^{2-}$ possess

(a) Single bond between two Re

(b) Double bond between two Re

(c) Triple bond between two Re

(d) Quadruple bond between two Re

Answer: (d)

16. Which complex amongst the following is stable according to HSAB principle ?

(a) $[AgF_2]^-$

(b) $[Cd(NH_3)_4]^{2+}$

(c) $[CoI_6]^{3-}$

(d) $[AgI_2]^-$

Answer: (d)

17. The collision theory of reaction rates is only valid for
(a) Complex reactions
(b) Parallel reactions
(c) Simple bimolecular reactions
(d) All the reactions
Answer: (c)

18. Which ion possess sp^3d^2 hybridisation ?
(a) [IF6]−
(b) [ICl4]−
(c) [BrF2]−
(d) [ICl2]−
Answer: (b)

19. The outcome of Carnot's theorem is the concept of the following
(a) Enthalpy
(b) Internal energy
(c) Free energy
(d) Entropy
Answer: (d)

20. Surface area of an adsorbent is calculated by usir ollowing equation
(a) Freundlich equation
(b) Langmuir equation
(c) B.E.T. equation
(d) McBain equation
Answer: (c)

21. Among the chlorides of alkaline earths given below, the lowest melting point as per Fajan's rules will be shown by
(a) CaCl2
(b) BaCl2
(c) MgCl2
(d) SrCl2
Answer: (c)

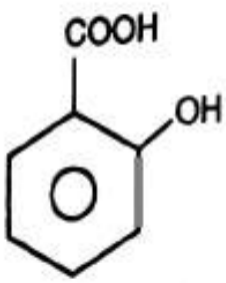
22. Who first used phenyl isothiocyanate for the synthesis of a peptide ?
(a) Frederic Sanger
(b) Max Bergmann
(c) Leonidas Zervas
(d) Fehr Edman
Answer: (d)

23. The most strong acid is

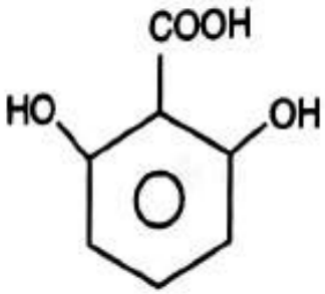
(a)



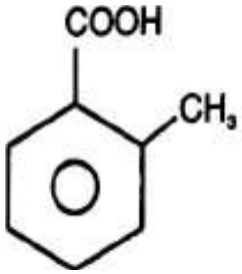
(b)



(c)



(d)



Answer: (c)

24. Which of the following compounds has a cylindrical symmetry ?

(a) Ethane

(b) Ethyne

(c) Methane

(d) Ethene

Answer: (b)

25. First law of thermodynamics is based on
    (a) Theory
    (b) Derivation
    (c) Quantum mechanics
    (d) Experimental facts
    Answer: (d)

26. $4PCl5 + 4NH3 \rightarrow ?$
The aforementioned reaction yields
    (a) $(PNCl2)3 + 9HCl$
    (b) $(PNCl2)4 + 12HCl$
    (c) $(PNCl2)3 + 12HCl$
    (d) $(PNCl2)4 + 9HCl$
    Answer: (b)

27. Concentrations of following aqueous solutions are equal. Select the solution with highest B.P.
    (a) Potassium sulfate
    (b) Potassium chloride
    (c) Potassium phosphate
    (d) Urea
    Answer: (c)

28. In orthoboric acid, $H3BO3$, the trigonal $BO3^{3-}$ ur are bonded together through
    (a) Electrovalent bond
    (b) Covalent bond
    (c) Hydrogen bonds into two dimensional she
    (d) Coordinate bonds
    Answer: (c)

29. The expression for Joul-Thomson coefficient μ_{JT} is
    (a) $\mu_{JT} = -(\partial H/\partial P)_T / C_V$
    (b) $\mu_{JT} = -(\partial E/\partial P)_T / C_V$
    (c) $\mu_{JT} = -(\partial E/\partial V)_T / C_P$
    (d) $\mu_{JT} = -(\partial H/\partial V)_T / C_P$
    Answer: —

30. With Fenton's reagent t-butanol forms
    (a) $CH3CH2CH2CHO$
    (b) $(CH3)2C(OH)CH2CH2C(OH)(CH3)2$
    (c) $CH3CH2CH2COOH$
    (d) $(CH3)2C(OH)CH{=}CHC(OH)(CH3)2$
    Answer: (b)

31. Hydrolysis of which of the following compounds forms benzaldehyde ?

(a) Benzyl chloride

(b) Benzal chloride

(c) Benzotrichloride

(d) Benzonitrile

Answer: (b)

32. Number of Cr–O bonds in Chromium (II) acetate hydrate are

(a) 2

(b) 9

(c) 10

(d) 8

Answer: (c)

33. Which of the following relation holds true for the reaction ?
$CO(g) + (1/2)O2(g) \rightarrow CO2(g)$

(a) $\Delta H = \Delta E$

(b) $\Delta H = \Delta E + RT$

(c) $\Delta H = \Delta E + (1/2)RT$

(d) $\Delta H = \Delta E - (1/2)RT$

Answer: (d)

34. The complex $M(NH3)2Cl2$ does not show geome[illegible]al isomerism, if the central metal ion, M is

(a) $Ni^{2}+$

(b) $Cu^{2}+$

(c) $Zn^{2}+$

(d) $Pt^{2}+$

Answer: (c)

35. The Miller Indices of a crystal plane which cut through the crystal axes at (2a, 3b, c) is

(a) (231)

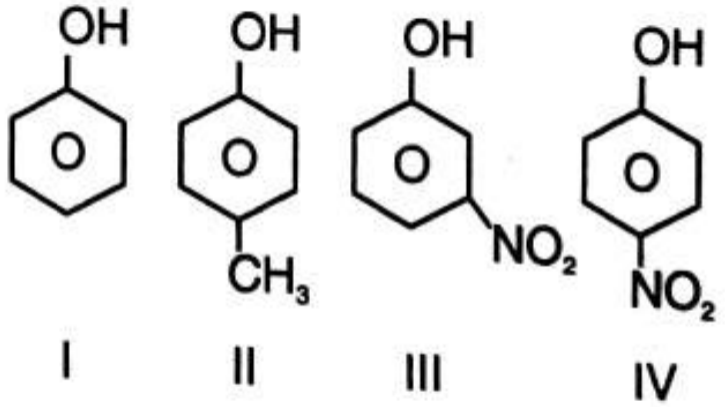
(b) (312)

(c) (623)

(d) (326)

Answer: (d)

36. In the following compounds



the order of acidity is

(a) III > IV > I > II

(b) I > IV > III > II

(c) II > I > III > IV

(d) IV > III > I > II

Answer: (d)

37. The reaction
C6H5CH3 + 2CrO2Cl2 → C6H5CH(OCrCl2OH)2 —(H2O)→ C6H5CHO + 2CrCl2(OH)2
is called

(a) Leukart reaction

(b) Dakin reaction

(c) Etard reaction

(d) Strecker reaction

Answer: (c)

38. The chromates are oxidising while molybdate and tungstates are non-oxidising because

(a) Cr is unstable in all its oxidation states

(b) Mo and W are stable in their higher oxidation states

(c) Mo and W are stable in their lower oxidation states

(d) Cr is stable in its higher oxidation state

Answer: (b)

39. In [UO2(NO3)3]−, the coordination number and geometry are

(a) 8 and hexagonal bipyramidal

(b) 8 and square antiprism

(c) 5 and square pyramidal

(d) 5 and trigonal bipyramidal

Answer: (a)

40. If the half-life for first order reaction A → Products is 200 seconds, the value of rate constant will be

(a) $3.46\times10^{-2}s^{-1}$

(b) $3.46\times10^{-3}s^{-1}$

(c) $3.46\times10-4s^{-1}$

(d) $3.46\times10-5s^{-1}$

Answer: (b)

41. In which of the following d-orbital resonance is possible ?

(a) CF3−

(b) CCl3−

(c) CH3−

(d) CHF2−

Answer: (b)

42. Nitrogenase enzyme involves which of the following as co-factor ?

(a) $Mg^{2}+$

(b) Mo

(c) $Cu^{2}+$

(d) $Zn^{2}+$

Answer: (b)

43. If the standard oxidation potential of zinc electro s 0.763 volt at 25°C, the electrode potential of half cell consisting of zinc electrode dipped in 0. l ZnSO4 solution at 25°C will be

(a) 0.822 volt

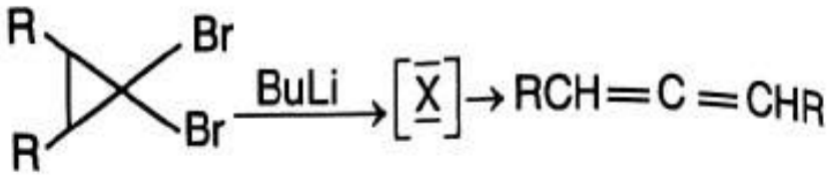
(b) 8.22 volt

(c) 82.2 volt

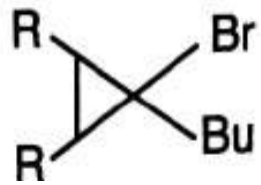
(d) 0.0591 volt

Answer: (a)

44. Identify [X] in the following reaction.



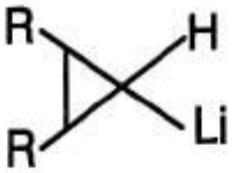
(a)



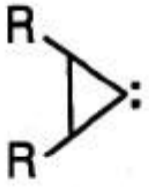
(b)



(c)



(d)



Answer: (d)

45. The correct set of magic numbers for nuclear shells is

(a) 2, 8, 20, 52, ...

(b) 2, 8, 16, 32, ...

(c) 2, 8, 32, 64, ...

(d) 2, 8, 26, 80, ...

Answer: (a)

46. The number of triple points in phase diagram of sulfur are

(a) Six

(b) Three

(c) Two

(d) One

Answer: (b)

47. The ground state electronic configurations of the central metal atom in some octahedral complexes are given below. In which case the electronic transition is forbidden as per the spin selection rule ?

(a) $t2g^6 e_g^1$

(b) $t2g^3 e_g^0$

(c) $t2g^6 e_g^2$

(d) $t2g^6 e_g^3$

Answer: (a)

48. Cl_2 —(Cold and dil. NaOH)→ (A) + NaCl + H_2O
Cl_2 —(Hot and Conc. NaOH)→ (B) + NaCl + H_2O
Compounds (A) and (B) are respectively

(a) NaClO and $NaClO_3$

(b) $NaClO_2$ and NaOCl

(c) $NaClO_3$ and NaOCl

(d) NaOCl and $NaOCl_2$

Answer: (a)

49. A molecule in vibrational motion is associated with energy equal to the following

(a) (3/2)kT

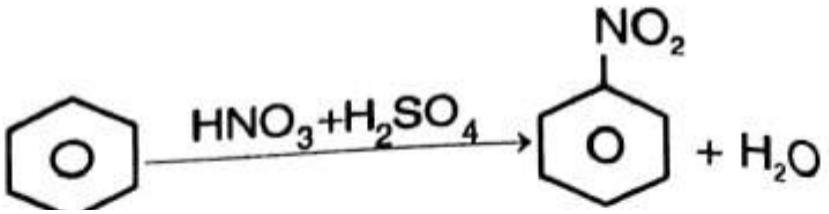
(b) (1/2)kT

(c) kT

(d) 2kT

Answer: (c)

50.



In the above reaction, in the nitrating mixture, HNO_3 acts as

(a) a base

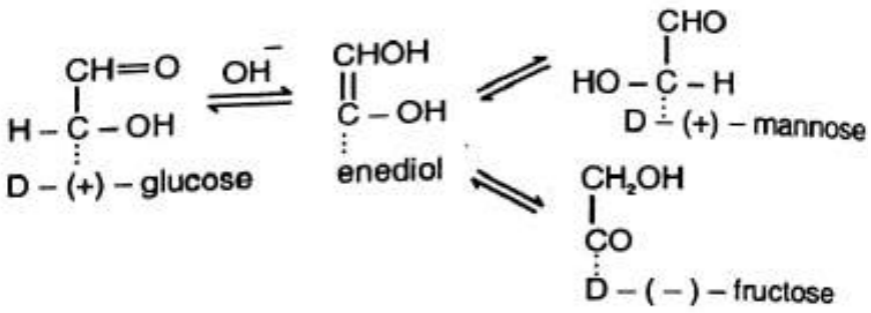
(b) an acid

(c) a catalyst

(d) a reducing agent

Answer: (a)

51.



The above reaction is called

(a) Amadori rearrangement

(b) Lobry de Bruyn van Ekenstein rearrangement

(c) Wallach rearrangement

(d) Semidine rearrangement

Answer: (b)

52. Which one of the following represent the compressibility factor of a perfect gas ?

(a) 0

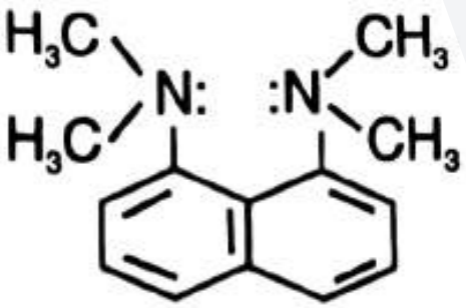
(b) 1

(c) 2

(d) 3

Answer: (b)

53.



The above mentioned compound is precisely termed as

(a) Base

(b) Proton sponge

(c) Electron sponge

(d) Acid

Answer: (b)

54. I2 (A) + I− → I3− (B)
(A) + I+ → I3+ (C)
Correct order of ν_I-I in A, B, C are

(a) A > B > C

(b) A < B < C

(c) A < C < B

(d) B > A > C

Answer: (b)

55. Which one of the following undergoes the Diels-Alder reaction ?

(a) Thiophene

(b) Pyridine

(c) Pyrrole

(d) Furan

Answer: (d)

56. Which carbanion is most stable among given below ?

(a) R−C≡C−

(b) R2C=C−−R

(c) R3C−CH2−

(d) CH3−

Answer: (a)

57. For a reaction in equilibrium state, the value of (_P,T is

(a) Zero

(b) +ve

(c) −ve

(d) Depends on the reaction

Answer: (a)

58. Geometries of N(CH3)3 and N(SiH3)3 are respectively

(a) Planar and Pyramidal

(b) Planar and Planar

(c) Pyramidal and Planar

(d) Pyramidal and Pyramidal

Answer: (c)

59. Given that, ΔH°f (HCl) = −92.3 kJmol−¹ and ΔHf(HCl.100H2O) = −168.1 kJmol−¹. The enthalpy of dissolution of one mole of HCl in 100 moles of water is

(a) −260.4 kJ

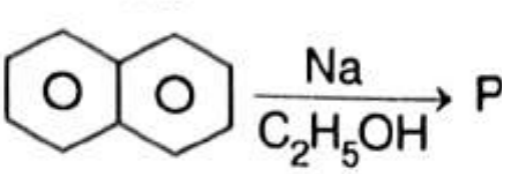
(b) +260.4 kJ

(c) −75.8 kJ

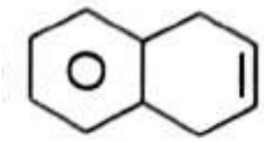
(d) +75.8 kJ

Answer: (c)

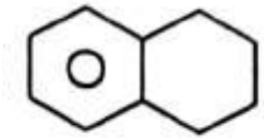
60. Indicate the product P in the following reaction.



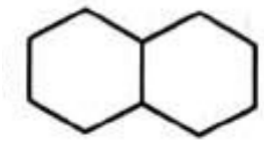
(a)



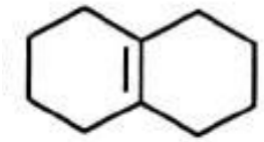
(b)



(c)

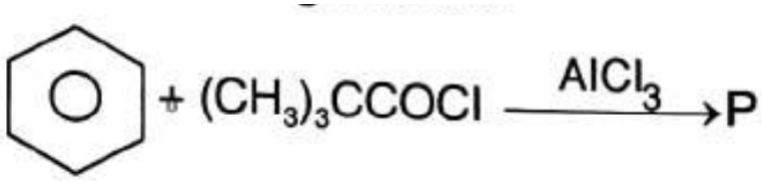


(d)



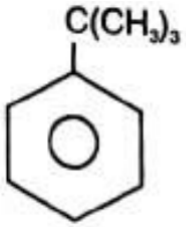
Answer: (a)

61. In the following reaction



the product P is

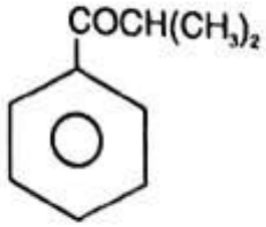
(a)



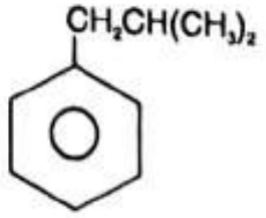
(b)



(c)



(d)



Answer: (a)

62. CFSE will be highest for

(a) $[CoF6]^{3-}$

(b) $[Co(NCS)4]^{2-}$

(c) $[Mn(H2O)6]^{2+}$

(d) $[Co(NH3)6]^{3+}$

Answer: (d)

63. Calomel electrode is an example of
(a) Metal-metal ion electrode
(b) Metal-amalgam electrode
(c) Oxidation-reduction electrode
(d) Metal-insoluble metal ion-soluble same anion electrode

Answer: (d)

64. In the following reactions, products (A) and (B) respectively, are
$NaOH(hot\ and\ conc.) + Cl_2 \rightarrow A$ + side-product
$Ca(OH)_2\ (dry) + Cl_2 \rightarrow B$ + side-product
(a) $NaClO_3$ and $Ca(ClO_3)_2$
(b) NaOCl and $Ca(ClO_3)_2$
(c) $NaClO_3$ and $Ca(OCl)_2$
(d) NaOCl and $Ca(OCl)_2$

Answer: (c)

65. The effect of increase in temperature on rate of enzyme catalyzed reaction is
(a) Increases
(b) Decreases
(c) Reaches to an optimum value and then decreases
(d) For some increases and for some decreases

Answer: (c)

66. The temperature above which a real gas cannot be liquified is known as
(a) Critical temperature
(b) Consolute temperature
(c) Boyle temperature
(d) Inversion temperature

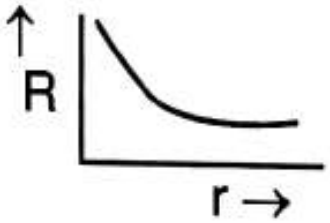
Answer: (a)

67. The most suitable alkali metal to remove traces of N_2 from highly pure argon gas is
(a) Li
(b) K
(c) Rb
(d) Cs

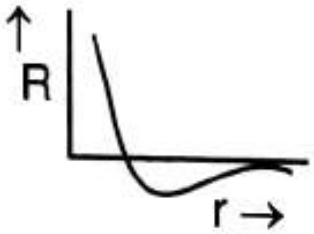
Answer: (a)

68. Which of the following figure represents the 3s atomic orbital ?

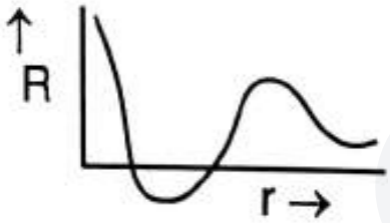
(a)



(b)



(c)



(d)



Answer: (c)

69. The pair of ions that most commonly forms complexes with coordination number two

(a) Cd(II), Hg(II)

(b) Cu(II), Hg(I)

(c) Cu(I), Hg(I)

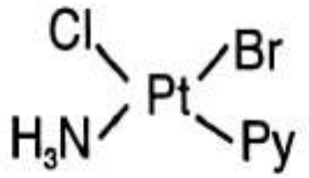
(d) Cu(I), Hg(II)

Answer: (d)

70. The example of a vat dye is
    (a) Indigo
    (b) Alizarin
    (c) Malachite green
    (d) Methyl orange
    Answer: (a)

71. Select the crystal system which has no symmetry
    (a) Tetragonal
    (b) Monoclinic
    (c) Triclinic
    (d) Hexagonal
    Answer: (c)

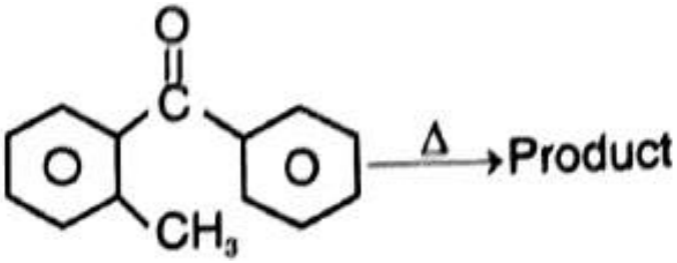
72. The complex



can be formally formed from K2[PtCl4] by which one he following sequences of substitutions of the chloride ions ?
    (a) Py, Br–, NH3
    (b) Br–, Py, NH3
    (c) Br–, NH3, Py
    (d) NH3, Br–, Py
    Answer: (a)

73. Dewar benzene is
    (a) bicyclo [2, 0, 2] hexadiene
    (b) bicyclo [2, 1, 2] hexadiene
    (c) bicyclo [1, 0, 2] hexadiene
    (d) bicyclo [2, 2, 0] hexadiene
    Answer: (d)

74. Identify the product of the following reaction.



(a) Phenanthrene
(b) Naphthalene
(c) 2-Methylanthracene
(d) Anthracene

Answer: (d)

75. $C_6H_5CONH_2 + P_2O_5 \xrightarrow{(\Delta)} \text{Product}$.
The product of the above reaction is

(a) $C_6H_5NH_2$
(b) C_6H_5CN
(c) $C_6H_5CH_2NH_2$
(d) C_6H_5NC

Answer: (b)

76. The acid-base concept involving molten conditior

(a) Arrhenius concept
(b) Lowry-Bronsted concept
(c) Lux-flood concept
(d) Lewis concept

Answer: (c)

77. Which of the following statement is not correct ?

(a) Cu^{2+} ion behaves as harder acid than Mn^{2+} ion
(b) Cs^+ ion is harder acid than Li^+ ion
(c) NH_3 is harder base than $C_6H_5NH_2$
(d) $(C_6H_5)_2NH$ is a soft base

Answer: (b)

78. A monobasic acid has a dissociation constant equal to 1.8×10^{-5} at 25°C. Its degree of dissociation at a concentration of 0.20 M at the same temperature is

(a) 0.00949
(b) 0.00849
(c) 0.00994
(d) 0.00489

Answer: (a)

79. Electrophilic substitution in quinoline takes place preferentially at which position ?

(a) 2
(b) 3
(c) 7
(d) 8

Answer: (d)

80. The α-Helix structure of protein is stabilised by

(a) Peptide bond
(b) Vander-Waals forces
(c) Hydrogen bond
(d) Dipole-dipole force

Answer: (c)

81. Most probable velocity (C_mp) of a gas molecule is given by the following expression

(a) C_mp = √(8RT/πM)
(b) C_mp = √(3RT/M)
(c) C_mp = √(2RT/M)
(d) C_mp = √(RT/M)

Answer: (c)

82. An ion M^{2+} forms the complex $[M(H2O)6]^{2+}$, $[M(en)3]^{2+}$ and $[MBr6]4-$. Match the complex with appropriate colour.

(a) green, blue, red
(b) blue, red, green
(c) green, red, blue
(d) red, blue, green

Answer: (c)

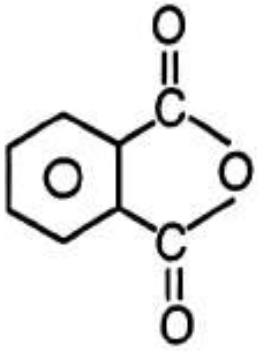
83. Bond enthalpy is evaluated by using following

(a) Kirchoff's equation
(b) Gibbs Duhem equation
(c) Hess law
(d) Maxwell's relations

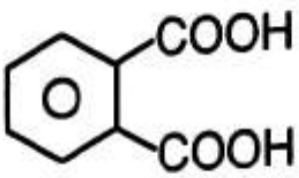
Answer: (c)

84. Naphthalene on oxidation with chromiumtrioxide and acetic acid gives

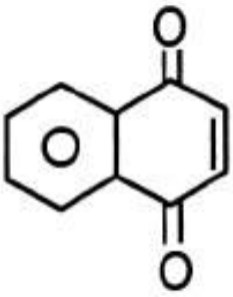
(a)



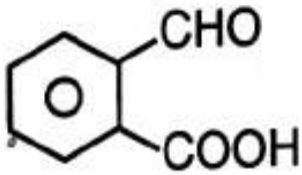
(b)



(c)

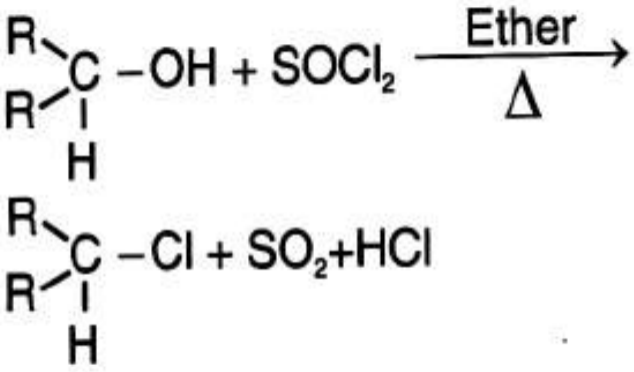


(d)



Answer: (c)

85.



This reaction can be explained by

(a) SN1 mechanism

(b) SN2 mechanism

(c) E2 mechanism

(d) SN_i mechanism

Answer: (d)

86. Which one of the following theories is used to explain homogeneous catalysis ?

(a) Intermediate compound theory

(b) Adsorption theory

(c) Arrhenius theory

(d) Dalton's theory

Answer: (a)

87. Select the photochemical reaction with quantum yield two.

(a) H2 + Cl2 —(hv)→ 2HCl

(b) H2 + Br2 —(hv)→ 2HBr

(c) 2HBr —(hv)→ H2 + Br2

(d) SO2 + Cl2 —(hv)→ SO2Cl2

Answer: (c)

88. Allene on reaction with dilute sulphuric acid gives

(a) CH3CH2CHO

(b) CH3COCH3

(c) CH3COCOOH

(d) CH3CH2CH3

Answer: (b)

89. NOCl and NaNO3 react in liquid N2O4 to produce

(a) NO+

(b) NO3−

(c) N2O4 and NaCl

(d) NaNO3 and NaCl

Answer: (c)

90. The correct order of LMCT energies is

(a) MnO_4^- < CrO_4^{2-} < VO_4^{3-}

(b) MnO_4^- > CrO_4^{2-} > VO_4^{3-}

(c) MnO_4^- > CrO_4^{2-} < VO_4^{3-}

(d) MnO_4^- < CrO_4^{2-} > VO_4^{3-}

Answer: (a)

91. What is phorone ?

(a) $(CH_3)_2C{=}CHCOCH{=}C(CH_3)_2$

(b) $(CH_3)_2C{=}CHCOCH_3$

(c) $(CH_3)_2C{=}CHCOCH_2OH$

(d) $CH_3COCH_2CH_2COCH_3$

Answer: (a)

92. Conductivity at infinite dilution of CH_3COONH_4 can be determined by using following

(a) Hittorf method

(b) Kohlrausch law

(c) Arrhenius theory

(d) Debye-Huckel-Onsagar equation

Answer: (b)

93. The octahedral complex which shows both fac- a mer- isomerism

(a) triglycinatocobalt(III)

(b) tris(ethylenediamine)cobalt(III)

(c) dichlorodiglycinatocobalt(III)

(d) trioxalatocobaltate(III)

Answer: (a)

94. Which of the following will not give haloform reaction ?

(a) $CH_3 - CHO$

(b) $CH_3 - CO - CH_3$

(c) $CH_3 - CH_2 - CO - CH_3$

(d) $CH_3 - CH_2 - CO - CH_2 - CH_3$

Answer: (d)

95. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is

(a) R_3SiCl

(b) R_4Si

(c) $RSiCl_3$

(d) R_2SiCl_2

Answer: (c)

96. Which of the following does not obey EAN rule ?

(a) Fe(CO)4

(b) V(CO)6

(c) K4[Fe(CN)6]

(d) Mn2(CO)10

Answer: —

97. The resistance of 0.01 M solution of an electrolyte is 210 ohm at 25°C. The molar conductance of solution is (cell constant = 0.90)

(a) 0.0410 $sm^2\ mol^{-1}$

(b) 0.0419 $sm^2\ mol^{-1}$

(c) 0.0423 $sm^2\ mol^{-1}$

(d) 0.0429 $sm^2\ mol^{-1}$

Answer: (d)

98. If 3g urea is dissolved in 45g water, the relative lowering of vapour pressure will be

(a) 0.02

(b) 0.01

(c) 0.04

(d) 0.05

Answer: (a)

99. In potassium permanganate the dark colour arise because of

(a) Polarisation

(b) d – d transition

(c) Both polarisation and d – d transition

(d) Charge transfer transition

Answer: (d)

100. The CFSE for $[CoCl_6]^{4-}$ is 18000 cm^{-1}
Δt for $[CoCl_4]^{2-}$ will be

(a) 18000 cm^{-1}

(b) 16000 cm^{-1}

(c) 8000 cm^{-1}

(d) 7450 cm^{-1}

Answer: (c)

101. Which positions are very reactive in phenanthrene ?

(a) 1, 2

(b) 9, 10

(c) 3, 4

(d) 5, 6

Answer: (b)

102. Which intermediate forms triptycene on reaction with anthracene ?

(a) Benzyne

(b) Carbene

(c) Nitrene

(d) Carbocation

Answer: (a)

103. Reaction of acetone with selenium dioxide forms

(a) CHO−CHO

(b) CHO−CH2OH

(c) CH3COCHO

(d) CH3COCOOH

Answer: (c)

104. Match the following compounds (Column – I) with their uses (Column – II).
Column-I — Column-II
I. Ca(OH)2 — a. Cast of statues
II. NaCl — b. White wash
III. CaSO4·0.5 H2O — c. Antacids
IV. CaCO3 — d. Washing soda preparation
Code : I II III IV

(a) d a c b

(b) b d a c

(c) b c d a

(d) c d b a

Answer: (b)

105. Which of the following reaction will be preferred to remain on the left side ?

(a) CaS + H2O → CaO + H2S

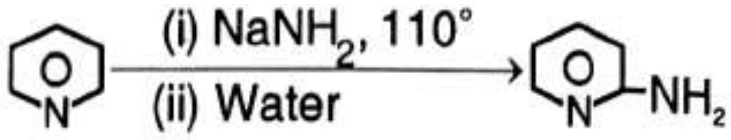
(b) HgF2 + BeI2 → HgI2 + BeF2

(c) BeF2 + HgI2 → HgF2 + BeI2

(d) LiI + CsF → LiF + CsI

Answer: (c)

106.



Reaction is known as

(a) Carbylamine reaction

(b) Chichibabin reaction

(c) Sandmeyer reaction

(d) None of the above

Answer: (b)

107. The order of reaction
$C_{12}H_{22}O_{11} + H_2O \xrightarrow{(H^+)} C_6H_{11}O_6 + C_6H_{11}O_6$ is

(a) Zero

(b) Half

(c) One

(d) Two

Answer: (c)

108. The number of S═O and S−OH bonds present in Marshall's acid and Oleum, respectively are

(a) (4 and 2) and (4 and 2)

(b) (2 and 4) and (2 and 4)

(c) (4 and 2) and (2 and 4)

(d) (2 and 2) and (2 and 2)

Answer: (a)

109. Which one of the following is responsible for lesser pressure of a real gas in comparison to an ideal gas ?

(a) Finite size of molecules

(b) Enhancement of kinetic energy of molecules

(c) Viscosity

(d) Intermolecular forces

Answer: (d)

110. For which group of cations the magnetic mome can be given by spin only formula ?

(a) $Gd^{3}+$ and $Lu^{3}+$

(b) $Ce^{3}+$ and $Nd^{3}+$

(c) $Yb^{3}+$ and $Tm^{3}+$

(d) $Pm^{3}+$ and $HO^{3}+$

Answer: (a)

111. In liquid ammonia, sulphamic acid behaves as

(a) Monobasic acid

(b) Tribasic acid

(c) Dibasic acid

(d) Base

Answer: (c)

112. Ethanol on reaction with bromine in aqueous solution gives

(a) CH_3COOH

(b) CH_3CHO

(c) $CH_2═CH_2$

(d) $CH_2═CH - OH$

Answer: (b)

113. Which one is not nucleophilic reagent in the following ?

(a) CH_3^-

(b) NH_2^-

(c) :CH_2

(d) R – Ö – R

Answer: (c)

114. The unit of rate constant for zero order reaction is

(a) s^{-1}

(b) mol dm^{-3} s^{-1}

(c) mol^{-1} dm^{-3} s^{-1}

(d) mol^{-2} dm−6 s^{-1}

Answer: (b)

115. C_V for CO_2 at room temperature is equal to (assume 20% vibrational contribution at room temperature)

(a) 54.04 $JK^{-1}mol^{-1}$

(b) 27.44 $JK^{-1}mol^{-1}$

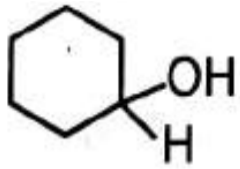
(c) 22.44 $JK^{-1}mol^{-1}$

(d) 12.44 $JK^{-1}mol^{-1}$

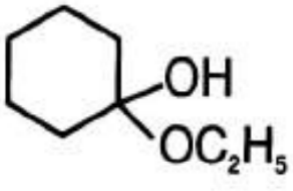
Answer: (b)

116. In the reaction
$BrMg(CH_2)_5MgBr + CH_3CO_2C_2H_5 \rightarrow P$
what is P ?

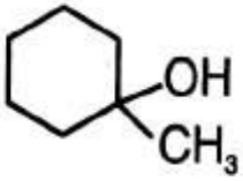
(a)



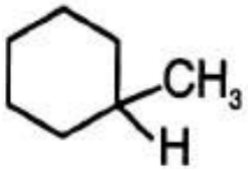
(b)



(c)



(d)



Answer: (c)

117. If the gold number for the colloidal solutions A, B and C are 0.1, 2.5 and 20 respectively, the order of protective powers of these colloids will be

(a) C > B > A
(b) A > B > C
(c) A = B = C
(d) B > A > C

Answer: (b)

118. Which one of the following is hydrolysed more rapidly ?

(a) CH_3Cl
(b) CH_3CH_2Cl
(c) $CH_2{=}CHCl$
(d) CH_3OCH_2Cl

Answer: (d)

119. What type of reaction takes place upon treatment of ketone with HCN to form a cyanohydrin ?

(a) Nucleophilic addition reaction
(b) Electrophilic substitution reaction
(c) Electrophilic addition reaction
(d) Nucleophilic substitution reaction

Answer: (a)

120. The expression I = I0e^(−∈cl) is known as

(a) Lambert law
(b) Lambert-Beer law
(c) Grotthus-Draper law
(d) Stark-Einstein law

Answer: (b)

121. A 5.13% sugar solution is isotonic with a 0.9% unknown solution. The molar mass of the solute is

(a) 51.3
(b) 60.0
(c) 72.4
(d) 90.0

Answer: (b)

122. Among the given statements about structure of N[illegible] and H3O+, which one is incorrect ?

(a) All N − H bonds in NH3 are equal in length ar[illegible]trength
(b) All O − H bonds in H3O+ are equal in length[illegible]d strength
(c) N in NH3 and O in H3O+, both the a[illegible]ve sp^3 hybridization
(d) Number of lone pairs of electrons on N ato[illegible] is only one but it is two in case of O in H3O+

Answer: (d)

123. The anodic oxidation, in the electrolysis of ice cold H2SO4(50%) between Pt electrodes at high current density, gives

(a) Oleum, H2S2O7
(b) Dithionic acid, H2S2O6
(c) Marshall's acid, H2S2O8
(d) Caro's acid, H2SO5

Answer: (c)

124. $OsO4 + 9CO \rightarrow Os(CO)5 + 4CO2$
The above mentioned reaction is

(a) Substitution reaction
(b) Direct carbonylation reaction
(c) Reductive carbonylation reaction
(d) Reduction reaction

Answer: (c)

125. Which of the following metalloenzymes do not contain zinc ?

(a) Carboxy peptidase

(b) Carbonic anhydrase

(c) Nitrogenase

(d) Alcohol dehydrogenase

Answer: (c)

Answer key

Answer key from the U.P. Secondary Education Services Selection Board's official answer key for this sitting. "—" means the key gave none.

Chemistry

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