Inspire academy @ Pudukkottai- 622001
Jansi Complex, Nizam Colony, Near Brihadambal School
Pudukkottai – 622 001, 9884043569

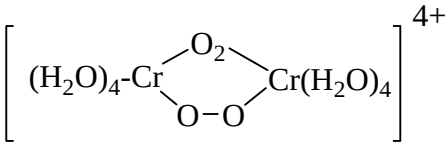
Time 2 hours	PG-TRB 2017 MOCK TEST 2 – CHEMISTRY	Questions :100

1. What is the oxidation state of the Co in $[Co(NH_3)_4(NO_2)_2]^+$?

a) +3 b) +2 c) +1 d) +5

2. What is the density of the ligand 1,10-phenanthroline?

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

3. What is the oxidation state of Cr in 

a) +5 b) +4 c) +6 d) +3

4. A compound has an empirical formula $CrCl_3.5NH_3$. When an aqueous solution of this compound in mixed with excess of $AgNO_3$, 2 moles of AgCl precipitates per mole of the compound. On reaction with HCl, no NH_4^+ is detected. Hence the compound is

a) $[Cr(NH_3)_5Cl_2]Cl$ c) $[Cr(NH_3)_4Cl_2]Cl$

b) $[Cr(NH_3)_5Cl]Cl_2$ d) $[Cr(NH_3)_3Cl_3]3NH_3$

5. How many geometrical isomer(s) is/are possible for $[Pt(NH_3)_3Cl]^{+1}$?

a) 1 b) 2 c) 3 d) 0

6. How many geometrical isomer(s) is/are possible for $[Pt(NH_3)Cl_5]^{-1}$?

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

7. How many geometrical isomer(s) is/are possible for $[Pt(NH_3)Cl(NO)_2]$?

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

8. How many geometrical isomer(s) is/are possible for $[Pt(NH_3)_4Cl_{Br}]^{+2}$?

a) 2 b) 4 c) 6 d) 8

9. Which of the following shows geometrical isomerism?

a) $[Mabcd]^{n\pm}$ b) $[Ma_3b]^{n\pm}$ c) $[Ma_2bc]$ d) [Mabcx]

10. Which of the following exhibits ionization isomerism?

a) $[Cr(NH_3)_6]Cl_3$ c) $[M(en)_3]Cl_3$

b) $[M(en)_3Cl_3]$ d) $[M(NH_3)_5Br]SO_4$

11. The pair of $[Co(NH_3)_5SO_4]NO_3$ and $[Co(NH_3)_5NO_3]SO_4$ will exhibit

a) Hydrate isomerism b) linkage isomerism

c) Ionization isomerism d) coordinate isomerism

12. Which of the following will have three stereoisomeric forms?

i) $[Cr(NO_3)_3(NH_3)_3]$ ii) $K_3[Co(C_2O_4)_3]$

iii) $K_3[Co(C_2O_4)_2Cl_2]$ iv) $[Co(en)_2ClBr]$

a) (iv) and (iii) b) (iv) and (i) c) (iii) and (ii) d) (i) and (ii)

13. A coordination compound of cobalt has the molecular formula containing 5 NH_3, one nitro and 2 Cl atoms for one Co atom. One mole of this compound produces 3 moles of ions in aqueous solution. The aqueous solution on treatment with an excess of $AgNO_3$ gives two moles of AgCl as a precipitate. The formula of this complex would be

a) $[Co(NH_3)_4NO_2Cl]$ b) $[Co(NH_3)_5NO_2]Cl_2$

c) $[Co(NH_3)_5Cl]NO_2Cl$ d) $[Co(NH_3)_4ClNO_2].NH_3Cl$

14. The coordination number of Ag in $[Ag(NH_3)_2]^+Cl$ is

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

15. The compounds $[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_5Cl]Cl_2.H_2O$ exhibit

a) Linkage isomerism b) hydrate isomerism

c)geometrical isomerism d) ionization isomerism

16. Which of the following exhibit cis-trans-isomerism?

a) $[PtCl_2(NH_3)_2]$ b) $[PdCl_2Br_2]$

c) $[PdBr_2FCl]$ d) All these

17. Which pairs of isomers illustrates ionization isomerism?

a) $[Cr(SCN)(NH_3)_5]^{2+}$ and $[Cr(NCS)(NH_3)_5]^{2+}$

b) $[CoCl(NH_3)_5]SO_4$ and $[Co(SO_4)(NH_3)_5]Cl$

c) Cis-$[PtCl_2(NH_3)_2]$ and trans-$[PtCl_2(NH_3)_2]$

d) (+)-$[Co(en)_3]^{3+}$ and (-)-$[Co(en)_3]^{3+}$

20. Which of the following is incapable of showing geometrical isomerism?

a) $[PtCl_2(NH_3)_2]$ b) $[CoCl_2(NH_3)_4]^+$ c) $[Co(NO_2)_3(NH_3)_3]$ d) $[Co(en)_3]^{3+}$

21. Which of the following is incapable of forming chelate rings?

a) en b) NH_2-CH_2-CH_2-NH-CH_2-CH_2-NH_2

c) CH_3-NH_2 d) H_2N-CH_2-COO^-

22. Which of the following cannot show coordination isomerism?

a) [CCl(NH3)4] [PtCl4] b) [Pt(en)3]SO4

c) [Fe(NH3)6]2[Pt(CN)6]3 d) None of these

23. Which is/are not correct statement(s)?

a) [Cr(CN)6] will exhibit coordination isomerism

b) [Mn(CO)5(SCN)] can exhibit linkage isomerism

c) a & b

d) Neither a nor b

24. What is the name of the ligand NO^+ ?

a) nitronium b) nitrosyl c) nitrosonium d) hydrazonium

25. The IUPAC name of the [Ag(NH3)2]Cl is

a) Amine silver chloride b) Chloramine Silver (I)

c) diamine silver chloride d) diamminesilver(I) chloride

26. Fe(III) hexacyanoferrate(II) is

a) Fe4[Fe(CN)6]3 b) Fe3[Fe(CN)6]2 c) Fe(CN)6 d) Fe[Fe(CN)6]

27. Inertness of a complex depends on

a) Reaction energy b) E_{act} c) both a & b d) None of these

28. Thermodynamic stability of a complex depends on

a) Reaction energy b) E_{act} c) both a & b d) None of these

29. Generally step-wise stability constants generally decrease. This is due to

a) Statistical energy b) steric factor c) electrostatic factor d) all these

30. With a ligand under identical conditions, which of the following forms the most stable complex?

a) La^{3+} b) Gd^{3+} c) Lu^{3+} d) Dy^{3+}

31. With a particular ligand, which of the following will form the least stable complex keeping other factors constant?

a) K^+ b) Na^+ c) Rb^+ d) Cs^+

32. Successive stability constants of "en" complexes with a metal ion are:

log K_1 = 2.5; log K_2 = 1.7 and log K_3 = 0.8. Then, the overall stability constant is

a) 15 b)104.2 c) 10^5 d) None of these

33. The instrument used to determine the optical activity of an optically active compound is

a) potentiometer b) polarimeter c) UV spectrometer d) Gouy Balance

34. Pick out the odd ligand from

a) Py. b) bipy. c) en d) dien

35. An antidote used in Hg poisoning is
a) Calomel b) cis-platin c) EDTA d) None of these

36. A polydendate ligand that does not form a chelate is
a) gly. b) acac c) trien d) hydrazine

37. Citric acid acts as a _____ in the gravimetric determination of Ni^{2+} as its complex in the presence of Fe^{3+}
a) Precipitating agent b) reducing agent c) masking agent d) none of these

38. A bidendate ligand having one acidic and one coordinate group is
a) en b) glycine c) $C_2O_4^{2-}$ d) bipy

39. $[Ca\text{-}EDTA]^{2-}$ chelate has _____ 5-membered rings.
a) 3 b) 4 c) 2 d) 5

40. The coordination number of a central metal in a 1:1 complex of the metal with EDTA is
a) 6 b) 5 c) 4 d) 8

41. The most stable complex among the following is
a) $[Co(en)(H_2O)_4]^{3+}$ b) $[Co(en)_2(H_2O)_2]^{3+}$
c) $[Co(NH_3)_6]^{3+}$ d) $[Co(en)_3]^{3+}$

42. The ion present in hemoglobin is
a) Fe^{3+} b) Zn^{2+} c) Fe^{2+} d) Mg^{2+}

43. The metal present in the blood of various invertebrates is
a) Fe b) Mn c) Co d) Zn

44. The metal present in Vitamin B_{12} is
a) Co b) Mn c) Fe d) Mg

45. The metal present in Chlorophyll is
a) Mg b) Mn c) V d) Cu

46. Which of the following is not bidendate?
a) Oxalate b) glycine c) o-phen d) nitrilo triacetic acid

47. Which of the following has two acidic groups?
a) Oxalato b) sulphato c) carbanato d) all the above

48. Pick out the odd one from
a) Oxine b) en c) bipy d) o-phen

49. An aromatic compound with 10 electrons in the ring current. According to Huckel's rule for Aromaticity, the value of n is
a) 0 b) 1 c) 2 d) 3

50. Which of the following is anti-aromatic?
a) cyclopropene b) cyclopropenyl cation
c) cyclopropenyl anion d) cyclopropenyl radical

51. Which of the following is non-aromatic?
a) 4-annulene b) 6-annulene c) 10-annulene d) all these

52. Which of the following is not basic?
a) pyrrole b) pyridine c) piperidine d) pyrrolidine

53. Which of the following aromatic compounds have 14 electrons?
a) $C_{10}H_8$ b) $C_{14}H_{10}$ c) $C_{18}H_{12}$ d) all these

54. Which of the following reagents produces a neutral planar simple nucleophile?
a) $HNO_3 + H_2SO_4$ b) $H_2S_2O_7$ c) R-X + $AlCl_3$ d) R-COX + $AlCl_3$

55. Which of the following is an activating group?
a) $-N^+\text{-}R_3$ b) -COR c)-NO_2 d) -NHCOR

56. Which is the major product when nitrobenzene is chlorinated?
a) m-nitrochloro benzene b) o-nitrochloro benzene
c) p-nitrochloro benzene d) benzoic acid

57. Which of the following is an ortho and para directing group?
a) NO_2 b) SO_3H c) $-CH_2Cl$ d) H

58. Which group shows +M, -I effect?

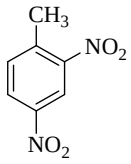
a) $-O^-$ b) -COR c) $-SO_3H$ d) -OH

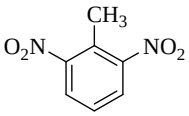
59. What product is obtained when aniline is nitrated with nitration mixture?

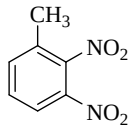
a) o-nitroaniline b) m-nitroaniline

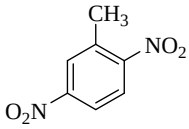
c) p-nitroaniline d) both o- and p-nitroaniline

60. What is the major product obtained when o-nitrotolune is nitrated?

a) 

b) 

c) 

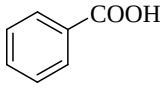
d) 

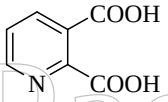
62. Benzyne mechanism involves

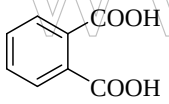
a) substitution b) addition-elimination

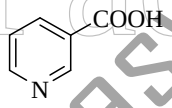
c) elimination-addition d) addition-substitution

63. What product is obtained when quinoline is oxidized with

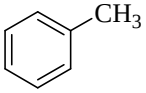
a) 

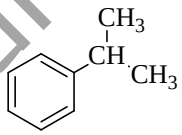
b) 

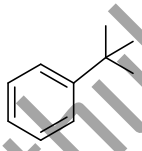
c) 

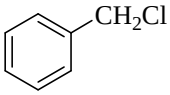
d) 

64. Which of the following does not give benzoic acid with alk. $KMnO_4$?

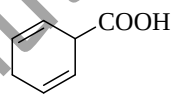
a) 

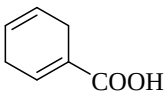
b) 

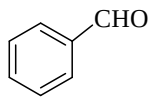
c) 

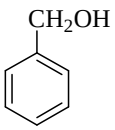
d) 

65. Predict the product when benzoic acid is treated with $Na/NH_3/EtOH$, H_3O^+?

a) 

b) 

c) 

d) 

66. In which of the following reaction alkylisocyanate is not an intermediate?

a) Curtius b) Lossen c) Schmidt d) Smiles

67. Oxygen insertion is involved in?

a) Smiles b) Schmidt c) Benzilic d) Baeyer-Villiger

68. Carbocation is an intermediate in

a) Curtius b) Pinacol c) Benzilic d) Benzidine

69. Acyl phenols undergo _____ rearrangement.

a) Cope b) oxy-cope c) Calisen d) Fries

70. Which of the following is not sigmatropic?

a) Fries b) Cope c) oxy-cope d) Clause

71. Which one is allowed for 4n system conrotatory mode?

a) Δ b) hν c) Δ or hν d) both a & b

72. Which reaction involves phosphorous ylide?

a) Mannich b) Stork c) Witting d) Wagner

73. α-alkylalion is carried out in

a) Mannich b) Stork c) Witting d) Grignard

74. Which of the following in a multicomponent condensation reaction?

a) Benzoin b) Michael c) Mannich d) both a & b

75. The major product on dehydration of $(CH_3)_3C\text{-}CH_2OH$ is:

a) $(CH_3)_2\text{-}C{=}CH\text{-}CH_3$ b) $CH_3\text{-}CH{=}CH\text{-}CH_3$

c) $(CH_3)_2\text{-}CH\text{-}CH{=}CH_2$ d) $(CH_3)_2C{=}CH_2$

76. On treatment with ethanolic KOH, 2-Chlorobutane gives mainly:

a) 1-butene b) cis-2-butene c) trans-2-butene d) 2-butanol

77. Consider the following statements about E1 reaction:

1) It is unimolecular reaction.

2) It involves rearrangement.

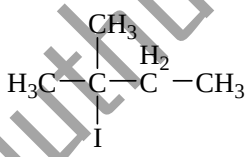
3) 3° alkyl halides generally give this mechanism.

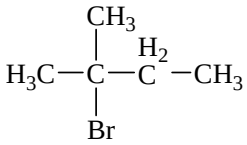
4) Strong base and polar aprotic solvent accelerate the reaction

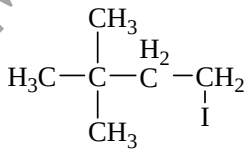
Select the correct statements from the codes given below:

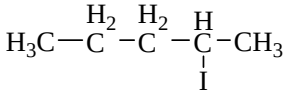
a) Only 4 b) 1, 2 & 4 c) 1,3 & 2 d) 1,2,3 & 4

78. Which one of the following compounds undergoes E2 reaction most readily?

a) 

b) 

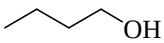
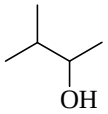
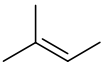


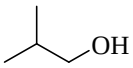
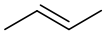
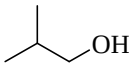
d) 

79. Allyl chloride on dehydrochlorination gives:

a) propadiene b) propylene c) allyl alcohol d) propene

80. An alcohol A on dehydration gives B which on ozonolysis produces acetone and formaldehyde. A and B are

a)    b)    

c)       d)    

81. Which of the following pairs is correctly matched?

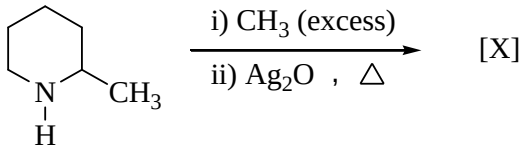
a) E2- anti-periplanar conformation

b) E1-rearrangement of less stable carbocation

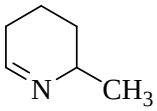
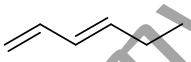
c) $E1_{CB}$ – Carbanion intermediate

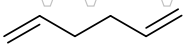
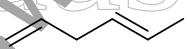
d) all these

82. In the reaction

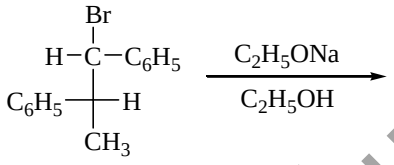


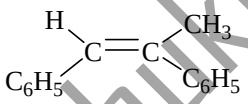
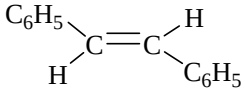
[X] is

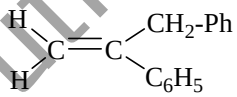
a)    b) 

c)    d) 

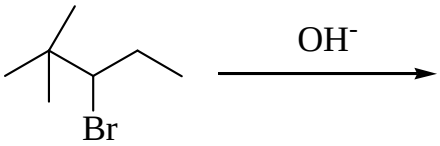
83. In the given reaction, the major product is



a)    b) 

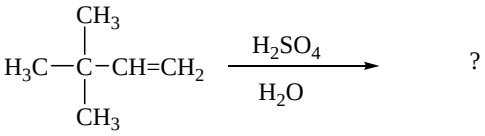
c)    d) Both (a) and (b)

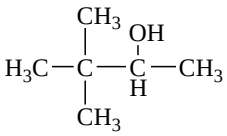
84. The number of alkenes that would be formed in the following reaction is

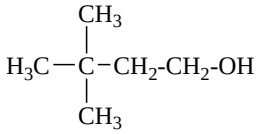


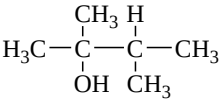
a) only one   b) two   c) four   d) five

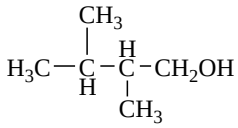
85. The major product obtained in the reaction is



a) 

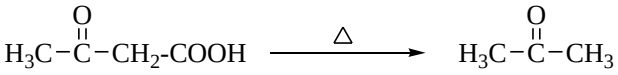
b) 

c) 

d) 

86. Which of the following is an example for Hunsdicker reaction?

a) $CH_2(COOH)_2 \xrightarrow{\Delta} CH_3COOH$

b) 

c) $2\ C_6H_5-Cl \xrightarrow{Na} C_6H_5-C_6H_5$

d) $CH_3\text{-}CH_2\text{-}COOH \xrightarrow[ii)\ Br_2/CCl_4]{i)\ Ag_2O} CH_3\text{-}CH_2\text{-}Br$

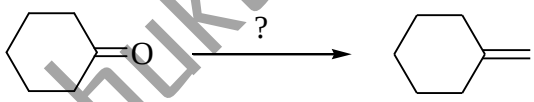
87. In Baeyer-Villiger oxidation of alkyl aryl ketones, the migrating aptitude of the aryl groups is in the order of

a) p-chlorophenyl > p-anisyl > p-tolyl > phenyl

b) phenyl> p-tolyl> p-anisyl > p-chlorophenyl

c) p-anisyl > p-tolyl > phenyl > p-chlorophenyl

d) p-chlorophenyl > phenyl > p-tolyl > p-anisyl

42. 

a) RMgX b) CH_3I/PPh_3

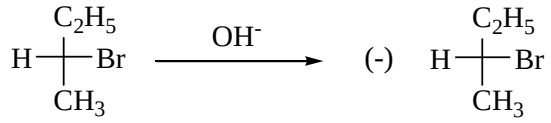
c) BH_3/THF d) Zn, $BrCH_2\text{-}COOC_2H_5$

89. Arrange the following in the order of acidity: H_2O, $CH{\equiv}CH$, NH_3, $CH_3\text{-}CH_3$

a) $H_2O > CH{\equiv}CH > NH_3 > CH_3\text{-}CH_3$ b) $CH{\equiv}CH > H_2O > NH_3 > CH_3\text{-}CH_3$

c) $CH_3\text{-}CH_3 > CH{\equiv}CH > NH_3 > H_2O$ d) $H_2O > NH_3 > CH{\equiv}CH > CH_3\text{-}CH_3$

90. In which of the following reaction NGP is involved?

a) (+)  (-)

b) Threo-dl-3-bromo-2-butanol $\xrightarrow{HBr}$ (dl)-2,3-dibromobutane

c) Erythro-dl-3-bromo-2-butanol $\xrightarrow{HBr}$ meso-2,3-dibromobutane

d) both b & c

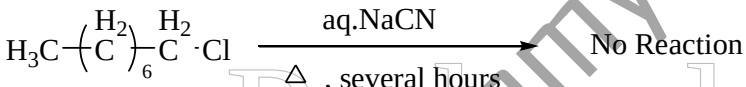
91. DMSO is a

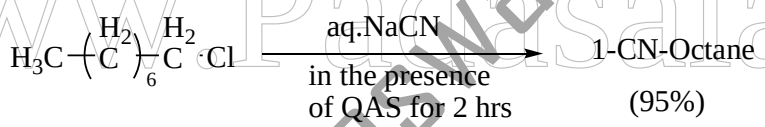
a) non-polar solvent b) protic solvent

c) polar protic solvent d) dipolar aprotic solvent

92. Which of the following functions as a base in ammonia solvent?

a) NH_4I b) KCl c) H^+ d) NH_2^-

16. Reaction 1: 

Reaction 2: 

In reaction 2, QAS acts as a

a) good phase transfer catalyst (PTC)

b) good nucleophile

c) good electrophile

d) good charge transfer catalyst.

94. Which of the following is not an electrophile?

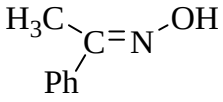
a) NH_3 b) BF_3 c) $AlCl_3$ d) Hg^{2+}

95. Compounds exhibiting geometrical isomerism have

a) benzene ring b) all σ-bonds c) one double bond d) cross links

96. Ph-CO-Ph can be converted into Ph-CH_2-Ph using

a) Na/EtOH b) H_2/Ni c) HI d) none of these

20. Beckmann rearrangement of  gives

a) Ph-CH_2-CH_2-NH_2OH b) Ph-NH-CH_2-CH_3

c) Ph-CH_2-CH_2-NH_2 d) Ph-NH-$COCH_3$

98. Hofmann rearrangement involves the intermediate of

a) RNC b) RCNO c) RNCO d) RCN

99. How many signals would be expected in NMR spectrum of CH_3-CH_2-Br?

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

100. Which of the following is not a tautomeric system?

a) keno-enol b) chloro-bromo c) amido-imido d) nitro-acinito