Shivaji University , Kolhapur

Seat No.	

Paper Code(ENT202012)

M.Sc Entrance Exam , MAY-2020

58713-CHEMISTRY

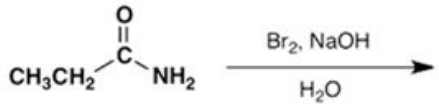
Day And Date : Friday 20/11/2020 **Total Marks :** 100

Time : 10:30 To 12:00

Marks

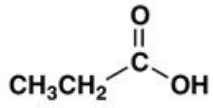
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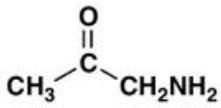
Which is the main product of the following reaction of an amide?



a) $CH_3CH_2CH_2NH_2$

b) $CH_3CH_2NH_2$

c) 

d) 

2 Melphalan is an example of ……drug. 1

A) Antiinflammatory

B) Antituberculosis

C) Analgesics

D) Anticancer

3 At the congruent melting point of the compound, system is …… variant. 1

A) uni

B) bi

C) tri

D) in

4 ---------- of nitrogen (N) is present in Urea 1

A) 80

B) 70

C) 46

D) 0.3

5 As ……MO's are available for electronic transition, charge transfer spectra is possible. 1

A) Bonding

B) Non-bonding

C) Anti-bonding

D) Sigma bonding

6 Rate of flow value (Rf) is the ratio of ……. 1

A) Distance travelled by solvent front by solute

B) Distance travelled by solute to that by solvent front

C) Distance travelled by mobile phase by solute

D) Distance travelled by stationary phase to that by mobile phase

7 Coordination position isomers are related to …….. complexes. 1

A) Bridged

B) Cationic

C) Anionic

D) Neutral

8 According to Werner complexes with CN of central metal atom or ion = 6, geometry is always…… 1

A) Octahedral

B) Trigonal bipyramidal

C) Prismatic

D) Planar hexagonal

9 MOT discussed on the basis of principle……. 1

A) Pauli's exclusion principle

B) Aufbau principle

C) Periodicity in properties of elements

D) LCAO approximation

10 During the formation of an octahedral complexes when (n-1)d orbital's are involved in bonding, resultant complex will be ……. ..orbital complex. 1

A) Outer

B) Inner

C) Neither inner nor outer

D) Upper

11 Which one of the following element is involved in blood clotting? 1

A) Na

B) Mg

C) Ca

D) Platinum

12 Which one of the following is not used as a detector in flame emission photometer? 1

A) Photovoltaic cell

B) Photronic cell

C) Photo-emissive tube

D) Chromatogram

13 1

The base catalyzed rearrangement of enolizable α-haloketones or cyclopropanones to carboxylic acids or their derivatives is known as----------

a) Hofmann rearrangement b) Favorskii rearrangement

c) Schmidt rearrangement d) Wagner- Meerwein rearrangement

14 The degeneracy of rotational energy levels is ---------. 1

A) J+1

B) 2(J+1)

C) 2J+1

D) J+2

15 Wave function of first excited state of a particle in a box of length a is given by ψ = --------. 1

a) [√(2/a)] sin (πx/a) b) [√(2/a)] sin (2πx/a)

c) [√(1/a)] sin (2πx/a) c) [√(1/a)] sin (2πx/a)

16 1

The kinetic energy of a particle is given by ----------.

a) ½(m/V) b) ½(mV) c) ½(mV^2) d) ½(m^{2}V)

17 The temperature at which two liquids are partially miscible becomes completely miscible in all proportions is known as ……temperature. 1

A) consolute

B) boiling

C) critical

D) none of thees

18 In construction of gas electrode, an inert metal is used……. 1

A) as reference electrode

B) as indicator electrode

C) to make electrical contact

D) none of these

19 When glass electrode is dipped in solution a difference of ……..exists at the interface between glass and solution containing H+ ions. 1

A) potential

B) conductance

C) temperature

D) none of these

20 For a system $S_M \rightleftarrows S_L \rightleftarrows S_V$, the degree of freedom is…… 1

a) one b) zero c) two d) four

21 1

Oxidation of naphthalene using V_2O_5, air at 733K yields ----------

a) phthalic acid b) acetic acid

c) phthalic anhydride d) succinic acid

22 Deduce the structure of the compound from the following spectral data. 1

M.F. $C_6H_{14}O$

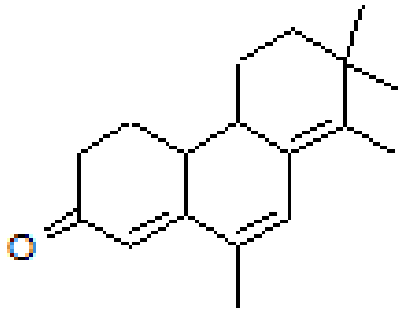
IR- 1200 cm^{-1}

PMR- δ 1.05 (s, 9H); 0.9 (t, 3H); 3.3 (q, 2H)

a) OH-CH_2-CH_2-$C(CH_3)_3$ b) CH_3-O-CH_2-$C(CH_3)_3$

c) CH_3-CH_2-O-$C(CH_3)_3$ d) CH_3-CH_2-O-CH_2-$CH(CH_3)_2$

23 λ_{max} for the following compound is ---------. 1



a) 351 b) 369 c) 359 d) 315

24 A Michael reaction is an example of a conjugate addition. What is a conjugate addition? 1

A) A conjugate addition is a synchronous addition of an electrophile and nucleophile to a double bond

B) A conjugate addition is a nucleophilic addition to a triple bond followed by protonation

C) A conjugate addition converts an α,β-unsaturated ketone into a substituted saturated ketone

D) A conjugate addition is a nucleophilic addition to an aromatic ring followed by the expulsion of a leaving group

25 What does the notation $\sigma^* \leftarrow n$ mean? 1

a) Emission; transition from a quantum level n to σ^* MO

b) Absorption; transition from a non-bonding MO to σ^* MO

c) Emission; transition from a non-bonding MO to σ^* MO

d) Absorption; transition from a quantum level n to σ^* MO

26 Deduce the structure of the compound from the following spectral data. 1

M.F. $C_5H_{10}O$
UV-λmax 285 nm
IR-1717 cm^{-1}
PMR- δ 0.9 (3H, t); 1.08 (2H, Sextet); 2.5(2H, t); 2.75 (3H, s)

a) CH_3-CO-CH_2-CH_2-CH_3 b) CH_3-CH_2-CHOH-CH_2-CH_3
c) CH_3-CH_2-CH_2-CH_2-O-CH_3 d) CH_3-CH_2-CH_2-CH_2-CHO

27 The intensity of beam recorded in mass spectra depends upon the relative abundance of _____species 1

A) Free radical

B) Molecular

C) Cationic

D) Neutral

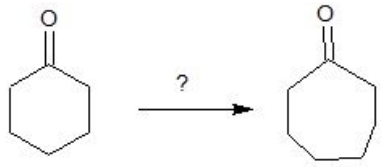
28 Deuterated solvent in an NMR sample is used to ----------. 1

A) stabilize the magnetic field

B) set the chemical shift reference

C) cobtain good field homogeneity across the sample

D) both (a) and (c)

29  1

a) DMSO b) CH_2N_2 c) H_2O_2 d) None of these

30 ……is an antibiotic 1

A) Ibuprofen
B) Quinine
C) Penicillin-G
D) Isoniazid

31 2,3-dibromobutane is produced by ……. 1

A) The addition of the bromine to 2-butene
B) The addition of the bromine to 1-butene
C) The addition of the bromine to 1,3-dibutadine
D) The addition of the bromine to cyclobutene

32 The functional groups present in sucrose monosterate are----- 1

A) Ether, alcohol and ester
B) Ester and alcohol
C) Alcohol and amide
D) Alcohol and ester

33 Which of the following is subtype of stereoisomer?` 1

A) Optical
B) Ionization
C) Hydrate
D) Linkage

34 Silicon is doped with trivalent impurity; then the resultant substance is…… 1

A) Superconductor
B) p-type semiconductor
C) n-type semiconductor
D) insulator

35 The driving force in Wittig reaction is--- 1

A) Formation of phosphorous-carbon bond in ylide
B) Formation of Betaine
C) Formation of phosphorous-oxygen bond in triphenylphosphine oxide
D) Both a and b

36 The pure substances which are insulators at low temperature but conduct electricity at high temperature are called ……. 1

A. Extrinsic semiconductor
B. intrinsic semiconductor
C. n-type semiconductor
D. p-type semiconductor

37 Superconductivity was discovered by…… 1

A) R.S. Drago
B) L. Pauling
C) H.K. Onnes
D) N. Bohr

38 Common oxidation state of actinides is …….. 1

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

39 The colour change property of an acid base indicator depends on …….. 1

A) pH of the solution

B) structural rearrangement

C) ionization of indicator

D) all of the above

40 pH range of methyl red indicator is …….. 1

A) 3.1 to 4.2

B) 4.2 to 6.3

C) 6.3 to 7.1

D) 5.2 to 6.3

41 The rotational constant of NO molecule is 1.956 cm-1. The frequency of transition from J = 2 to J = 3 is ------ cm-1. a)3.912 b) 7.824 c) 11.736 d) 15.648 1

A) 3.912

B) 7.824

C) 11.736

D) 15.648

42 The rotational constant of HCl molecule is 10.35 cm-1. The frequency of transition from J = 1 to J = 2 is ------ cm-1. 1

A) 20.7

B) 31.05

C) 41.4

D) 51.75

43 The potential of standard Hydrogen electrode is arbitrarily taken as ..... V. 1

A) 1.1

B) 1.018

C) 0.6991

D) 0.0

44 The upper CST of Phenol-Water System is..... oc 1

A) 36.1

B) 63.9

C) 66.5

D) 105.2

45 If ionic product..... the solubility product then the precipitation occur. 1

a) proceeds b) exceeds c) remain constant d) zero

46 Which factor decides the major product in Favoriskii rearrangement? 1

A) Strain in cyclopropanone ring

B) Nature of base used

C) Stability of carbanion

D) Temperature of reaction

47 Increase in temperature decrease extent of..... 1

a) post precipitation b) precipitation c) peptization d) co- precipitation

48 The value of potential of saturated calomel electrode at 298 K is ……V. 1

A) 0.0591
B) 0.4540
C) 0.2458
D) 0.6998

49 Bond order of O_2 molecule is…… 1

a) 1 b) 2 c) 3 d) 2.5

50 Dry ice is used to prepare the carboxylic acid from …….. 1

a) EAA b) Malonyl Ester c) Grignard's reagent d) aldehyde

51 Which of the following is a constitutive property? 1

A) Mass
B) Optical activity
C) Molar heat capacity
D) Dipole moment

52 In simple reactions the rate of reaction ---------- as the concentration of reactants increases. 1

A) Increase
B) Decrease
C) Remains Constant
D) Reaches maximum

53 Deduce the structure of the compound from the following spectral data. 1

M.F. C_8H_8O
UV- λmax 292 nm
IR- 1722, 2740 cm^{-1}
PMR- δ 7.27 (s, 5H); 2.80 (s, 2H); 9.88 (s, 1H)

a) C_6H_5-CO-CH_3 b) C_6H_5-CH_2-CHO
c) C_6H_5-CH_2-CH_2-OH d) C_6H_5-CHOH-CH_3

54 Nicotine on oxidation with chromic acid gives…. 1

A) Nicotinic acid
B) Benzoic acid
C) Pyridine-3-carboxylic acid
D) Both a and c

55 Alkoxy group in alkaloids detected and estimated by ……method 1

A) Acylation
B) Reduction
C) Ziesel
D) dehydrogenation

56 The compound propadiene is an example of _____diene. 1

A) conjugated
B) isolated
C) cumulated
D) cyclo

57 Mass spectrometer separates ions on the basis of which of the following? 1

A) Mass
B) Charge
C) Molecular weight
D) Mass to charge ratio

58 The Kjeldahl's method is used to estimate amount of _____ 1

A) phosphorus
B) potassium
C) nitrogen
D) iron

59 In Kjeldhal's method nitrogen is liberated in the reduced form of 1

A) NO2
B) HNO3
C) (NH4)2SO4
D) HNO2

60 MOT explain satisfactorily 1

a) π bonding b) charge transfer spectra
c) nephelauxetic effect d) all of these

61 According to MOT, $[FeF_6]^{-3}$ is a paramagnetic with ..... unpaired electrons. 1

a) one b) two c) three d) four

62 The ratio of energy per Einstein and that of photon is……number. 1

A) Equivalent
B) Einstein
C) Lamberts
D) Avogadro's

63 Which of the following is not an application of flame photometers? 1

A) Analysis of biological fluids
B) Determination of Na, K in soil
C) Determination of metals such as Mn, Ca
D) Analysis of complex mixtures

64 .....element is the transuranic element. 1

a) $_{93}NP^{239}$ b) $_{90}Th^{230}$ c) $_{92}U^{235}$ d) $_{91}Pa^{232}$

65 ..... Element is a transuranic elements. 1

a) $_{92}U^{238}$ b) $_{90}Th^{233}$ c) $_{91}Pa^{230}$ d) $_{94}Pu^{239}$

66 Photosynthesis is an example of ……. 1

A) Fluorescence
B) Phosphorescence
C) Chemiluminescence
D) Photosensitization

67 Coating of Zn, Al and Cd on steel are _____ , because their electrode potentials are lower. 1

A) cathodic
B) anodic
C) not affecting
D) none of the above

68 The electromagnetic radiation having longest wavelength are a) 1

A) Light
B) Infra red
C) Radio waves
D) Gamma rays

69 Which of the following metal is more corrosive? 1

A) platinum
B) gold
C) silver
D) zinc

70 The unit of 'a' in Van der Wall's equation is…….. 1

a) atm $(dm^3)^2$ $mole^{-2}$ b) atm $(dm^3)^{-2}$ $mole^{-2}$ c) atm $(dm^3)^2$ $mole^{-1}$

d) atm (dm^3) $mole^{-1}$|

71 **The term ……. is called temperature coefficient of cell.** 1

a) $(dS/dT)_P$ b) $(dV/dT)_P$ c) $(dE/dT)_P$ d) $(dE/dT)_V$

72 For thermodynamically reversible process, the entropy change is ……JK-1. 1

A) 10
B) 0
C) 20
D) 30

73 For a certain opposing reaction at 100^0C, having K = 2.79 and $k_f = 0.428\ s^{-1}$, then 1

k_b = ……s^{-1}

a) 6.51 b) 0.15×10^{-4} c) 153 d) 0.1534

74 If the plane of crystal cuts the two coordinate axes and is parallel to third axis, then this plane is known as ---------. 1

A) cubic
B) cubic diagonal
C) simple
D) diagonal

75 The ratio of fugacity of substance in a given state to that in its standard state is known as ……of a substance. 1

A) activity
B) molarity
C) concentration
D) chemical potential

76 In case of cyclic process.....

a) $q = -W$ b) $-q = W$ c) $\Delta E = W$ d) $q = W$ 1

77 Half life of third order reaction is proportional to .....

a) $1/a^3$ b) $1/a^2$ c) $1/a^{-2}$ d) $1/a^{-3}$ 1

78 **A first order reaction has a half life of 69.3 seconds. Its rate constant is .....**

a) $10^{-11}\ s^{-1}$ b) $10^{-2}\ s^{-1}$ c) $10^{-3}\ s^{-1}$ d) $10^{-4}\ s^{-1}$ 1

79 What is the degree of unsaturation for the compound possessing MF C6H6O 1

A) 4
B) 2
C) 1
D) 3

80 For a certain gas having b= 0.4596 $dm^3\ mol^{-1}$ the value of Vc = ...dm^3 1

a) 0.1379 b) 0.09192 c) 0.00211 d) 0.2144

81 **In Van der Wall's equation for a non -ideal gas, the term that accounts for intermolecular forces is.....** 1

a) (v-b) b) RT c) $\left(P + \frac{a}{v^2}\right)$ d) $(RT)^{-1}$

82 Linear phosphonitrilic chloride can be prepared by heating..... at 250 to 350^{0}C with an excess of oxygen. 1

A. $(NPCl_2)_3$
B. $(NPCl_2)_n$
C. $(NPX_2)_3$
D. $(NPX_2)_n$

83 A first order reaction has a half life of 69.3 seconds. Its rate constant is 1

a) $10^{-11}\ s^{-1}$ b) $10^{-2}\ s^{-1}$ c) $10^{-3}\ s^{-1}$ d) $10^{-4}\ s^{-1}$

84 The unit of second order rate constant is..... 1

a) mole $dm^{-3}\ s^{-1}$ b) $mole^{-1}\ dm^3\ s^{-1}$ c) s^{-1} d) mole $dm^3\ s^{-1}$

85 In potentiometric analysis Calomel electrode is used as ---------- electrode. 1

A) Indicator

B) Reference

C) Supporting

D) Inert

86 In a face centered cubic lattice, a unit cell is shared by equally by how many unit cells? 1

A) 8

B) 4

C) 2

D) 6

87 Average life of a certain radioactive element is 1440 years. Then the half life period of same element is .....years. 1

A) 10

B) 100

C) 1000

D) 144

88 The unit of first order rate constant is…….. 1

a) mole dm^{-3} s^{-1} b) dm^3 $mole^{-1}$ s^{-1} c) s^{-1} d) mole dm^{-3}

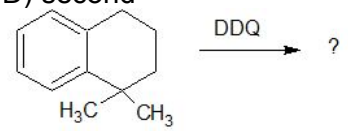
89 $Fe^{3+}_{(aq)} + 2I^{-}_{(aq)} \rightarrow Products$; is example of……order reaction. 1

A) zero

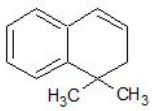
B) first

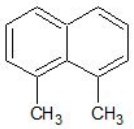
C) third

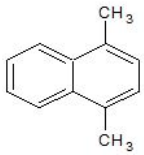
D) second

90 

1

a) 

b) 

c) 

d) None of these

91 What is the relation between restoring force, f to the displacement q in Hooke's law? 1

A) f = -kq

B) f = kq

C) f = kq2

D) f = -kq2

92 Which of following is used for 1,2-cis-hydroxylation of alkenes? 1

A) Manganese dioxide

B) Potassium permanganate

C) Osmium tetraoxide

D) Both b & c

93 The liquor left after crystallization of sugar is called as-- 1

A) Spent wash

B) Bagasse

C) Black strap

D) Both a & b

94 The three component solvent system is preferred for TLC and paper chromatography because it helps to 1

A) accelerate the driving force

B) increase the polarity of solvent

C) decrease the polarity of solvent

D) retain more water in organic solvent

95 Uranium-238 is…….. 1

A) fissile nuclear fuel

B) transuranic element

C) non-radioactive element

D) fertile nuclear fuel

96 The quinhydrone electrode is reversible with respect to --------- ion 1

A) Hydrogen

B) Cholride

C) Ferrous

D) Ferric

97 The correct form of Hamiltonian operator for a freely moving particle of mass m in one dimensional box is given by ----------. 1

a) $- h / 8 \pi^2 m (d/dx)$, b) $- h^2 / 8 \pi^2 m (d/dx)$, c) $- h^2 / 8 \pi^2 m (d^2/dx^2)$

d) $- h / 8 \pi^2 m (d^2/dx^2)$

98 Which of the following liquids forms completely soluble mixture? 1

A) phenol and water

B) benzene and water

C) ethanol and water

D) all of the above

99 In Phase rule F = C – P + 2, the number 2 indicate --------- and ----------. 1

A) volume and pressure

B) volume and temperature

C) pressure and temperature

D) concentration and temperature

100 An electrode has the value of potential as 0.771 V. This electrode is connected with another electrode and the potential of the resulting electrochemical cell is also 0.771 V. The another electrode is ----------. 1

A) Calomel

B) Silver-silver chloride

C) Standard hydrogen

D) Zinc-Zinc ion