

**BRAINWARE UNIVERSITY****Term End Examination 2021 - 22****Programme – Bachelor of Technology in Computer Science & Engineering****Course Name – Chemistry****Course Code - BSC(CSE)202****(Semester II)****Time allotted : 1 Hrs.25 Min.****Full Marks : 70**

[The figure in the margin indicates full marks.]

Group-A**(Multiple Choice Type Question)****1 x 70=70**

Choose the correct alternative from the following :

(1) In gauche form of n- butane two methyl groups are at angle

a) 55°

b) 60°

c) 45°

d) 75°

(2) When the molecule is called optically active?

a) If it has plane of symmetry

b) If it exhibits enantiomerism

c) If it exhibits diastereoisomerism

d) If it has centre of symmetry

(3) What is the axis of symmetry present in water molecule?

a) C_2 b) C_3 c) C_4 d) C_6

(4) What is formed by reaction of ammonia with formaldehyde?

a) Hexamethylenediamine

b) Adipic acid

c) Urotrophine

d) Aldol

(5) SN1 reaction proceeds through the formation of

a) Carbon radicals

b) Carbocation

c) Carbanion

d) Carbene

(6) The human body is an example of a

a) Open system

b) Closed system

c) Isolated system

d) Homogenous system

(7) In an isothermal expansion of an ideal gas which of the following is true?

a) $\Delta S=0$ b) $\Delta V=0$ c) $\Delta q=0$ d) $\Delta T=0$

(8) In an adiabatic process which of the following is true?

a) $\Delta q=0$ b) $\Delta T=0$ c) $\Delta V=0$ d) $\Delta H=0$ (9) 100g of ice at 0 °C was melted to 100g of water at 0 °C. Given latent heat of fusion of ice at 0 °C is 80 Cal per g. The ΔU of the process is

- a) 1000 Cal
c) 4000 Cal
- b) 2000 Cal
d) 8000 Cal
- (10) For the reaction $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) = 2\text{SO}_3(\text{g})$, which of the following is maintained?
a) $\Delta H > \Delta U$
c) $\Delta H < \Delta U$
b) $\Delta H = \Delta U$
d) $\Delta H = 1/\Delta U$
- (11) In a reversible cyclic process the entropy change is
a) Positive
c) Negative
b) Zero
d) Unpredictable
- (12) In what process is the internal energy unchanged?
a) Reversible cyclic process
c) Isothermal process
b) Irreversible process
d) Both reversible and irreversible process.
- (13) Both heat (q) and work (w) are not state functions. Which of the following is correct for (q+w)?
a) State function
c) Both path and state function
b) Path function
d) All of the above
- (14) The relation between ΔG of the cell reaction and emf E of the cell is given by
a) $\Delta G = -nFE$
c) $\Delta G = FE/n$
b) $\Delta G = nFE$
d) $\Delta G = n/FE$
- (15) Standard hydrogen electrode has been assigned to a potential of
a) 1.5 Volt
c) 0.5 Volt
b) 1.0 Volt
d) 0 Volt
- (16) Which one is true for a galvanic cell?
a) The cell potential is always positive
c) ΔG for the cell reaction is positive
b) The cell potential is always negative
d) ΔG for the cell reaction is zero
- (17) In normal hydrogen electrode the activity of H^+ ion is
a) 0.2
c) 0.1
b) 2.0
d) 1.0
- (18) The unit of van der Waal's constant "a" is
a) $\text{atm L}^2\text{mol}^{-1}$
c) $\text{atm L}^2\text{mol}^{-2}$
b) $\text{atm L}^{-2}\text{mol}^{-2}$
d) $\text{mol}^{-1}\text{L}^{-1}$
- (19)
The critical constant (V_c) of a van der Waal's gas is given by
a) $V_c = 3b$
c) $V_c = b/3$
b) $V_c = 2b$
d) $V_c = b/2$
- (20) For an ideal gas undergoing isothermal reversible expansion which of the following is true
a) $\Delta G = \Delta A$
c) $\Delta G = 2\Delta A$
b) $\Delta G = 1/\Delta A$
d) $\Delta G = 2/\Delta A$
- (21) According to the second law of thermodynamics which of the following quantities represent the change in a state function (q=heat change)?
a) q_{rev}
c) Tq_{rev}
b) q_{rev}/T
d) T/q_{rev}
- (22) The stereoisomers which rotates the plain polarized light towards right is known as
a) R
c) S
b) D
d) d
- (23) Compounds which have different arrangements of atoms in space while having same atoms bonded to each other are said to have

a) Position isomerism

b) Functional group isomerism

c) Chain isomerism

d) Stereoisomerism

(24) If a solution of a compound (30.0 g/100 mL of solution) has a measured rotation of $+15^\circ$ in a 2 dm tube, the specific rotation is:

a) $+50^\circ$

b) $+25^\circ$

c) $+15^\circ$

d) $+4.0^\circ$

(25) Total number of conformations of ethane are

a) 2

b) 1

c) 3

d) 4

(26) Let there be four groups OH, D, H, NH_2 attached to the chiral carbon, Which one will have least priority sequence

a) OH

b) D

c) H

d) NH_2

(27) In case of Carbohydrate which chiral carbon is taken to assign D,L nomenclature

a) First

b) last

c) Both first and last

d) Second

(28) In flying wedge projection formulae, horizontal bonds are projected

a) Above the plane of the paper

b) Below the plane of the paper

c) On the plane of the paper

d) Both above and below the plane of the paper

(29) The crystal field stabilization energy(CFSE) value for $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ that has an absorption maximum at 492 nm is

a) 20325 cm^{-1}

b) 12195 cm^{-1}

c) 10162 cm^{-1}

d) 8130 cm^{-1}

(30) Saw horse projection formulae is

a) 3D

b) 2D

c) 1D

d) All of these

(31) Non superimposable mirror images are known as

a) Enantiomers

b) Diastereomers

c) Optical isomers

d) Isomers

(32) Cis 2-butene and trans 2-Butene are

a) Configurational isomers

b) Diastereoisomers

c) Both configurational isomers and diastereoisomers

d) Conformational isomers

(33) In staggered conformations of n-butane, two methyl groups are separated at an angle

a) 30°

b) 60°

c) 90°

d) 180°

(34) Optical rotation depends on

a) Nature of sample and solvent

b) Temperature of medium

c) Wavelength of light used

d) All of these

(35) At a constant temperature the optical angle of rotation is proportional to the

a) Concentration of the solution of optically active molecules

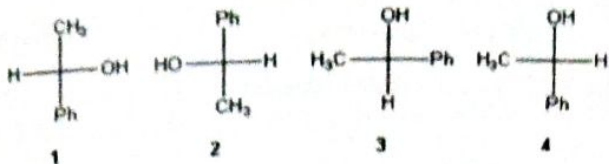
b) Length of the polarimeter tube

c) Specific rotation

d) Both concentration of molecule and length of polarimeter tube

(36) Which of the following Fischer projections is different from the other three?

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- a) 1
c) 3

- b) 2
d) 4

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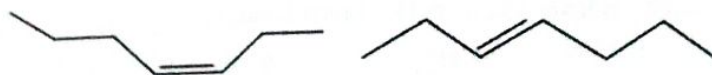
(37) 1-butene on ozonolysis produces

- a) Formaldehyde only
c) Both Formaldehyde and propanal

- b) Propanal only
d) Acetone only

(38)

Which of the following terms best describes the following pair of molecules?



- a) Isomers
c) Constitutional isomers

- b) Configurational isomers
d) Geometrical isomers

(39) What is the major product of the reaction between $\text{CH}_3\text{-CH}_2\text{-CH(NMe}_3\text{)-CH}_3$ with NaOH ?

- a) 1-butene
c) Ethylene

- b) 2-butene
d) Propene

(40) In nitration the electrophile is

- a) NO_3^-
c) NO_2^+

- b) HNO_3
d) N_2O_6

(41) Which one is more effective in nucleophilic addition reaction?

- a) CH_3CHO
c) PhCHO

- b) CH_3COCH_3
d) HCHO

(42) Which of the following electronic configuration is likely to have highest electronegativity

- a) ns^2np^3
c) ns^2np^5

- b) ns^2np^4
d) ns^2np^6

(43) Which statement is true?

- a) The electronegativity of elements increases along the period
c) The chemical reactivity of elements increases along the period

- b) The electropositivity of elements increases along the period
d) The chemical reactivity of element decreases along the period

(44) The probability density is represented by

- a) Square root of the wave function
c) Inverse of the wave function

- b) Absolute value of the wave function
d) Absolute square of the wave function

(45) What is the CFSE of a free Co(II) ion on forming the tetrahedral chloro complex, $[\text{CoCl}_4]^{2-}$ (in the unit of Δ) ?

- a) 0.6
c) 1.8

- b) -1.2
d) 2.4

(46)

According to Crystal Field Theory in the octahedral complexes, the d orbital splits into

- a) Higher energy t_{2g} and lower energy e_g level b) Lower energy t_{2u} and higher energy e_u level
c) Lower energy t_{2g} and higher energy e_g level d) Lower energy e_u and higher energy t_{2u} level
- (47) In which of the following coordination entities the magnitude of Δ_o (CFSE in octahedral field) will be maximum?
a) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ b) $[\text{Co}(\text{NH}_3)_6]^{3+}$
c) $[\text{Co}(\text{CN})_6]^{3-}$ d) $[\text{Co}(\text{C}_2\text{O}_4)_3]^{3-}$
- (48) For a particle inside a box, the potential is maximum at $x =$ _____
a) L b) 2L
c) L/2 d) 3L
- (49) Molecule for which the bonding pair of electrons is equally shared between the atoms is
a) Homoneuclear diatomic b) hAtomic
c) Semi nuclear d) Hetroneuclear diatomic
- (50) Electrons should be filled in energy sub shells in order of increasing energy values, is the principle of
a) Aufbau b) Pauling's
c) Pauli's exclusion d) Hund's
- (51) Which of the following notations is not used to distinguish between pairs of enantiomers?
a) R and S b) E and Z
c) + and - d) D and L
- (52) The efficiency of a heat engine is maximum when the
a) Temperature difference of source and sink is maximum. b) Temperature difference of source and sink is minimum.
c) Temperature of source is greater than that of sink. d) Temperature of sink is greater than that of source.
- (53) Which of the following compounds can exhibit geometrical isomerism?
a) 1-Hexene b) 2-Methyl-2-Pentene
c) 3-methyl-1-pentene d) 2-Hexene
- (54) Conformations are different arrangements of atoms that can be converted into one another by rotation about
a) Covalent bond b) Double bond
c) Single bond d) Triple bond
- (55) What type of reaction takes place upon treatment of a ketone with HCN to form a cyanohydrin?
a) Nucleophilic addition b) Electrophilic substitution
c) Nucleophilic substitution d) Electrophilic addition
- (56) The shift of absorption maxima towards higher wavelength is called
a) Blue shift b) Red shift
c) Auxochrome d) Chromophore
- (57) The shift of absorption maxima towards lower wavelength is called
a) Auxochrome b) Chromophore
c) Blue shift d) Red shift
- (58) Cis stilbene has lower wavelength than trans stilbene due to
a) Presence of steric repulsion between two benzene rings in cis stilbene b) Presence of steric repulsion between two H atoms in cis stilbene
c) Presence of steric repulsion between two benzene rings in trans stilbene d) Presence of steric repulsion between two H atoms in trans stilbene
- (59) Ozonolysis of Ethylene produces

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- a) Formaldehyde
- c) Butanal

- b) Acetaldehyde
- d) Acetone

(60) In bromination of benzene the electrophile is

- a) Cl
- c) Br⁻

- b) Br⁺
- d) Br₂

(61) What is the effect of the optical angle of rotation (α) if length of polarimeter tube is halved and the concentration of the molecule is doubled

- a) α remains same
- c) α gets four times

- b) α gets halved
- d) α eight times

(62) Which statement is not true for wave function, ψ ?

- a) Must be single-valued
- c) Must be infinite

- b) Must be continuous
- d) Must be normalized

(63) The decreasing order of atomic radii of Li, B, C, F is

- a) Li < B < C < F
- c) Li > B > C < F

- b) Li > B < C < F
- d) Li > B > C > F

(64) The entropy of mixing of two ideal gases at constant pressure and temperature

- a) Decreases
- c) Remain unchanged

- b) Increases
- d) Both a and b

(65) One mole of an ideal gas expands from 5 liter to 50 liter at 298 K. The value of $\Delta S/R$ is equal to

- a) 0.693
- c) 2.303

- b) 0.2303
- d) 6.93

(66) Two moles of an ideal gas expand spontaneously into vacuum. The work done is

- a) 2 J
- c) Zero

- b) 4 J
- d) 6 J

(67) A process which is carried out at a constant pressure is known as

- a) Isothermal process
- c) Isochoric process

- b) Isobaric process
- d) Reversible process

(68) Which one of the following is an intensive property?

- a) Enthalpy
- c) Density

- b) Entropy
- d) Internal energy

(69) ΔE of a process is equal to

- a) Heat change at constant pressure
- c) Work done

- b) Heat change at constant volume
- d) Temperature change

(70) The value of $\Delta H - \Delta E$ for a reaction involving gaseous substances is

- a) ΔnRT
- c) $\Delta nR/T$

- b) $\Delta n/RT$
- d) $RT/\Delta n$