



# BRAINWARE UNIVERSITY

Term End Examination 2021 - 22

Programme – Bachelor of Technology in Computer Science & Engineering - Artificial Intelligence & Machine Learning

Course Name – Chemistry-I

Course Code - BSCM202

( Semester II )

Full Marks : 60

Time allotted : 1 Hrs.15 Min.

[The figure in the margin indicates full marks.]

## Group-A

(Multiple Choice Type Question)

1 x 60=60

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 <sub>2</sub>	b) C <sub>3</sub>
c) C <sub>4</sub>	d) C <sub>6</sub>
- (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  $\Delta U$  of the process is

- a) 1000 Cal  
b) 2000 Cal  
c) 4000 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)  $\Delta H > \Delta U$   
b)  $\Delta H = \Delta U$   
c)  $\Delta H < \Delta U$   
d)  $\Delta H = 1/\Delta U$

(11) In a reversible cyclic process the entropy change is

- a) Positive  
b) Zero  
c) Negative  
d) Unpredictable

(12) In what process is the internal energy unchanged?

- a) Reversible cyclic process  
b) Irreversible process  
c) Isothermal 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  
b) Path function  
c) Both path and state function.  
d) All of the above

(14) The relation between  $\Delta G$  of the cell reaction and emf E of the cell is given by

- a)  $\Delta G = -nFE$   
b)  $\Delta G = nFE$   
c)  $\Delta G = FE/n$   
d)  $\Delta G = n/FE$

(15) Standard hydrogen electrode has been assigned to a potential of

- a) 1.5 Volt  
b) 1.0 Volt  
c) 0.5 Volt  
d) 0 Volt

(16) Which one is true for a galvanic cell?

- a) The cell potential is always positive  
b) The cell potential is always negative  
c)  $\Delta G$  for the cell reaction is positive  
d)  $\Delta G$  for the cell reaction is zero

(17) In normal hydrogen electrode the activity of  $\text{H}^+$  ion is

- a) 0.2  
b) 2.0  
c) 0.1  
d) 1.0

(18) The unit of van der Waal's constant "a" is

- a)  $\text{atm L}^2\text{mol}^{-1}$   
b)  $\text{atm L}^{-2}\text{mol}^{-2}$   
c)  $\text{atm L}^2\text{mol}^{-2}$   
d)  $\text{mol}^{-1}\text{L}^{-1}$

(19)

The critical constant ( $V_C$ ) of a van der Waal's gas is given by

- a)  $V_C = 3b$   
b)  $V_C = 2b$   
c)  $V_C = b/3$   
d)  $V_C = b/2$

(20) For an ideal gas undergoing isothermal reversible expansion which of the following is true

- a)  $\Delta G = \Delta A$   
b)  $\Delta G = 1/\Delta A$   
c)  $\Delta G = 2\Delta A$   
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)  $q_{\text{rev}}$   
b)  $q_{\text{rev}}/T$   
c)  $Tq_{\text{rev}}$   
d)  $T/q_{\text{rev}}$

(22) The stereoisomers which rotates the plain polarized light towards right is known as

- a) R  
b) D

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c) S

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)  $+4.0^\circ$

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(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,  $\text{NH}_2$  attached to the chiral carbon, Which one will have least priority sequence

a) OH

b) D

c) H

d)  $\text{NH}_2$

(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)  $20325 \text{ cm}^{-1}$

b)  $12195 \text{ cm}^{-1}$

c)  $10162 \text{ cm}^{-1}$

d)  $8130 \text{ cm}^{-1}$

(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)  $30^\circ$

b)  $60^\circ$

c)  $90^\circ$

d)  $180^\circ$

(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

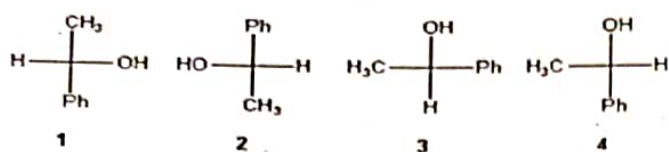
a) Concentration of the solution of optically active molecules

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

b) 2

c) 3

d) 4

(37) 1-butene on ozonolysis produces

a) Formaldehyde only

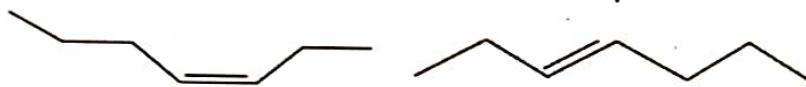
b) Propanal only

c) Both Formaldehyde and propanal

d) Acetone only

(38)

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



a) Isomers

b) Configurational isomers

c) Constitutional 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

b) 2-butene

c) Ethylene

d) Propene

(40) In nitration the electrophile is

a)  $\text{NO}_3^-$

b)  $\text{HNO}_3$

c)  $\text{NO}_2^+$

d)  $\text{N}_2\text{O}_6$

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

a)  $\text{CH}_3\text{CHO}$

b)  $\text{CH}_3\text{COCH}_3$

c)  $\text{PhCHO}$

d)  $\text{HCHO}$

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

a)  $ns^2np^3$

b)  $ns^2np^4$

c)  $ns^2np^5$

d)  $ns^2np^6$

(43) Which statement is true?

a) The electronegativity of elements increases along the period

b) The electropositivity of elements increases along the period

c) The chemical reactivity 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

b) Absolute value of the wave function

c) Inverse of the wave function

d) Absolute square of the wave function

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

a) 0.6

c) 1.8

b) -1.2

d) 2.4

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(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  $\Delta_o$  (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) Homonuclear diatomic

b) Atomic

c) Semi nuclear

d) Heteronuclear 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
- c) Presence of steric repulsion between two benzene rings in trans stilbene

(59) Ozonolysis of Ethylene produces

- a) Formaldehyde
- c) Butanal

(60) In bromination of benzene the electrophile is

- a) Cl
- c) Br<sup>-</sup>

- b) Presence of steric repulsion between two H atoms in cis stilbene
- d) Presence of steric repulsion between two H atoms in trans stilbene

- b) Acetaldehyde
- d) Acetone

- b) Br<sup>+</sup>
- d) Br<sub>2</sub>

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