BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – B.Tech.(CSE)-AIML-2021
Course Name – Chemistry-I
Course Code - BSCM202
(Semester II)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. *Choose the correct alternative from the following :*

(i) 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

(ii) Define the term related to the energy required to remove an electron from an isolated gaseous atom in its ground state to produce a unipositive ion in its ground state

a) Electron affinity
b) Ionization energy
c) Electronegativity
d) Bond energy

(iii) Predict the coordination entity for which the magnitude of Δ_o (CFSE in octahedral field) will be maximum?

a) $[Co(H_2O)_6]^{3+}$
b) $[Co(NH_3)_6]^{2+}$
c) $[Co(CN)_6]^{3-}$
d) $[Co(C_2O_4)_3]^{3-}$

(iv) State the condition of a molecule to be optically active.

a) If it has plane of symmetry
b) If it exhibits enantiomerism
c) If it exhibits diasteroisomerism
d) If it has centre of symmetry

(v) In the periodic table elements with ns^2 electronic configuration are placed in the group number

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

(vi) Identify the axis of symmetry present in water molecule.

a) C_2

b) C_3

c) C_4

d) C_6

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

a) Hexamethylenediamine

b) Adipic acid

c) Urotrophine

d) Aldol

(viii) Predict the no of alpha hydrogens present in the compound undergoing Cannizaro reaction

a) 0

b) 1

c) 2

d) 3

(ix) The human body is an example of a

a) Open system

b) Closed system

c) Isolated system

d) Homogenous system

(x) Which of the following equation can be related to an adiabatic process?

a) $\Delta q=0$

b) $\Delta T=0$

c) $\Delta V=0$

d) $\Delta H=0$

(xi) 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. Calculate the ΔU of the process.

a) 1000 Cal

b) 2000 Cal

c) 4000 Cal

d) 8000 Cal

(xii) Examine the reason why cis stilbene has lower wavelength than trans stilbene

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

(xiii) Which statement is not related to a wave function, ψ?

a) Must be single-valued

b) Must be continuous

c) Must be infinite

d) Must be normalized

(xiv) Predict the decreasing order of atomic numbers of the atoms He, C, F, B

a) F> C> B> He

b) F> C> He> B

c) C> F> B> He

d) He> B> C> F

(xv) Which of these is a comparatively insignificant factor affecting the magnitude of specific optical rotation?

a) Concentration of the substance

b) Purity of the sample

c) Temperature of measurement

d) Length of the sample tube

Group-B
(Short Answer Type Questions)
3 x 5=15

2. State and explain the First Law of Thermodynamics. (3)

3. What is a reference electrode? Give one example. (3)

4. Describe the salient features of crystal field theory (CFT). (3)

5. Predict the magnetic moment of [Fe(H2O)6]3+ complex. (3)

6. Explain the mechanism when Benzene is treated with CH_3Cl in presence of anhydrous $AlCl_3$. (3)

Differentiate SN1and SN2 reactions with examples. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. (a) Explain Fajan's Rule. (5)

(b) Compare the polarizability of small cation, large anion and higher ionic charge.

8. (5)

Analyze the shifting of λ_{max} in case of
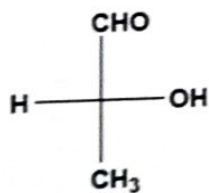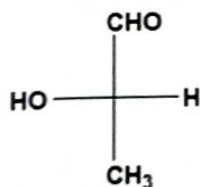
i. Phenol to Phenoxide anion.

ii. Aniline to Anilinium cation.

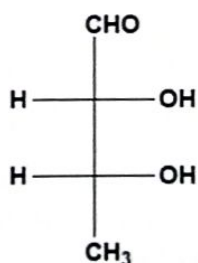9. Define the centre of symmetry, plane of symmetry, alternating axis of symmetry with suitable examples. (5)

10. (5)

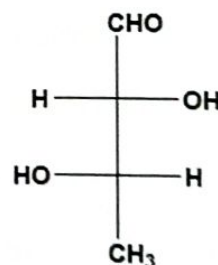Assign D/L nomenclature for the following compounds

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     CHO              CHO           CHO          CHO           CHO
      |                |        H —— —— OH    H —— —— OH   HO —— —— H
 H —— —— OH      HO —— —— H                                       
      |                |        H —— —— OH   HO —— —— H   HO —— —— H
     CH3              CH3           CH3          CH3           CH3
     (a)              (b)           (c)          (d)           (e)
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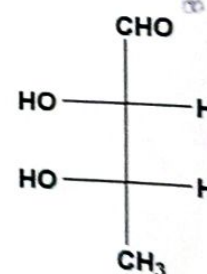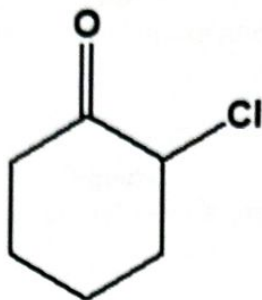
11. Distinguish between E1 and E2 elimination with examples. (5)

12. Predict the product with a mechanism when the below compound is treated with **OH⁻**?   (5)

OR

Predict the product/(s) when prop -1-ene is treated with HBr in presence of peroxide? Which law governs it?   (5)
Define that law.