INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL

B.Sc. (Applied Sciences) in Engg.

End – Semester Theory Examinations – MAY 2021 –Repeaters 2018 Batch

II SEMESTER - CHEMISTRY (ICH-121)

(Branch: Common to all)

Time: 3 Hours **Date: 18 May 2021** **Max. Marks: 100**

- ✓ **Answer any five full questions from the following**
- ✓ **Draw the diagrams wherever required**

1A. Discuss the mechanism of S_N1 and S_N2 reaction of alkyl halides. Explain the Homolytic fission and Heterolytic fission of organic compounds with suitable examples. (10)

1B. What are the sign conventions for electrode potentials? A galvanic cell consists of copper plate immersed in 10 M solution of $CuSO_4$ and iron plate immersed in 0.5 M $FeSO_4$ at 298K. If E^0_{cell} = 0.78 V, write the cell reaction and calculate E.M.F. of the cell. (6)

1C. Draw the structure of the following molecules

i) 1-Penten-4-yne ii) 2- Methoxy-1 -butanol

iii) 4-Hexen-3-one iv) 1-Chloro-2-methylbutane (4)

2A. Explain the hybridization concept and hybridized structures of BeF_2 and CH_4. (10)

2B. Derive the expression for the degree of dissociation and obtain Ostwald's dilution law. Calculate the degree of hydrolysis of 0.01 M CH_3COONa at 25 ℃. If the hydrolysis constant of CH_3COONa at 25 ℃ is 5.76 X 10^{-10}. (6)

2C. Differentiate order and molecularity of a reaction. Give examples. (4)

3A. Explain the following:

i) Band theory of metals and its significance

ii) Criteria for Resonance and orbital approach to benzene (10)

3B. Derive the rate constant of second order reaction having one reactant. (6)

3C. Explain: Extensive property and intensive property. (4)

4A. According to VSEPR theory describe the structures of NH_3 and H_2O molecules. Compare its bond angle with CH_4. (10)

4B. Derive Gibbs-helmholtz equation. Discuss its application and significance. (6)

4C. Obtain the expression from the circuit diagram in the Poggendorff's compensation method. (4)

5A. Explain types of electrochemical cells its construction and working. (10)

5B. For the reaction: $N_2 + 3H_3 \rightleftharpoons 2\ NH_3$ at 500 ℃ and low pressure, the value of Kp with partial pressure in atmospheres is 1.44×10^{-5}, calculate the value of Kc for this equilibrium with concentration in units of moles per liter. (R in liter atm K^{-1} mol^{-1} is 0.0820). Discuss the magnitude of equilibrium constant. (6)

5C. Give reason:

i) Conductivity of metals decrease at high temperatures

ii) Silvery white lustrous surface of metals (4)

6A. Explain the following types of isomerism with a suitable example

i) Chain isomerism
ii) Position isomerism
iii) Functional isomerism
iv) Metamerism
v) Tautomerism (10)

6B. Discuss energy of activation of a reaction. Explain the Arrhenius method of determination of activation energy of a reaction (6)

6C. Derive an expression for the electrode potential and pH of glass electrode. (4)

7A. Give reason:

a) HF is liquid at lab temperature but HCl is a gas
b) Covalent compounds exhibit low chemical reactivity and have low melting and boiling points
c) O_2 is paramagnetic
d) In a galvanic cell anode is negative and cathode is positive
e) Ionic solids are generally brittle (10)

7B. Explain the construction and working of calomel and gas electrode. (6)

7C. Explain the different factors affecting the rate of a reaction. (4)

8A. Discuss the factors governing ionic bond formation. Discuss in detail the Born-Haber cycle for the formation of NaCl crystal. (10)

8B. Explain the Le-Chatelier's principle. Apply them to the manufacture of ammonia. (6)

8C. Discuss the following in secondary bonding with examples and diagrams:

i) Dipole-induced dipole interaction

ii) Induced dipole-induced dipole interaction (4)

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