Question Paper

Exam Date & Time: 08-Jun-2019 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
II SEMESTER B.Sc. (APPLIED SCIENCES) IN ENGINEERING END SEMESTER THEORY EXAMINATION-APRIL/MAY 2019
CHEMISTRY [ICH 121 - S2]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

Draw diagram whereever necessary.

1) Derive an expression for the rate constant of a first order reaction. Explain four factors influencing the rate of chemical reaction. (8)

A)

B) Discuss transition state theory of reaction rates. (8)

C) State Hess's law. With a suitable example explain how Hess's law is useful for calculating the enthalpies of reactions and enthalpies of formation. (4)

2) Define law of mass action. Obtain the mathematical expression for equilibrium constant. Derive the relationship between K_c and K_p. (8)

A)

B) Explain the Homolytic fission and Heterolytic fission of organic compounds with suitable examples. Discuss the stability of carbonium ion and carbanion. (8)

C) Calculate E.M.F. of the zinc - silver cell at 25˚C when $[Zn^{2+}]$ = 1.0 M and $[Ag^{+}]$ = 10 M (E^{0}_{cell}=1.56V at 25˚C). Write the cell representation and cell reaction. (4)

3) Explain the mechanism of free radical substitution and Electrophilic substitution with a suitable example. (8)

A)

B) What is a standard cell? Explain the construction and working of Weston Cadmium cell. (8)

C) Give reason: (4)

i) The He_2 does not exist (with respect to MO theory).

ii) Covalent compounds exhibit low chemical reactivity and have low melting and boiling points.

4) Explain in detail four characteristic properties of metals. (8)

	A)		
	B)	Discuss the following in secondary bonding: i) Hydrogen bonding ii) Dipole-dipole interaction iii) London forces iv) Dipole-induced dipole interaction	(8)
	C)	Draw the structural formula of the following molecules i) 3,3-Diethyl-5-methyldecane ii) 5-Methyl-2-hexyne iii) 3-Bromo-2chloro-5-nitrohexane iv) 2- Butenal	(4)
5)		What are the necessary conditions required for a molecule to exhibit optical isomerism? Explain the optical isomerism in lactic acid and tartaric acid.	(8)
	A)		
	B)	Explain the mechanism of Electrophilic addition and nucleophilic addition reaction with a suitable example.	(8)
	C)	Derive Nernst equation for electrode potential of a single electrode.	(4)
6)		Describe the construction and working of Calomel electrode. Give two advantages and disadvantages.	(8)
	A)		
	B)	What is meant by salt hydrolysis? Discuss with a suitable example four types of hydrolysis of salt.	(8)
	C)	Explain with diagram the electron sea model of metallic bonding. Mention its significance.	(4)
7)		Explain i) Second law of thermodynamics ii) Entropy of a system. Obtain the expression for entropy change in isothermal expansion of an ideal gas.	(8)
	A)		
	B)	Explain the following terms: i) Extensive property ii) Adiabatic process iii) Isolated system iv) Heterogeneous system	(8)
	C)	Explain the shape of water and ammonia molecules based on VSEPR theory.	(4)
8)		Draw the MO energy level diagram for H_2, Li_2, and N_2 molecules and predict their bond order and magnetic properties.	(8)
	A)		
	B)	Explain the types hybridization in the following: Acetylene and Phosphorous pentachloride	(8)
	C)	Explain the function of salt bridge. Why is potassium chloride used for preparing salt bridge.	(4)

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