Question Paper

Exam Date & Time: 02-Jun-2018 (09:30 AM - 12:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES II SEMESTER B.Sc. (Applied Sciences) MAKE - UP EXAMINATION - MAY/JUNE 2018 DATE : 06 JUNE 2018 TIME:9.30 AM TO 12.30 PM

Chemistry [ICH 121]

Duration: 180 mins.

Marks: 100

4)

Answer 5 out of 8 questions.

- Explain the construction and working of standard hydrogen ⁽⁸⁾
 electrode. Give two applications and limitations.
 - ^{B)} What is meant by energy of activation of a reaction? ⁽⁸⁾ Explain the Arrhenius method of determination of activation energy of a reaction
 - Calculate the hydrolysis constant for KCN if hydrolysis of
 0.01 M solution of KCN is 3.7 % at certain temperature.
- ²⁾ Define lattice energy. Discuss in detail the Born-Haber ⁽⁸⁾ cycle for the formation of NaCl crystal.
 - ^{B)} Define half-life period of a chemical reaction. Derive the ⁽⁸⁾ expressions for the half-life period of first and second order reactions.
 - ^{C)} Explain the shape of water and ammonia molecules based ⁽⁴⁾ on VSEPR theory.
- ³⁾ Explain the term hybridization. Give an account of sp³ and ⁽⁸⁾
 - A) sp^2 types of hybridization of carbon with examples
 - ^{B)} What is single electrode potential? Derive Nernst equation ⁽⁸⁾ for electrode potential of a single electrode.
- ^{C)} Explain the different factors affecting the rate of a reaction. ⁽⁴⁾
 - Derive Gibbs-helmholtz equation. Discuss its application ⁽⁸⁾ and significance.
 - ^{B)} Distinguish between the following.
 - i) Reversible process and Irreversible process.
 - ii) Homogeneous system and Heterogeneous system.

(8)

		iii) Isothermal process and Adiabatic processiv) Intensive and Extensive properties.	
	C)	State and explain Hess's law. Discuss its application in calculating the enthalpies of reactions.	(4)
5)	A)	Give the important postulates of Arrhenius theory of ionization. What are its limitations?	(8)
	Β)	 Give reason: i) Ionic solids are generally brittle. ii) Covalent compounds exhibit low chemical reactivity and have low melting and boiling points. iii) HF is liquid at lab temperature but HCl is a gas. iv) O₂ is paramagnetic 	(8)
	C)	The cell SCE / HCl (0.1M) // AgCl(s) / Ag gave an emf of 0.38 V and 0.29 V with a buffer having pH 2.8 and unknown pH respectively. Calculate the pH of unknown buffer solution. Given E_{SCE} = 0.2422 V.	(4)
6)	A)	Define Le Chatelier's Principle. Explain the effect do the following changes have on the position of equilibrium for this reversible reaction? $PCl_{5 (g)} + heat \leftrightarrow PCl_{3 (g)} + Cl_{2 (g)}$ i) Addition of Cl_2 .	(8)
		ii) Increase in pressure. iii) Removal of heat.	
	В)	What is meant by common ion effect and solubility product of an electrolyte? Discuss its any two applications briefly.	(8)
	C)	Discuss the following in secondary bonding: i) Dipole-dipole interaction ii) Dipole-induced dipole interaction	(4)
7)	۸)	Describe the construction and working of Calomel electrode. Give two advantages and disadvantages.	(8)
	B)	Draw the MO energy level diagram for $H_2 + \hat{A}$, Li_2 , and O_2 molecules and predict their bond order and magnetic properties.	(8)
	C)	State and obtain the mathematical expression for Ostwald's dilution law.	(4)
8)	A)	Explain the following types of isomerism with a suitable example i) Geometrical isomerism ii) Position isomerism iii) Functional isomerism	(8)

iv) Optical isomerism

- $^{\text{B})}$ Discuss the mechanism of $\text{S}_{\text{N}}\text{1}$ and $\text{S}_{\text{N}}\text{2}$ reaction of alkyl $^{(8)}$ halides.
- ^{C)} How are organic reagents classified? Give examples for ⁽⁴⁾ each type.

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