

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.Sc. SECOND SEMESTER (January – June) 2015

Mid-Semester Examination, March 2015

Date : 19/03/2015

CHEMISTRY (General)

Time : 12 noon – 1 pm

Paper : II

Full Marks : 25

Group – A

Attempt any one question :

1. a) Define 'temperature' with reference to the zeroth law of thermodynamics. [3]
b) What do you mean by thermodynamic equilibrium. [1]
2. a) Classify the following properties as extensive or intensive variables—
pressure, density, molar volume, heat capacity [2]
b) An amount of gas is enclosed within a iron cylinder. What is the nature of the boundary that separates the gas from the surrounding— closed/open, fixed/movable, adiabatic/non-adiabatic. [2]

Attempt any one question :

3. a) Define temperature with respect to the kinetic theory of gases. Also show that $C_{rms} = \sqrt{\frac{3RT}{M}}$. [3]
b) What is most probable velocity of gaseous system? [1]
4. a) Define the expression of Maxwell's distribution of gas molecular speed. Explain the terms. [2]
b) Arrive at the Dalton's law of partial pressure equation from kinetic theory of gas. [2]

Group – B

Attempt any one question :

5. a) Write the structural formulas and give the IUPAC names for all monochloro derivatives of isopentane. [2]
b) Write equations to show the products obtained from the reactions : [2]
i) 2-Bromo-2-methylpropane + magnesium in dry ether
ii) Product of (i) + H₂O
iii) Product of (i) + D₂O
c) Write different resonating structures of $\text{MeO}-\text{C}_6\text{H}_4-\text{CH}_2^+$.
Compare its stability with $\text{C}_6\text{H}_5\text{CH}_2^+$. [2]
d) Arrange the following in order of stability. Justify your answer. $\text{CH}_3^{(-)}$, $\text{CH}_3-\text{CH}_2^{(-)}$, $\text{CF}_3^{(-)}$ [2]
6. a) Use 1-bromo-2-methylbutane and any other one- or two- carbon compounds, if needed, to synthesize the following with good yields : [2×2]
i) 3, 6-dimethyloctane (ii) 3-methylhexane
b) Define centre of symmetry with an example. [2]
c) Mention three aspects for a chiral molecule which can distinguish it from an achiral molecule. [2]

Group – C

Attempt any one question :

7. a) What do you mean by specific conductance and what is the unit of specific conductance? [1+1]
b) Write the relation between equivalent conductance and molar conductance taking the example of $\text{Al}_2(\text{SO}_4)_3$. [2]
c) Arrange and explain the equivalent conductance of the following solutions of Na_2SO_4 . 1·0(N), 0·1(N), 0·01(N) and at infinite dilution. [2]
d) Draw the graph of equivalent conductance at different concentration to infinite dilution of the electrolytes HCl, BaCl_2 and CH_3COOH and explain. [3]
8. a) Draw the qualitative MO diagram of CO and comment on the C–O bond order. [3]
b) Comment on the bond order and bond length of N_2 , N_2^+ , N_2^- , N_2^{2-} . [3]
c) Define, conductor, semiconductor and Insulator. What happen when trace amount of ‘B’ is dopped with Si? [3]

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