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End Semester Examination of Semester-I, 2015

Subject : CHEMISTRY (HONS.)

Paper : CEMH-102 (Physical)

Full Marks : 20

Time : 1 Hr.

*The figures in the margin indicate the marks
corresponding to the question*

*Candidates are requested to give their answers
in their own word as far as practicable.*

Illustrate the answers whenever necessary

Group A

Answer any one question:

10x1=10

1. a) Define compressibility factor of gas. What is the value of compressibility factor of a Vander Waals gas at critical state? 3
- b) Vander Waals constant 'b' of a gas is 0.065 lit mol⁻¹. Calculate the diameter of the gas molecule. 3
- c) Define ion conductance and ionic mobility. Derive the relation between them. 4
2. a) Classify the following as extensive or intensive property: Density, Enthalpy, Specific heat, Pressure. 2

S # K Z G / w L

(2)

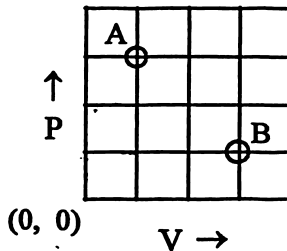
- b) One mole of an mono-atomic ideal gas at 300 K and 10 atm. expands to 1 atm. Calculate w , q , Δu and ΔH for
- isothermal reversible process,
 - adiabatic reversible process
- 4
- c) Adiabatic P-V plot is steeper than isothermal P-V plot. Explain. 2
- d) What are the advantages of conductometric titration over ordinary titration using indicator? 2

Group-B

Answer any one question:

6x1=6

3. a) One mole of an ideal gas undergoes a change of state from 'A' to 'B' by a single step expansion process and returns back to initial state A from 'B' by a single step compression process as shown in the following diagram.



Each small division along 'V' axis = 10^3 c.c. Each small division along 'P' axis = 10^6 dyne/cm²

- Calculate the work for expansion.
 - Calculate the work for compression.
- 2+2

(3)

- b) Represent the Vander Waals Constant 'a' and 'b' in terms of P_c and T_c . 2
4. a) Describe the transport number calculation using moving boundary method. 4
- b) "Presence of attractive force among the gas molecules decreases the value of mean free path in comparison to the situation where there is no force of attraction" – explain. 2

Group-C

Answer any two questions:

2x2=4

5. a) Deduce an expression for the total number of collisions in unit volume and unit time among the molecule of gas.
- b) Equivalent conductance of H^+ ion is $350 \text{ ohm}^{-1}\text{cm}^2 \text{ eq}^{-1}$ and SO_4^{2-} is, $80 \text{ ohm}^{-1}\text{cm}^2 \text{ eq}^{-1}$ at infinite dilution. Find molar conductance of H_2SO_4 .
- c) CO_2 gas shows same type of 'PV' vs 'P' curve as H_2 gas does – Justify or criticise.
- d) Classify the following system as open, closed or isolated system.
- i) Thermo flask
 - ii) Human body
 - iii) A solution being boiled under reflux
 - iv) Clinical thermometer.
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