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Fifth Semester B.Sc. Degree Examination, October 2015
First Degree Programme under CBCSS
Core Course V : CHEMISTRY
CH1541 : Physical Chemistry – I

ıe: 3 Hours

Max. Weight : 30

SECTION – A

swer in a **word/sentence**. Answer **all** questions.

1) Give the expression for Boyle temperature in terms of Vander Waal's constants.

2) The equation proposed by Kammerlingh-Onnes for a real gas is commonly called _____

3) Why does a gas occupy the entire volume of the container ?

4) How many atoms are present in one unit cell of a b.c.c. lattice ?

I. 5) To which point group does H_2O belong to ?

6) For a tetragonal crystal system, the unit cell angles α, β and γ are _____

7) Schottky and Frenkel defects would increase exponentially with increase in _____

8) Water drops assume spherical shape due to the _____ of water.

III. 9) It is impossible to convert heat into work without compensation. This is a way of stating _____ law of thermodynamics.

10) It is not possible to determine the molecular mass of a non-volatile solute by Cryoscopic method using an ordinary thermometer. Why ?

11) A spontaneous process is accompanied by decrease in _____ of a system.

12) What is the point groups of BF_3 ?

P.T.O.

IV. 13) At STP, the temperature of the system is _____

14) For an ideal gas, Joule-Thomson effect is _____

15) Unit of viscosity in SI units is _____

16) It is not possible to liquify CO_2 at 40°C by applying pressure. Why ?

(.25×16=4 Weig

SECTION – B

(Short answer type) Answer **any 8. Each** question carries **1** weightage.

17. Calculate the work done when 1 mole of hydrogen occupying in a cylinder volume 1 litre at 25°C expands isothermally and reversibly to 2 litres.

18. What are the reasons for the deviations from ideal behaviour of real gases ?

19. Calculate the critical temperature of a liquid if its B.P. is 80°C.

20. What is meant by the molar refraction of a liquid ?

21. Calculate the osmotic pressure of an aqueous solution containing 1 gram glucose per litre at 27°C.

22. Sodium Chloride has a f.c.c. structure. How many Na^+ and Cl^- ions are there the unit cell ?

23. Calculate the interplanar spacing for a cubic system between 110 planes.

24. Explain why the determination of molecular mass of benzoic acid in benzene b cryoscopic method gives almost double the value expected.

25. Write down the mathematical statement of first law of thermodynamics and explai the terms.

26. Distinguish between transition point and melting point.

27. How is mean free path related to coefficient of viscosity ?

28. Write down the equation showing the variation of enthalpy of a reaction wit temperature and explain the terms.

SECTION – C

ver **any 5** from the following. **Each** question carries **2** weightage.

At what temperature would ethane molecules have the same RMS velocity as methane molecules at 27°C ?

A metal crystallises with b.c.c. Lattice. The length of unit cell edge is 287 pm. Calculate the density of the metal in gcm^{-3}.

Set up the group multiplication table for C_{3V} point group.

How is surface tension determined by the stalagmometer ?

Explain the conditions of spontaneous process in terms of entropy and Gibbs free energy.

What are liquid crystals ? How are they classified ?

Write a note on fugacity.

Determine the point groups of NH_3.

SECTION – D

g essay type) Answer **any 2** from the following. **Each** question carries **4** weightage.

a) Derive the Gibbs-Helmholtz equation for a process taking place at constant pressure.

b) The free energy change ΔG accompanying a process is – 80.5 KJ at 20°C and – 78.2 KJ at 30°C. Calculate the change in enthalpy ΔH for the process.

Describe Carnot's cycle and derive an equation for the efficiency of a heat engine operating at two different temperatures.

a) Plot the isotherms for CO_2 and explain continuity of state.

b) State the relationship between Vander Waal's constants and critical constants.