THIRD SEMESTER (CBCSS-UG) DEGREE EXAMINATION, NOVEMBER 2020

Chemistry/Industrial Chemistry/Polymer Chemistry

CHE 3B 03—PHYSICAL CHEMISTRY – I

Time : Two Hours   Maximum : 60 Marks

Section A (Short Answers)

Answer at least **eight** *questions.*
Each question carries 3 marks.
All questions can be attended.
Overall Ceiling 24.

1. The density of O_2 at 298K and 1 atm is 1.429 gdm^{-3} Calculate the RMS velocity of O_2 at 275K.

2. For O_2 at 25°C calculate mean free path at l atm given d = 361 pm.

3. Define Cp and Cv of an ideal gas. How are they related ?

4. Calculate change in internal energy for conversionof 1 mol of H_2O at 100°C to steam at 1 atm. The heat absorbed and work done by system are 40.7 kJ and 3.1 kJ respectively.

5. How is entropy related to thermodynamic probability ?

6. What is meant by partition function ?

7. State Le chatliers principle.

8. Give relation between Kp and Kc and explain the terms.

9. Name point group to which NH_3 belongs. Write down its symmetry elements.

10. What is an identity operation ?

11. What is meant by axis of symmetry ? Illustrate with an example.

12. What are the symmetry elements ?

(8 × 3 = 24marks)

Section B (Paragraph)

Answer at least **five** *questions.*
Each question carries 5 marks.
All questions can be attended.
Overall Ceiling 25.

13. Why Vander waals equation is applicable to real gases? Define compressibility factor and Boyle Temperature.

14. Give a brief account of Maxwell's distribution law of velocities.

15. Derive Kirchoffs equation showing variation of heat of reaction with temperature.

16. 10 moles of an ideal gas is expanded reversibly and isothermally from pressure 10 atm to 2 atm at 300K. Calculate maximum work done.

17. Discuss apllications of third law of thermodynamics.

18. Derive Gibbs-Duem equation.

19. Identify symmetry elements in (a) BF_3 (b) C_6H_6 ; (c) benzene ; (d) acetylene. Name point group of these molecules.

(5 × 5 = 25 marks)

Section C (Essay)

Answer any **one** *question.*
The question carries 11 *marks.*

20. (a) What is Joule-Thomson effect ?

    (b) Describe Lindes and Claudes method for liquefaction of gases.

21. (a) State and explain the terms law of mass action and chemical equilibrium.

    (b) Apply Lechatelier principle to predict effect of (a) change of temperature (b) change of pressure

    on $PCl_5 \rightleftharpoons PCl_3 + Cl_2$ $\Delta H = 92.05$ KJ.

(1 × 11 = 11 marks)