



DEPARTMENT OF CHEMISTRY

Shyam Lal College

(University of Delhi)

Physical Chemistry Assignments, B.Sc.Phy.Sc.(CBCS) IVth Semester

By: Dr. OMPAL SINGH YADAV

1. What is the average Kinetic energy of one mole of nitrogen oxide at 300 K in kJ?
2. Isotherms of carbon dioxide at different temperatures have helped in establishing the relation between critical constant and van-der waals constant. Justify.
3. Calculate the radius of atom, given its critical temperature and pressure as - 122^oC and 48 atm. respectively. Assume that argon obeys van-der waals equation of state.
4. Derive the following:

$$P_c V_c = \frac{3}{8} RT_c$$

Where the symbols have their usual meanings.

5. state the law of corresponding states and deduce the equation

$$\left[\left(\pi + \frac{3}{\phi^2} \right) \right] (3\phi - 1) = 8\theta$$

What is the limit of its applicability and to what use has it been put?

6. What is meant by the co-efficient of viscosity of a liquid? Describe one method of determining it.
7. (a) describe briefly the drop weight and drop number method for determining the surface of a liquid.

(b) Two soap bubbles of radius 4.0 cm. and 5.0 cm. are joined together so as to have a common surface. Find the radius of the surface.

8. Derive Bragg's equation for the diffraction of X-rays by crystals.

9. Briefly explain the terms-unit cell and crystals lattice;

10. (a) Write short note on 'Miller Indices'

(b) A crystal plane intercepts the three axes of a crystal at the multiplies of $\frac{3}{2}$, 2 and 1 of the axial lengths. What are the Miller indices of this plane?

11. Use the Arrhenius equation to show why the rate constant of a reaction

(i) Decreases with increasing activation energy.

(ii) Increases with increasing temperature.

12. Derive the expression for the rate constant of second order reaction

$2A \rightarrow \text{products}$.

13. What is the half- life of a compound? If 75% of a given sample of the compound decomposes in 60 min. Assume first -order kinetics.

14. Write short note on the following:

(a) Collision Theory of the Reaction Rates

(b) Theory of Absolute Reaction rates.

15. What is meant by Pseudo-unimolecular reactions? Explain with examples.