Physical Chemistry
1G

1) Write the postulates of kinetic theories of gases.
2) Derive the equation $PV = 1/3 \, mnc^2$ from kinetic theory of gases.
3) Explain temperature from kinetic theories of gases.
4) Starting from the equation $PV = 1/3 \, mnc^2$ deduce the following –
i) Boyle's law
ii) Charle's law
iii) Avogadro's law
iv) Graham's law
v) Average KE per mole and per molecule of a gas at a definite temperature.
vi) Daltons law of partial pressure.
5) Write Maxwell distribution of molecular velocity with graphical representation.
6) Define most probable velocity, average velocity, root mean square velocity and write the ration of them.
7) Define collision diameter, collision number, collision frequency
8) What is mean free path? Write the relation between mean free path, pressure and temperature.
9) Define Specific heat and heat capacities of gases
10) Show that $C_p - C_v = R$
11) Why real gases do not obey ideal behavior?
12) Under which condition real gases obey ideal behavior?
13) Write the differences between ideal gases and real gases.
14) What is compressibility factor?
15) Write Vanderwall's equation for 1 mole and 'n' mole of gases.
16) Derive Vanderwall's equation followed by volume and pressure correction.
17) Write the significance and unit of Vanderwaal's constant 'a' and 'b'.
18) What is Boyle's temperature?
19) Express Vanderwaal's equation in terms of critical constant.
20) How Vanderwaal constant are related with critical volume, critical temperature and critical volume?
21) What is Boltzman constant and Loschmidt number?
22) What is critical coefficient? Find critical coefficient for Vanderwaal's gas.
23) Express Vanderwaal's constant in terms of critical constant.
24) What is critical compressibility factor? What is the value for Vanderwaal's gas.
25) Write law of corresponding state. Deduce the reduced equation of state for Vanderwaal's gas.
26) Calculate average velocity of Nitrogen molecule at 27^0C.
27) Calculate r.m.s velocity of He molecule at 27^0C.
28) Calculate the KE of 32 g of methane at 27^0C.
29) Calculate the most probable velocity of N_2 gas at 27^0C.
30) Write the value of C_p/C_v for monoatomic, diatomic and polyatomic gases.
31) Draw the Amagat's curve and explain the nature of the plot with the help of vanderwaal's equation.
32) Calculate average KE of 1 mole CO_2 gas at 300^0C.
33) Calculate the mean free path of Ar at normal temperature and pressure. The diameter of Ar atom is $2.24 A^0$.