Date Planned : __ / __ / __	Daily Tutorial Sheet-4	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration :________

46. An evacuated glass vessel weighs 50 gm when empty, 148 gm when filled with a liquid of density 0.98 gm/ml and 50.5 gm when filled with an ideal gas at 760 mm Hg at 300 K. Calculate molar mass of gas. **(1998)**

47. **Statement I :** The value of vander Waals' constant 'a' is larger for ammonia than for nitrogen.
Statement II : Hydrogen bonding is present in ammonia. **(1998)**

(A) Statement-I is True, Statement-II is True and Statement-II is a correct explanation for Statement-I
(B) Statement-I is True, Statement-II is True and Statement-II is NOT a correct explanation for Statement-I
(C) Statement-I is True, Statement-II is False
(D) Statement-I is False, Statement-II is True

48. Using Van der Waal's equation, calculate the constant a when two moles of a gas confined in a four litre flask exert a pressure of 11.0 atm at a temperature of 300K. The value of b is c 0.05 L mol^{-1}. **(1998)**

49. Calculate the pressure exerted by one mole of CO_2 gas at 273 K if the Van der Waals' constant a = 3.592 $\text{dm}^6 \text{ atm mol}^{-2}$. Assume that the volume occupied by CO_2 molecules is negligible. **(2000)**

50. The compressibility of a gas is less than unity at STP. Therefore, **(2000)**

(A) $V_m > 22.4$ litres **(B)** $V_m < 22.4$ litres
(C) $V_m = 22.4$ litres **(D)** $V_m = 44.8$ litres

51. The rms velocity of hydrogen is $\sqrt{7}$ times the rms velocity of nitrogen. If T is the temperature of the gas, then : **(2000)**

(A) $T_{H_2} = T_{N_2}$ **(B)** $T_{H_2} > T_{N_2}$ **(C)** $T_{H_2} < T_{N_2}$ **(D)** $T_{H_2} = \sqrt{7}\, T_{N_2}$

52. **Statement I:** The pressure of a fixed amount of an ideal gas is proportional to its temperature **(2000)**
Statement II: Frequency of collisions and their impact both increase in proportion to the square root of temperature.

(A) Statement-I is True, Statement-II is True and Statement-II is a correct explanation for Statement-I.
(B) Statement-I is True, Statement-II is True and Statement-II is NOT a correct explanation for Statement-I.
(C) Statement-I is True, Statement-II is False.
(D) Statement-I is False, Statement-II is True.

53. The root mean square velocity of an ideal gas at constant pressure varies with density **(d)** as: **(2001)**

(A) d^2 **(B)** d **(C)** $\sqrt{d}$ **(D)** $1/\sqrt{d}$

54. The compression factor (compressibility factor) for one mole of a Van der Waal's gas at $0°C$ and 100 atm pressure is found to be 0.5. Assuming that the volume of a gas molecule is negligible, calculate the van der Waals' constant 'a'. **(2001)**

55. The density of the vapour of a substance at 1 atm pressure and 500 K is 0.36 $kg\,m^{-3}$. The vapour effuses through a small hole at a rate of 1.33 times faster than oxygen under the same condition. **(2002)**

(i) Determine, (a) molecular weight (b) molar volume (c) compression factor (Z) of the vapour and (d) which forces among the gas molecules are dominating, the attractive or the repulsive?

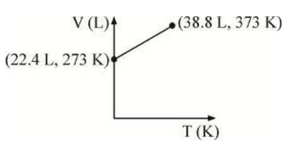
(ii) If the vapour behaves ideally at 1000 K, determine the average translational kinetic energy of a molecule.

56. When the temperature is increased, surface tension of water: **(2002)**

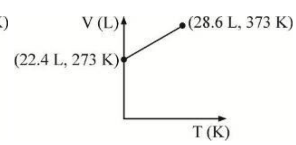
(A) increases **(B)** decreases

(C) remains constant **(D)** shows irregular behavior

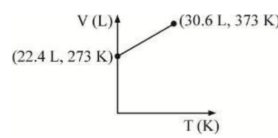
57. Which of the following volume (V) –temperature (T) plots represents the behaviour of one mole of an ideal gas at one atmospheric pressure? **(2002)**



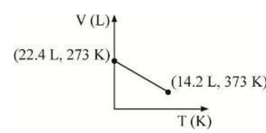
(A)



(B)



(C)



(D)

58. The average velocity of gas molecules is $400\ ms^{-1}$, find the rms velocity of the gas. **(2003)**

59. Positive deviation from ideal behaviour takes place because of : **(2003)**

(A) molecular interaction between atoms and $PV/nRT > 1$

(B) molecular interaction between atoms and $PV/nRT < 1$

(C) finite size of atoms and $PV/nRT > 1$

(D) finite size of atoms and $PV/nRT < 1$

60. The root mean square velocity of one mole of a monoatomic gas having molar mass M is $v_{r.m.s}$. The relation between the average kinetic energy (E) of the gas and $v_{r.m.s}$ is : **(2004)**

(A) $v_{r.m.s} = \sqrt{\frac{3E}{2M}}$ **(B)** $v_{r.m.s} = \sqrt{\frac{2E}{3M}}$ **(C)** $v_{r.m.s} = \sqrt{\frac{2E}{M}}$ **(D)** $v_{r.m.s} = \sqrt{\frac{E}{3M}}$