IV. Multiple Choice Questions

Question 1. For one mole of a gas, the ideal gas equation is
(a) PV = 1/2RT
(b) PV = RT
(c) PV = 3/2RT
(d) PV = 5/2 RT
Question 2. The average kinetic energy of the gas molecule is
(a) inversely proportional to its absolute temperature
(b) directly proportional to its absolute temperature
(c) equal to the square of its absolute temperature
(d) All of the above
Question 3. Which of the following is the correct mathematical relation for Charles law at constant pressure?
(a) VαT
(b) Vαt
(c) Vα1/T
(d) all of above
Question 4. At constant temperature, the pressure of the gas is reduced to one-third, the volume
(a) reduce to one-third
(b) increases by three times
(c) remaining the same
(d) cannot be predicted
Question 5. With rise in temperature, the surface tension of a liquid
(a) decreases
(b) increases
(c) remaining the same
(d) none of the above
Question 6. Viscosity of a liquid is a measure of
(a) repulsive forces between the liquid molecules
(b) frictional resistance
(c) intermolecular forces between the molecules
(d)none of the above
Question 7. The cleansing action of soaps and detergents is due to
(a) internal friction
(b) high hydrogen bonding
(c) viscosity
(d) surface tensions
Question 8. In van der Waals equation of state for a non-ideal gas the net force of attaction among the molecules is given by

$(a)\ \frac{an^2}{V^2}$ $(b)\ P+\frac{an^2}{V^2}$ $(c)\ P-\frac{an^2}{V^2}$ $(d)\ -\frac{an^2}{V^2}$

Question 9. The compressibility factor, z for an ideal gas is
(a) zero
(b) less than one
(c) greater than one
(d) equal to one
Question 10. Which of the following gases will have the lowest rate of diffusion?
(a) H_2 (b) N_2 (C) F_2 (d) O_2
Answer:
1. (b)
2. (b)
3. (a)

4. (b)
5. (a)
6. (b)
7. (d)
8. (a)
9. (d)
10. (c)

V. Hots Questions

Question 1. (a) Why aerated water bottles kept under water during summer?
(b) Which property of liquid is responsible for spherical shape of drop?
(c) Why is moist air lighter than dry air?
(d) Define aqueous tension.
(e) What are units of a and b which are van der Waals constants?
Answer:
(a) To reduce temperature, so as to reduce pressure, otherwise bottle may burst.
(b) Surface Tension.
(c) Moist air has water vapours which lowers vapour density, so it is lighter.
(d) It is pressure of water vapours at given temperature.
(e) Unit of a is $L^2\ mol^{-2}$, b is $L\ mol^{-1}$.

Question 2. Why does sharpened edge becomes smooth on heating up to melting point?
Answer: On heating the glass, it melts and take up rounded shape at edges which has minimum surface area b/c of surface tension.

Question 3. Arrange the following in order of increasing density:

$d = \frac{PM}{RT}$, O_2 at 25°C, 2 atm. O_2 at 0°C, 2 atm. O_2 at 273°C, 1 atm.

Answer:

$d = \frac{PM}{RT}$, R and M are constant, so d depends upon $\frac{P}{T}$. So at 25°C, 1 atm, $\frac{P}{T} = \frac{1}{298}$. At 273° C, 1 atm, $\frac{P}{T} = \frac{1}{546}$. Hence, increasing order of density will be:

O_2 at 273° C, 1 atm < O_2 at 25° C, 2 atm.

Question 4. An O_2 cylinder has 10 LO_2 at 200 atm. If patient takes 0.50 ml of O_2 at 1 atm in one breath 37°C, how many breaths are possible?
Answer:

$P_1 = 200$ atm, $V_1 = 10L$
$P_2 = 1$ atm, $V_2 = ?$
$P_1V_1 = P_2V_2 \Rightarrow 200 \times 10 = 1 \times V_2$ or $V_2 = 2000$ L.

$$\text{No. of breathes} = \frac{\text{Total Volume}}{\text{Volume for 1 breath}} = \frac{2000L}{0.5 \times 10^{-3}L} = 4 \times 10^6$$

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