NEET PHYSICS

Topic: Kinetic theory of gases

Q.1 The gas molecules are not accumulated at the bottom of the container because -

(1) These do not have gravitation force between them

(2) Molecules have less mass and high velocities and therefore no gravitational force

(3) The direction of motion of molecules is changing on account of collisions.

(4) These is cohesive force between the gas molecules and the wall of the container acting in all direction.

Q.2 In kinetic theory of gases, it is assumed that molecules -

(1) Have same mass but can have different volume

(2) Have same volume but masses can be different.

(3) Have both mass and volume different

(4) Have same mass but negligible volume.

Q.3 The postulates of kinetic theory will be true if the number of molecules be -

(1) Any

(2) Very large

(3) Very small

(4) Avogadro's number

Q.4 When two molecules of a gas come closer then -

(1) Their direction get changed

(2) There exists a force of attraction

(3) There exist a force of repulsion

(4) Kinetic energy is not conserved.

Q.5 Which of the following statement is not according to the postulates of kinetic theory of gases.-

(1) Gas molecules are of small size

(2) Gas molecules are always in motion with all possible velocities

(3) There is no force between the molecules

(4) None of these

Q.6 The molecular weight of O_2 and H_2 are 32 and 2 respectively. Then the ratio of the rms velocities of H_2 and oxygen is -

(1) 4 : 1 (2) 2 : 3 (3) 1 : 4 (4) 16 : 1

Q.7 Two vessels which have same volume are filled with H_2 and He respectively and at 1 and 2 atmospheric pressure. If temperature of both vessels is same then mean velocity of H_2 molecule is how many times the mean velocity of helium -

(1) Equal (2) Double

(3) Half (4) $\sqrt{2}$ times

Q.8 If velocities of 5 molecules of certain gas are –7, 5, 4, –3 and 1 m/sec respectively then mean speed of molecules is (m/sec) -

(1) Zero (2) 20 (3) 4 (4) $\sqrt{20}$

Q.9 If the rms speed of the nitrogen molecules of the gas at room temperature is 500 m/s, then the rms speed of the hydrogen molecules at the same temperature will be -

(1) 1870 m/s (2) 1935 m/s

(3) 7000 m/s (4) 83.7 m/s

Q.10 The rms velocity of molecules of a gas at temperature T is v_{rms}. Then the root mean square of the component of velocity in any one particular direction will be -

(1) $v_{rms}/\sqrt{3}$ (2) $\sqrt{3}\ v_{rms}$ (3) $v_{rms}/3$ (4) $3v_{rms}$

Q.11 The root mean square speed of molecules of ideal gases at the same temperature are -

(1) The same

(2) Inversely proportional to the square root of the molecular weight.

(3) Directly proportional to molecular weight.

(4) Inversely proportional to the molecular weight.

Q.12 The temperature of an ideal gas is increased from 27ºC to 927ºC.

The rms speed of its molecules becomes -

(1) Twice (2) Half

(3) Four times (4) One fourth

Q.13 At what temperature rms speed of gaseous hydrogen molecules equal

to that of oxygen molecules at 47ºC -

(1) 20 K (2) 80 K (3) –73 K (4) 3 K

Q.14 At what temperature, pressure remaining unchanged will the rms.

velocity of hydrogen molecule be twice its value at S.T.P.?

(1) 1000K (2) 1050 K

(3) 1092 K (4) 2010K

Q.15 The speed sound in a gas is v the rms velocity of gas molecules is (c),

if $C_p/C_v = \gamma$ for the gas then the ratio of v to c is -

(1) $3/\gamma$ (2) $\gamma / 3$

(3) $\sqrt{3/\gamma}$ (4) $\sqrt{\gamma/3}$

Q.16 A sample of gas is at 0ºC. The temperature at which its rms speed of the

molecules will be doubled is -

(1) 103ºC (2) 273ºC

(3) 723ºC (4) 819ºC

Q.17 The mass of an oxygen molecule is about 16 times that of hydrogen molecules. At room temperature, the rms speed of oxygen molecule is v. The rms speed of the hydrogen molecule at the same temperature will be -

(1) v/6 (2) v/4 (3) 4v (4) 16v

Q.18 RMS velocity of which of the following gas at a given temperature is minimum -

(1) O_2 (2) N_2 (3) Cl_2 (4) He

Q.19 At 0ºC temperature root mean square speed of which of the following gases be maximum –

(1) H_2 (2) N_2 (3) O_2 (4) SO_2

Q.20 The root mean square velocity of the molecules of an ideal gas is -

(1) $\sqrt{RT/M}$ (2) $\sqrt{3RT/TM}$

(3) $\sqrt{3RT/M}$ (4) $\sqrt{RT/3M}$

Q.21 N_2 molecule is 14 times heavier than a H_2 molecule. At what temperature will the rms speed of H_2 molecules be equal to that of N_2 molecule at 27ºC -

(1) 50ºC (2) 2ºC

(3) 21.4ºC (4) 21.4 K

Q.22 Equal masses of H_2 , He having molecular weight of 2 and 4 respectively are filled at same temperature in two containers of equal volumes. If H_2 gas has a pressure of 4 atmospheres, then He gas will have pressure as -

(1) 1 atmosphere (2) 4 atmosphere

(3) 2 atmosphere (4) 8 atmosphere

Q.23 The ratio of number of collisions per second at the wall of containers by H_2 and Ne gas molecules kept at same volume and temperature is given by -

(1) 10 : 1 (2) 1 : 10

(3) 1 : $\sqrt{10}$ (4) $\sqrt{10}$: 1

Q.24 The mass of a gas molecules is 4×10^{-30} kg. If such 10^{23} molecules per second strikes onto $4m^2$ area with velocity 10^7 m/sec, then the exerted pressure will be -

(1) 1 dyne/cm^2 (2) 1 N/m^2

(3) 2 N/m^2 (4) 2 dyne/cm^2

Q.25 The mass of hydrogen molecules is 3.32×10^{-24} gm. If 10^{23} H_2 molecules strike 2 sq. cm are per second with velocity of 10^5 cm/sec at an angle of 45º to the normal to wall, then the exerted pressure will be -

(1) 2.35 N/m^2 (2) 23.5 N/m^2

(3) 235 N/m^2 (4) 2350 N/m^2

Q.26 Molecules of a gas of mass m and velocity $\vec{v}$ after colliding normally with the wall change in momentum of the molecule will be -

(1) mv (2) 2mv (3) – mv (4) – 2mv

Q.27 If some gas has pressure P then pressure exerted by molecules along x direction will be -

(1) P (2) P/2 (3) P/3 (4) P/6

Q.28 When a gas is forced in a smaller volume without change in temperature, its pressure increases because its molecules -

(1) Strike the unit area of the container walls more often.

(2) Strike the unit area of the container walls at higher speed.

(3) Strike the unit area of the container wall with greater force.

(4) Have more energy.

Q.29 In a cubical box of volume V, there are N molecules of a gas moving randomly.

If m is mass of each molecule and v^2 is the mean square of x component of the velocity of molecules, then the pressure of the gas is -

(1) $P = \frac{1}{3}\frac{mNv^2}{V}$ (2) $P = \frac{mNv^2}{V}$

(3) $P = \frac{1}{3}mNv^2$ (4) $P = mNv^2$

Q.30 Gas exerts pressure on the walls of the container because the molecules are -

(1) Colliding with each other and exchanging momenta.

(2) Colliding with the walls of the container and transferring energy to the walls.

(3) Colliding with the walls and transferring momentum to the walls of the container.

(4) Accelerated towards the walls.

ANSWER KEY

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.	2	4	2	1	4	1	4	3	1	1
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	1	1	3	4	4	3	3	1	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	4	3	4	3	4	4	1	1	2	3