DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : PHYSICS**
Date : **DPP No. : 9**

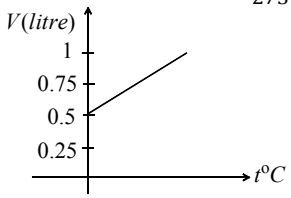
Topic :- KINETIC THEORY

1. The average kinetic energy of a gas molecule can be determined by knowing
   a) The number of molecules in the gas b) The pressure of the gas only
   c) The temperature of the gas only d) None of the above is enough by itself

2. Volume, pressure and temperature of an ideal gas are V, P and T respectively. If mass of its molecule is m, then its density is [$k =$ boltzmann's constant]
   a) mkT b) $\frac{P}{kT}$ c) $\frac{P}{kTV}$ d) $\frac{Pm}{kT}$

3. One kg of a diatomic gas is at a pressure of 8×10^4 Nm^{-2}. The density of the gas is 4 kgm^{-3}. What is the energy of the gas due to its thermal motion?
   a) 3×10^4 J b) 5×10^4 J c) 6×10^4 J d) 7×10^4 J

4. Graph between volume and temperature for a gas is shown in figure. If $\alpha =$ volume coefficient of gas $= \frac{1}{273} per$°C, then what is the volume of gas at a temperature of 819°C



   a) $1 \times 10^{-3}\ m^3$ b) $2 \times 10^{-3}\ m^3$ c) $3 \times 10^{-3}\ m^3$ d) $4 \times 10^{-3}\ m^3$

5. A lead bullet of 10 g travelling at 300 ms^{-1} strikes against a block of wood comes to rest. Assuming 50% of heat is absorbed by the bullet, the increase in is temperature is (Specific heat of lead = 150 JkgK^{-1})
   a) 100°C b) 125°C c) 150°C d) 200°C

6. When the pressure on 1200 ml of a gas in increased from 70 cm to 120 cm of mercury at constant temperature, the new volume of the gas will be
   a) 700 ml b) 600 ml c) 500 ml d) 400 ml

7. At constant temperature on increasing the pressure of a gas by 5% its volume will decrease by
   a) 5% b) 5.26% c) 4.26% d) 4.76%

8. The average kinetic energy of a helium atom at 30°C is
a) Less than 1 eV b) A few keV c) $50 - 60$ eV d) 13.6 eV

9. A diatomic gas is heated at constant pressure. What fraction of the heat energy is used to increase the thermal energy
a) 3/5 b) 3/7 c) 5/7 d) 5/9

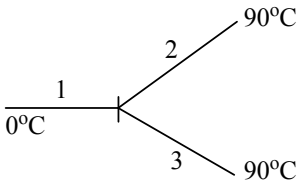
10. The molecules of a given mass of a gas have a rms velocity of 200 m/s at 27°C and 1.0×10^5 N/m^2 pressure. When the temperature is 127°C and pressure is 0.5×10^5 N/m^2, the rms velocity in m/s will be
a) $\frac{100\sqrt{2}}{3}$ b) $100\sqrt{2}$ c) $\frac{400}{\sqrt{3}}$ d) None of these

11. Three perfect gases at absolute temperature T_1, T_2 and T_3 are mixed. The masses of molecules are m_1, m_2 and m_3 and the number of molecules are n_1, n_2 and n_3 respectively. Assuming no loss of energy, the final temperature of the mixture is
a) $\frac{n_1T_1 + n_2T_2 + n_3T_3}{n_1 + n_2 + n_3}$ b) $\frac{n_1{T_1}^2 + n_2{T_2}^2 + n_3{T_3}^2}{n_1T_1 + n_2T_2 + n_3T_3}$
c) $\frac{{n_1}^2{T_1}^2 + {n_2}^2{T_2}^2 + {n_3}^2{T_3}^2}{n_1T_1 + n_2T_2 + n_3T_3}$ d) $\frac{T_1 + T_2 + T_3}{3}$

12. The density of a substance at 0°C is 10 g/cc and at 100°C, its density is 9.7 g/cc. The coefficient of linear expansion of the substance is
a) 10^{-4} °C^{-1} b) 10^{-2} °C^{-1} c) 10^{-3} °C^{-1} d) 10^{2} °C^{-1}

13. Molecular motion shows itself as
a) Temperature b) Internal Energy c) Friction d) Viscosity

14. Three rods made of same material and having same cross-section have been joined as shown in figure. Each rod is of same length. The left and right ends are kept at 0°C and 90°C respectively. The temperature of the junction of the three rods will be



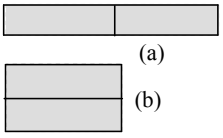
a) 45°C b) 60°C c) 30°C d) 20°C

15. An air bubble of volume 1.0 cm^3 rises from the bottom of a lake 40m deep at a temperature of 12°C. The volume of the bubble when it reaches the surface, which is at a temperature of 35°C, will be
a) 5.4 cm^3 b) 4.9 cm^3 c) 2.0 cm^3 d) 10.0 cm^3

16. The mean kinetic energy of a gas at 300 K is 100 J. The mean energy of the gas at 450 K is equal to
a) 100 J b) 3000 J c) 450 J d) 150 J

17. Two identical vessels A and B with frictionless pistons conatin the same ideal gas at the same temperature and the same volume V. The masses of gas in A and B are m_A and m_B respectively. The gases are allowed to expand isothermally to same final volume 2 V. The change in pressures of the gas in A and B are found to be Δp and 1.5 Δp respectively. Then
a) $9m_A = 4m_B$ b) $3m_A = 2m_B$ c) $2m_A = 3m_B$ d) $4m_A = 9m_B$

18. The identical square rods of metal are welded end to end as shown in figure, Q cal of heat flow through this combination in 4 min. If the rods were welded as shown in figure, the same amount of heat will flow through the combination in



a) 16 min b) 12 min c) 1 min d) 4 min

19. A steel ball of mass 0.1 kg falls freely from a height of 10 m of 10 m and bounces to a height of 5.4 m from the ground. If the dissipated energy in this process is absorbed by the ball, the rise in its temperature is
a) 0.01°C b) 0.1°C c) 1.1°C d) 1°C

20. The ratio of the vapour densities of two gases at a given temperature is 9:8. The ratio of the rms velocities of their molecules is
a) $3:2\sqrt{2}$ b) $2\sqrt{2}:3$ c) 9:8 d) 8:9