Q1. 21 January Shift 2

The r.m.s. speed of oxygen molecules at 47°C is equal to that of the hydrogen molecules kept at ____ °C. (Mass of oxygen molecule/mass of hydrogen molecule $= 32/2$)

(1) -235 (2) -253 (3) -100 (4) -20

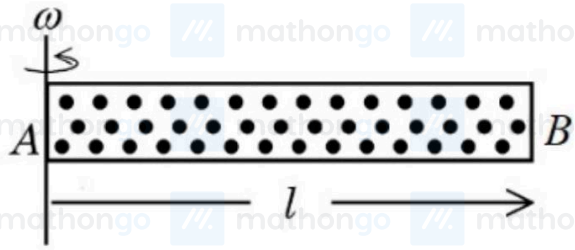
Q2. 22 January Shift 1

The volume of an ideal gas increases 8 times and temperature becomes $(1/4)^{\text{th}}$ of initial temperature during a reversible change. If there is no exchange of heat in this process $(\Delta Q = 0)$ then identify the gas from the following options (Assuming the gases given in the options are ideal gases):

(1) O_2 (2) NH_3 (3) CO_2 (4) He

Q3. 22 January Shift 1

A cylindrical tube AB of length l, closed at both ends contains an ideal gas of 1 mol having molecular weight M. The tube is rotated in a horizontal plane with constant angular velocity ω about an axis perpendicular to AB and passing through the edge at end A, as shown in the figure. If P_A and P_B are the pressures at A and B respectively,



then (Consider the temperature is same at all points in the tube)

(1) $P_B = P_A$ (2) $P_B = P_A \exp\left(M\omega^2 l^2/3RT\right)$

(3) $P_B = P_A \exp\left(M\omega^2 l^2/RT\right)$ (4) $P_B = P_A \exp\left(M\omega^2 l^2/2RT\right)$

Q4. 22 January Shift 2

Consider two boxes containing ideal gases A and B such that their temperatures, pressures and number densities are same. The molecular size of A is half of that of B and mass of molecule A is four times that of B. If the collision frequency in gas B is 32×10^{18}/s then collision frequency in gas A is ____ /s.

(1) 2×10^8 (2) 8×10^8 (3) 4×10^8 (4) 32×10^8

Q5. 24 January Shift 1

A gas of certain mass filled in a closed cylinder at a pressure of 3.23 kPa has temperature 50°C. The gas is now heated to double its temperature. The modified pressure is ____ Pa.

Q6. 28 January Shift 2

The mean free path of a molecule of diameter 5×10^{-10} m at the temperature 41°C and pressure 1.38×10^5 Pa, is given as ____ m.

(Given $k_B = 1.38 \times 10^{-23}$ J/K).

(1) $10\sqrt{2} \times 10^{-8}$ (2) $2\sqrt{2} \times 10^{-8}$ (3) $2\sqrt{2} \times 10^{-10}$ (4) 2×10^{-8}

ANSWER KEYS

1. (2)	**2.** (4)	**3.** (4)	**4.** (3)	**5.** 3730	**6.** (2)