

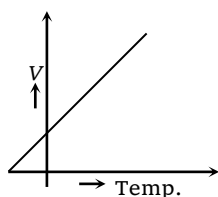
Gaseous State

Self Evaluation Test - 6

1. Same mass of CH_4 and H_2 is taken in container.
The partial pressure caused by H_2 is [IIT 1989; CPMT 1996]

(a) 8 / 9 (b) 1 / 9
(c) 1 / 2 (d) 1

2. The following graph illustrates [JIPMER 2000]



(a) Dalton's law (b) Charle's law
(c) Boyle's law (d) Gay-Lussac's law

3. If the pressure and absolute temperature of 2 litres of CO_2 are doubled, the volume of CO_2 would become

[CBSE PMT 1991]
(a) 2 litres (b) 4 litres
(c) 5 litres (d) 7 litres

4. What is kinetic energy of 1g of O_2 at $47^\circ C$

[Orissa JEE 2004]
(a) $1.24 \times 10^2 J$ (b) $2.24 \times 10^2 J$
(c) $1.24 \times 10^3 J$ (d) $3.24 \times 10^2 J$

5. The root mean square speeds at STP for the gases H_2, N_2, O_2 and HBr are in the order

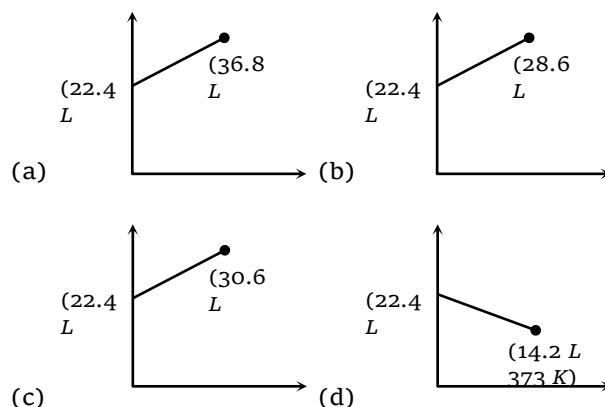
[Pb. CET 1994; CBSE PMT 1991]
(a) $H_2 < N_2 < O_2 < HBr$
(b) $HBr < O_2 < N_2 < H_2$
(c) $H_2 < N_2 = O_2 < HBr$
(d) $HBr < O_2 < H_2 < N_2$

6. By what ratio the average velocity of the molecule in gas change when the temperature is raised from 50 to $200^\circ C$

[DCE 2003]

(a) 1.21 / 1 (b) 1.46 / 1
(c) 1.14 / 1 (d) 4 / 1

7. Which of the following volume (V) - temperature (T) plots represents the behaviour of one mole of an ideal gas at one atmospheric pressure [IIT Screening 2001]



8. If the average velocity of N_2 molecule is $0.3 m/s$ at $27^\circ C$, then the velocity will be $0.6 m/s$ at [Pb. CET 2001]

(a) 1200 K (b) 600 K
(c) 400 K (d) 1800 K

9. Equal volumes of two gases which do not react together are enclosed in separate vessels. Their pressures at 100 mm and 400 mm respectively. If the two vessels are joined together, then what will be the pressure of the resulting mixture (temperature remaining constant) [CBSE PMT 1981]

(a) 125 mm (b) 500 mm
(c) 1000 mm (d) 250 mm

10. A gas of volume 100 cc is kept in a vessel at pressure $10^4 Pa$ maintained at temperature $24^\circ C$. If now the pressure is increased to $10^5 Pa$, keeping the temperature constant, then the volume of the gas becomes [AFMC 1992]

(a) 10 cc (b) 100 cc
(c) 1 cc (d) 1000 cc

11. If a gas is expanded at constant temperature [IIT 1986]

(a) The pressure increases
(b) The kinetic energy of the molecules remains the same

- (c) The kinetic energy of the molecules decreases
 (d) The number of molecules of the gas increases
12. The rate of diffusion of SO_2 and O_2 are in the ratio
- (a) $1 : \sqrt{2}$ (b) $1 : 32$
 (c) $1 : 2$ (d) $1 : 4$

[Assam JET 1991; EAMCET 1980]

AS Answers and Solutions

(SET -6)

1. (a) N_{CH_4} = number of moles of $CH_4 = \frac{m}{16}$
 N_{H_2} = number of moles of $H_2 = \frac{m}{2}$
 fraction partial pressure of H_2 is

$$H_2 = \frac{n_{H_2}}{n_{H_2} + n_{CH_4}} = \frac{\frac{m}{2}}{\frac{m}{2} + \frac{m}{16}} = \frac{\frac{m}{2}}{\frac{9m}{16}} = \frac{8}{9}$$
2. (b) According to Charle's Law $V \propto T$
 $V_t = V_o + V_o \alpha t$
 compare it with $Y = C + mx$
3. (a) $V_2 = \frac{P_1 V_1}{T_1} \cdot \frac{T_2}{P_2} = \frac{P}{2P} \times 2t \times \frac{2T}{T} = 2t$
4. (a) $K.E. = \frac{3}{2} nRT = \frac{3}{2} \times \frac{1}{32} \times 8.314 \times 320 J$
 $= 1.24 \times 10^2 J$
5. (b) $V_{rms} \propto \frac{1}{\sqrt{m}}$

$$U_{H_2} : U_{N_2} : U_{O_2} : U_{HBr} = \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{20}} : \frac{1}{\sqrt{32}} : \frac{1}{\sqrt{81}}$$
 is
 $U_{HBr} < U_{O_2} < U_{N_2} < U_{H_2}$
6. (c) $T_1 = 150 + 273 = 423 K$; $T_2 = 50 + 273 = 323 K$
 Hence, $\frac{(V_{av})_1}{(V_{av})_2} = \sqrt{\frac{T_1}{T_2}} = \sqrt{\frac{423}{323}} = \frac{1.14}{1}$
7. (c) $\frac{V_1}{V_2} = \frac{T_1}{T_2} \therefore V_2 = V_1 \cdot \frac{T_2}{T_1} = \frac{22.4 \times 373}{273} = 30.6 L$
8. (a) $V_{rms} = \sqrt{\frac{3RT}{M}}$; $V_{rms} = \sqrt{T}$
 Given, $V_1 = V$, $T_1 = 300 K$
 $V_2 = 2V$, $T_2 = ?$

$$= \frac{V_1}{V_2} = \sqrt{\frac{T_1}{T_2}} = \left(\frac{V}{2V} \right)^2 = \frac{300}{T_2}$$

 $T_2 = 300 \times 4 = 1200 K$
9. (d) When two vessels are joined together, the volume will be doubled hence effective pressure will be halved

$$P = \frac{P_1 + P_2}{2} = \frac{100 + 400}{2} = 250 mm$$
10. (a) $P_1 V_1 = P_2 V_2$ at constant T
 $10^4 \cdot 100 = 10^5 \times V_2$
 $V_2 = 10 cc$
11. (b) Kinetic energy will also remain constant if Temperature is constant.
12. (a) $\frac{r_{SO_2}}{r_{O_2}} = \sqrt{\frac{M_{O_2}}{M_{SO_2}}} = \sqrt{\frac{32}{64}} = \frac{1}{\sqrt{2}}$
