PHYSICAL CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP No. 26

Total Marks : 30

Max. Time : 35 min.

Topic : Gaseous State

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.2	(3 marks, 3 min.)	[6, 6]
Multiple choice objective ('–1' negative marking) Q.3	(4 marks, 4 min.)	[4, 4]
Subjective Questions ('–1' negative marking) Q.4 to Q.8	(4 marks, 5 min.)	[20, 25]

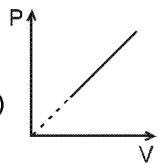
1. A bottle is heated with mouth open to have a final temperature as 125ºC from its original value of 25°C. The mole percentage of expelled air is about :

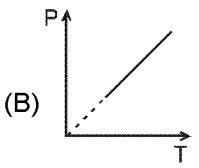
(A) 50% (B) 25% (C) 33% (D) 40%

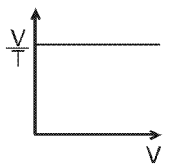
2. 1 litre of N_2 and 7/8 litre of O_2 are taken separately at the same temperature and pressure. What is the relation between the masses of the gases :

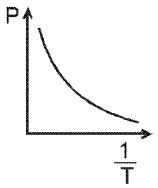
(A) $m_{N_2} = 3\, m_{O_2}$ (B) $m_{N_2} = 8\, m_{O_2}$ (C) $m_{N_2} = m_{O_2}$ (D) $m_{N_2} = 16\, m_{O_2}$

3. Which of the following graphs is /are possible for a fixed amount of gas :

(A) 

(B) 

(C) 

(D) 

4. A student forgot to add the reaction mixture to a round bottomed flask at 27°C but he put it on the flame. After a lapse of time, he realised his mistake. Using a pyrometer, he found that the temperature of the flask was 477°C. What fraction of moles of air would have expelled out ?

5. If the volume of a gas contained in a vessel increases by 0.4 % when heated by 1ºC, then find the initial temperature of gas in ºC.

6. A gas occupies 300 mL at 27°C and 684 mm pressure. What would be its volume at STP ?

7. 2 g of a gas A is introduced into an evacuated flask kept at 27°C. The pressure is found to be 1 atm. If 3 g of another gas B is added to the same flask, the total pressure becomes 1.5 atm. Assuming constant temperature and ideal gas behaviour, calculate :

(a) the ratio of mol. weight of gases, M_A and M_B. (b) the volume of the vessel, if gas A is He

8. Equal volumes of two gases, which do not react together, are enclosed in separate vessels. Their pressures are 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) :

(A) 350 mm (B) 500 mm (C) 1000 mm (D) 250 mm

Answer Key

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1.	(B)	**2.**	(C)	**3.**	(A,B,C,D)	**4.**	0.6		
5.	– 23°C	**6.**	245.7 mL	**7.**	(a) 1 : 3(b) 12.3 litre			**8.**	(D)

Hints & Solutions

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3. (A) Temperature should be increased continuously.

4. At T_1 = 300 K, mole of air = n_1 ; At T_2 = 750 K, mole of air = n_2

$\therefore$ at constant P, V $n_1T_1 = n_2T_2$; $\therefore$ $n_1 \times 300 = n_2 \times 750$

or $n_2 = \frac{300}{750} \times n_1$; or $n_2 = 0.4\ n_1$

$\therefore$ moles of air escaped out = $n_1 - n_2 = n_1 - 0.4\ n_1 = 0.6\ n_1$ **or** fraction of air escaped out = **0.6 Ans.**

5. **– 23°C**

6. Given, initially $V_2 = \frac{300}{1000}$ litre, $P_2 = \frac{684}{760}$ atm, T_2 = 300 K

At STP V_1 = ?, P_1 = 1 atm, T_1 = 273 K

Now use, $\frac{P_2V_2}{T_2} = \frac{P_1V_1}{T_1}$

V_1 = 0.2457 litre

$\therefore$ Volume (V) at STP = 245.7 mL.

7. (a) 1 : 3 (b) 12.3 litre

8. Let, vol of containers be V & temp be T

P_1 = 100 mm P_2 = 400mm

$\therefore$ $n_1 = \frac{P_1V}{RT}$ & $n_2 = \frac{P_2V}{RT}$

$\therefore$ $n_1 + n_2 = \frac{(P_1 + P_2) \times V}{RT}$

After joining two containers final vol = (V+V) = 2V(for gases)

$\therefore$ $P_{final} = \frac{(n_1 + n_2)RT}{V_{final}} = \frac{(P_1 + P_2) \times V}{RT} \times \frac{RT}{2V} = \frac{(P_1 + P_2)}{2}$

$= \frac{(100 + 400)mm}{2} = 250$ mm.