PHYSICAL CHEMISTRY

DPP

DAILY PRACTICE PROBLEMS

DPP No. 28

Total Marks : 30

Max. Time : 33 min.

Topic : Gaseous State

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.6	(3 marks, 3 min.)	[18, 18]
Subjective Questions ('–1' negative marking) Q.7 to Q.9	(4 marks, 5 min.)	[12, 15]

1. The density of Nitrogen gas is maximum at :

(A) STP (B) 273 K and 1 atm (C) 546 K and 2 atm (D) 546 K and 4 atm

2. A gas has a density of 1.25 g L^{-1} at STP. Identify it :

(A) NO_2 (B) O_2 (C) N_2 (D) SO_2

3. A sample of impure air contains 80% N_2, 10% O_2, 5% CO_2 and 5% Ar by volume. The average molecular weight of the sample is : (At wt. of Ar = 40)

(A) 29.4 (B) 29.8 (C) 30.0 (D) 29.6

4. The density of gas A is twice that of a gas B at the same temperature. The molecular weight of gas B is thrice that of A.The ratio of the pressure exerted on A and B will be :

(A) 6 : 1 (B) 7 : 8 (C) 2 : 5 (D) 1 : 4

5. A mixture of two gases A and B in the mole ratio 2 : 3 is kept in a 2 litre vessel. A second 3 litre vessel has the same two gases in the mole ratio 3 : 5. Both gas mixtures have the same temperature and same pressure. They are allowed to intermix and the final temperature and pressure are the same as the initial values, the final volume being 5 litres. Given that the molar masses are M_A and M_B, what is the mean molar mass of the final mixture :

(A) $\frac{77M_A+123M_B}{200}$ (B) $\frac{123M_A+77M_B}{200}$ (C) $\frac{77M_A+123M_B}{250}$ (D) $\frac{123M_A+77M_B}{250}$

6. Two flasks of equal volume connected by a narrow tube (of negligible volume) contains a certain amount of N_2 gas at 2 atm and 27°C. The I^{st} flask is then immersed into a bath kept at 47°C while the II^{nd} flask is immersed into a bath kept at 127°C. The ratio of the number of moles of N_2 in I^{st} flask and II flask respectively after sometime will be :

(A) 5 : 4 (B) 2 : 3 (C) 3 : 2 (D) 4 : 5

7. Two glass bulbs of equal volume and filled with a gas at 500 K and pressure of 76 cm of Hg, are connected by a narrow tube. One of the bulb is then placed in a water bath maintained at 700 K and the other bulb is maintained at 500 K. What is the new value of the pressure inside the bulbs ? The volume of the connecting tube is negligible.

8. A certain amount of gas is enclosed in a sphere of volume 5L at pressure 7atm and temperature 327ºC. It is then connected to another sphere of volume 2.5 L by a narrow tube and stopcock. The second sphere is initially evacuated and the stopcock is closed. After opening the stopcock, the temperature of gas in the second sphere becomes 127ºC, while the first sphere is maintained at 327ºC. Find the final gas pressure within the two spheres.

9. The stop cock connecting the two bulbs of volume 8 litre and 10 litre containing an ideal gas at 6.25 atm and 4 atm respectively, is opened. What is the final pressure, if the temperature remains same ?

Answer Key

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1.	(D)	**2.**	(C)	**3.**	(B)	**4.**	(A)	**5.**	(A)
6.	(A)	**7.**	88.67 cm of Hg	**8.**	4 atm	**9.**	5 atm		

Hints & Solutions

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6. Finally, the ratio of moles of gas in the 2 flasks is the ratio of the partial pressure of gas in the two flasks.

$$\therefore \frac{n_1}{n_2} = \frac{T_2}{T_1} = \frac{400}{320} = \frac{5}{4}$$

7. 88.67 cm of Hg

8. No of moles present initially = No of moles present finally

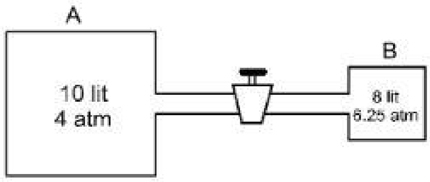
$$\therefore \frac{7 \times 5}{R \times 600} = \frac{P \times 5}{R \times 600} + \frac{P \times 2.5}{R \times 400}$$

on solving , P = 4 atm **Ans.** 4 atm

9. After the opening of the stop cock the pressure of the each bulb will remain same.

At the beginning, the no. of moles of gas in A = $\frac{10 \times 4}{RT}$

At the beginning, the no. of moles of gas in B = $\frac{6.25 \times 8}{RT}$



$\therefore$ total no. of mole at the beginning = $\frac{90}{RT}$

Total no. of mole of gas before opening the stop cock

= total no. of moles of gas after opening stop cock = $\frac{90}{RT}$

$\therefore$ pressure after the opening of the stop cock

$$P = \frac{90}{RT} \times \frac{RT}{V_{total}} = \frac{90}{10+8} = 5 \text{ atm}$$