Q1 - 24 June - Shift 2

At 300 K, a sample of 3.0 g of gas A occupies the same volume as 0.2 g of hydrogen at 200 K at the same pressure. The molar mass of gas A is____ g mol^{-1} (nearest integer) Assume that the behaviour of gases as ideal. (Given: The molar mass of hydrogen (H_2) gas is 2.0 g mol^{-1})

Space for your notes:

Q2 - 25 June - Shift 2

A rigid nitrogen tank stored inside a laboratory has a pressure of 30 atm at 06:00 am when the temperature is 27 °C. At 03:00 pm, when the temperature is 45°C, the pressure in the tank will be _____atm. [nearest integer]

Space for your notes:

Q3 - 26 June - Shift 1

An evacuated glass vessel weighs 40.0 g when empty, 135.0 g when filled with a liquid of density 0.95 g mL^{-1} and 40.5 g when filled with an ideal gas at 0.82 atm at 250 K. The molar mass of the gas in g mol^{-1} is :
(Given : R = 0.082 L atm K^{-1} mol^{-1})
(A) 35 (B) 50
(C) 75 (D) 125

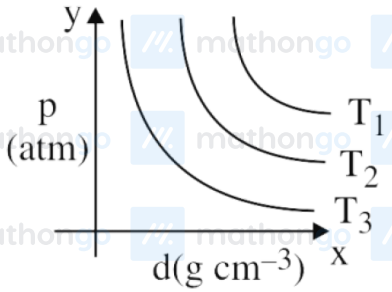
Space for your notes:

Q4 - 27 June - Shift 2

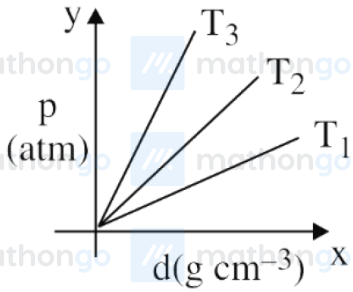
Which amongst the given plots is the correct plot for pressure (p) vs density (d) for an ideal gas ?

Space for your notes:

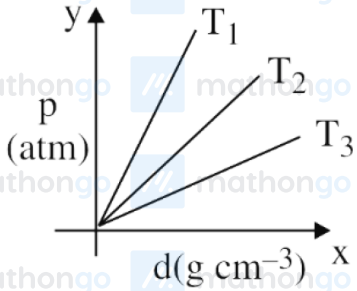
(A) $T_3 > T_2 > T_1$



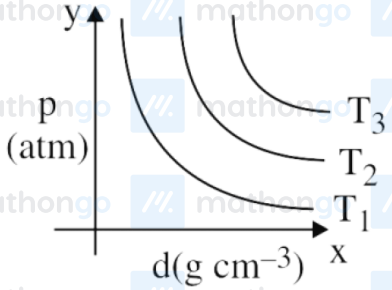
(B) $T_3 > T_2 > T_1$



(C) $T_3 > T_2 > T_1$



(D) $T_3 > T_2 > T_1$



Q5 - 28 June - Shift 2

100 g of an ideal gas is kept in a cylinder of 416 L volume at 27°C under 1.5 bar pressure. The molar mass of the gas is _____ g mol^{-1}. (Nearest integer) (Given : R = 0.083 L bar K^{-1} mol^{-1})

Space for your notes:

Answer Key

Q1 (45) **Q2** (32) **Q3** (D) **Q4** (B)

Q5 (4)

Q1 (45)

Given : Ideal gas A and H_2 gas at same pressure and volume.

From ideal gas equation pv = nRT

$n_1T_1 = n_2T_2$

$$\frac{3}{\text{GMM of A}} \times 300 = \frac{0.2}{2} \times 200$$

GMM of A = 45 g/mole

Q2 (32)

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{30}{300} = \frac{P_2}{318}$$

$$P_2 = \frac{30}{300} \times 318$$

$$= \frac{1}{10} \times 318$$

$$= 32$$

Q3 (D)

Mass of liquid = 135 – 40 = 95 g

$$\text{Volume of liquid} = \frac{\text{mass}}{\text{density}} = \frac{95}{.95}\text{ mL}$$

= 100 mL = 0.1 L

mass of ideal gas = 40.5 – 40 g = 0.5 g

PV = nRT

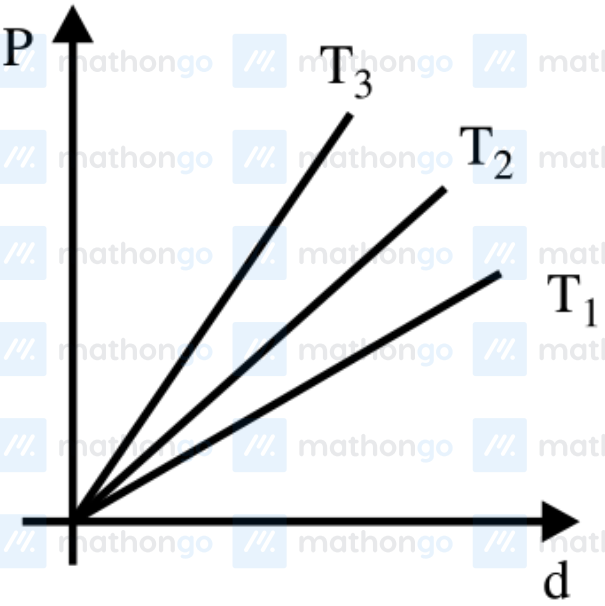
$$0.82 \times 0.1 = \left(\frac{0.5}{M}\right) \times 0.082 \times 250$$

M = 125

Q4 (B)

P vs d :

$$P = \left(\frac{RT}{M}\right) d$$



$$T_3 > T_2 > T_1$$

Q5 (4)

$$1.5 \times 416 = \frac{100}{M} \times 0.083 \times 300$$

$$\mathbf{M = 3.99}$$

Ans. 4