

CHAPTER 5: STATES OF MATTER

NCERT EXERCISES

- 5.1 What will be the minimum pressure required to compress 500 dm³ of air at 1 bar to 200 dm³ at 30 °C?
- 5.2 A vessel of 120 mL capacity contains a certain amount of gas at 35 °C and 1.2 bar pressure. The gas is transferred to another vessel of volume 180 mL at 35 °C. What would be its pressure?
- 5.3 Using the equation of state $pV=nRT$; show that at a given temperature density of a gas is proportional to gas pressure p .
- 5.4 At 0 °C, the density of a certain oxide of a gas at 2 bar is same as that of dinitrogen at 5 bar. What is the molecular mass of the oxide?
- 5.5 Pressure of 1 g of an ideal gas A at 27 °C is found to be 2 bar. When 2 g of another ideal gas B is introduced in the same flask at same temperature the pressure becomes 3 bar. Find a relationship between their molecular masses.
- 5.6 The drain cleaner, Drainex contains small bits of aluminum which react with caustic soda to produce dihydrogen. What volume of dihydrogen at 20 °C and one bar will be released when 0.15g of aluminum reacts?
- 5.7 What will be the pressure exerted by a mixture of 3.2 g of methane and 4.4 g of carbon dioxide contained in a 9 dm³ flask at 27 °C?
- 5.8 What will be the pressure of the gaseous mixture when 0.5 L of H₂ at 0.8 bar and 2.0 L of dioxygen at 0.7 bar are introduced in a 1L vessel at 27 °C?
- 5.9 Density of a gas is found to be 5.46 g/dm³ at 27 °C at 2 bar pressure. What will be its density at STP?
- 5.10 34.05 mL of phosphorus vapour weighs 0.0625 g at 546 °C and 0.1 bar pressure. What is the molar mass of phosphorus?
- 5.11 A student forgot to add the reaction mixture to the round bottomed flask at 27 °C but instead he/she placed the flask on the flame. After a lapse of time, he realized his mistake, and using a pyrometer he found the temperature of the flask was 477 °C. What fraction of air would have been expelled out?
- 5.12 Calculate the temperature of 4.0 mol of a gas occupying 5 dm³ at 3.32 bar. ($R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$).
- 5.13 Calculate the total number of electrons present in 1.4 g of dinitrogen gas.
- 5.14 How much time would it take to distribute one Avogadro number of wheat grains, if 10¹⁰ grains are distributed each second?
- 5.15 Calculate the total pressure in a mixture of 8 g of dioxygen and 4 g of dihydrogen confined in a vessel of 1 dm³ at 27 °C. $R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$.
- 5.16 Pay load is defined as the difference between the mass of displaced air and the mass of the balloon. Calculate the pay load when a balloon of radius 10 m, mass 100 kg is filled with helium at 1.66 bar at 27 °C. (Density of air = 1.2 kg m⁻³ and $R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$).
- 5.17 Calculate the volume occupied by 8.8 g of CO₂ at 31.1 °C and 1 bar pressure. $R = 0.083 \text{ bar L K}^{-1} \text{ mol}^{-1}$.
- 5.18 2.9 g of a gas at 95 °C occupied the same volume as 0.184 g of dihydrogen at 17 °C, at the same pressure. What is the molar mass of the gas?
- 5.19 A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.
- 5.20 What would be the SI unit for the quantity pV^2T^2/n ?
- 5.21 In terms of Charles' law explain why -273 °C is the lowest possible temperature.
- 5.22 Critical temperature for carbon dioxide and methane are 31.1 °C and -81.9 °C respectively. Which of these has stronger intermolecular forces and why?
- 5.23 Explain the physical significance of van der Waals parameters.

