

LEVEL - I

1. A gas is confined in a cylinder with a moveable piston at one end. When the volume of the cylinder is 684 mL, the pressure of the gas is 1.32 atm. What will be the pressure if the volume of the cylinder is reduced to 513 mL? Assume that the temperature is constant.
2. A gas occupies 9.5 L at 37°C and 775 mmHg. (a) What will be its volume at STP? (b) How many molecules does the gas sample contain?
3. Calculate the increase in temperature required to make the volume of a given gas double of its initial volume at constant pressure and 25°C temperature.
4. A LPG cylinder can bear maximum pressure of 25 atm, at what temperature it will burst if initial temperature and pressure are 25°C and 5 atm respectively.
5. At 27°C an 8.0-L sample of O₂ exerts a pressure of 5.0 atm. At what temperature it will exert a pressure of 4.0 atm in a 10.0-L container?
6. Calculate the mass of a O₂ gas sample at 600°C and 860 mm pressure having volume 1200 ml?
7. Calculate the total pressure of a gaseous mixture containing 20 gm O₂ and 24 gm N₂ in a container of volume 2 litre at 27°C.
8. 200 ml of H₂ takes 3 seconds for effusing out from a container, while an unknown gas takes 15 seconds for effusing 300 ml gas. Calculate the molecular mass of unknown gas?
9. 240 cc of SO₂ gas diffused through a porous membrane in 20 minutes. Under similar conditions, 720 cc of another gas diffused in 30 minutes. Find the molecular mass of the gas.
10. CO₂ and another gas 'X' have their rates of diffusion as 0.290 cc s⁻¹ and 0.271 cc s⁻¹ respectively. Find the vapor density of the gas 'X', if the vapor density of carbon dioxide is 22.

LEVEL - II

1. An air bubble is situated at a depth of 10 metre under water has radius 1 metre. If it starts rising up, then what will be its new radius on surface of water assuming temperature remains constant and pressure of water 1 metre = 1.5 atm.
2. A certain volume of a gas was found to be at a pressure of 1520 mm mercury. When the pressure was decreased to 760 mm of mercury the gas expands to 2400 ml. Calculate the volume before expansion.
3. Helium gas diffuses two times faster as compared to an unknown gas under identical conditions. Molecular mass of the gas will be.
4. A sample of gas occupies a volume of 2.0 litres at 1.0 atmospheric pressure at room temperature. What will be the volume of the sample gas at 5.0 atmospheres of pressure and at the same temperature?
5. In a one metre long glass tube from one end HCl gas and from other end NH₃ gas is introduced. At what distance from HCl end formation of NH₄Cl will take place?
6. A container was filled with 200 ml of a gas at 27°C and 700 mm of mercury pressure. The gas was cooled to -73°C under a pressure of 760 mm of mercury. Calculate the volume occupied by the gas.
7. The rate of diffusion of laughing gas is twice as that of tear gas. If these two gases are introduced from two different ends of a row in which 10 people are sitting, then find out the person from laughing gas and who will laugh and weep simultaneously.
8. Hydrogen chloride gas is sent into a 100 meter tube from one end 'A' and ammonia gas is sent into the tube from the other end 'B' under similar conditions. At what distance from 'A' will the two gases meet?
9. The volume of 2.8 g of carbon monoxide at 27°C and 0.821 atm pressure is (R = 0.0821 lit mol⁻¹ K⁻¹)
10. A five litre flask contains 3.5 g of nitrogen, 3.0 g of hydrogen and 8.0 g of oxygen at 27°C. Find the total pressure exerted by the mixture of these gases.

LEVEL - I

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|----|---------------|-----|-------------------------------------|
| 1. | 1.76 atm | 2. | (a) 8.53Lt (b) 2.3×10^{23} |
| 3. | 596K or 323°C | 4. | 1217°C |
| 5. | 300K | 6. | 0.60 gm |
| 7. | 16.9atm | 8. | 22.22 |
| 9. | 16 | 10. | 25.2 |

LEVEL - II

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|----|------------------------|-----|----------|
| 1. | 2.46 metre | 2. | 1200 ml |
| 3. | 16g | 4. | 0.4 lit |
| 5. | 40.56cm | 6. | 122.8 ml |
| 7. | 7 th person | 8. | 40.5m |
| 9. | 300L | 10. | 9.24atm |