

Gas Laws Practice Problems

1. A gas occupies 450.0 mL at 655 mm Hg pressure and 30.0 °C. What will its volume be at STP?
2. Calculate the mass of 500.0 mL of Cl₂ at STP, then at 22 °C and 755 mm Hg.
3. A 100.0 L sample of gas was compressed to 10.0 mL where its pressure is 350.0 torr. What was the original pressure of the 100.0 L sample?
4. Butane gas is stored in a tank at a pressure of 10.0 atm at 22.0 °C. The tank can hold a pressure of 50.0 atm before bursting. During a fire the gas is heated to 500.0 °C. What is the gas pressure, and will the tank contain the gas without bursting?
5. Calculate the volume of 38.8 g of CO₂ at 725 torr and 25.0 °C.
6. Calculate the density of SO₃ at STP, then at 1.00 atm and 23.0 °C.
7. A 650.0 mL sample has a mass of 1.71 g at 100.0 °C and 100.0 kPa. Calculate its molar mass.
8. A 40.0 g sample of zinc is allowed to react with 15.5 g of hydrochloric acid. How many liters of hydrogen are produced if the gas is collected by water displacement at 23.0 °C and 745 mm Hg pressure?
9. The combustion of 0.125 g of a sample to CO₂ and H₂O(l) produced 136.4 mL of CO₂ at STP. What is the percent carbon in the sample?
10. Compare the average velocities of molecules of H₂ gas with those of another alternative fuel, LNG, which is liquefied natural gas (methane).
11. What would be the rate of diffusion of hydrogen compared to methane?
12. It has been estimated that each square meter of the earth's surface supports 1 x 10⁷ g of air above it. If air is 20% oxygen by weight, approximately how many moles of O₂ are there above each square meter of the earth?
13. What is the partial pressure of each gas in a mixture which contains 40.0 g He, 56.0 g N₂, and 16.0 g O₂, if the total pressure of the mixture is 5.00 atmospheres?
14. Given that the average speed of an O₂ molecules is 1700 km/h at 0 °C, what would you expect the average speed of a CO₂ molecule to be at the same temperature?
15. At what temperature will the V_{rms} of CO₂ be the same as the V_{rms} of O₂ at 22 °C?