

Chapter 9
Properties of Gases: The Air We Breathe
Learning Objectives

8.12.2022

To satisfy the minimum requirements for this course, you should be able to:

1. **Describe the Kinetic Molecular Theory of gases** and:
 - identify the assumptions made in the Kinetic Molecular Theory and use the theory to explain the nature of gas pressure and temperature
 - explain how the distribution of speeds and the average speed of gas molecules change with temperature
 - arrange gases in order of increasing average molecular speed (at a given temperature)

2. **List the physical characteristics shared by all gases** and:
 - identify elements that exist as diatomic gases or monatomic gases at 25°C and 1 atm
 - be able to convert between the units of atmosphere (atm) and torr (or mm Hg)
 - understand how to measure the pressure of a gas
 - define mole fraction of a gas

3. **Use the ideal gas equation ($PV = nRT$)** to:
 - calculate P, V, n, or T given the other three variables and describe how a gas responds to changes in P, V, n, or T
 - calculate the molar mass of a gas and the density of a gas
 - solve stoichiometry problems involving gases

4. **State Dalton's Law of Partial Pressure** and be able to:
 - calculate the partial pressure of any gas in a mixture, given the composition of that mixture
 - calculate the mole fraction of a gas in a mixture, given its partial pressure and the total pressure of the system

Note - Section 9.10 (Real Gases) is not assigned.