10.1 Interactions between Particles

	Equations and Constants
	1 atm = 760 mm Hg
	1 atm = 14.70 psi
	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
	$PV = nRT$
	R = 0.0821 L·atm/mol·K
	Avogadro's #: 6.02×10^{23}

1. How does the motion of particles change as a substance transitions from liquid to gas? In this transition, does the substance absorb or release heat energy?

10.2 Solids and Liquids

2. Describe each of the following as ionic, metallic, or molecular solids:

    Sodium fluoride   Sucrose, $C_6H_{12}O_6$

    Bronze, an alloy of copper and tin KNO_3

3. The following compounds have very similar formula masses. Classify these compounds as ionic or covalent. Predict which compound would have the highest and lowest boiling points.

    LiF H_2O N_2 HCl

4. How is a polymer different from a molecular solid?

10.3 Describing Gases

5. Standard atmospheric pressure is 1 atmosphere. Express standard atmospheric pressure in mm Hg, kilopascals, and bars.

10.4 The Gas Laws

6. A gas occupies a volume of 224 cm^3 and a pressure of 1.51 bar. If the gas expands to a volume of 578 cm^3, what will the new pressure be? (Assume the temperature remains constant.)

7. A cylinder with a constant volume of 2.80 L has a pressure of 32.0 psi at a temperature of 25.0 °C. If the cylinder is warmed to a temperature of 75.0 °C, what will be the pressure inside the cylinder?

8. A gas occupies a volume of 600.0 mL at a temperature of 25.00 °C. At what temperature would the gas occupy only half this volume?

9. In air-conditioning systems, compressed gases are allowed to expand, and this expansion results in cooling. A gas with a volume of 12.0 mL at a pressure of 8.0 bar at a temperature of 45 °C is allowed to expand to a volume of 40.0 mL at a pressure of 2.0 bar. What is the temperature of the gas after it expands?

10. What is the volume of 4.52 moles of gas, calculated at standard temperature and pressure?

11. What is the pressure of 12.5 moles of gas at a temperature of 360.0 K and a volume of 5.02 liters?

12. A helium balloon has a volume of 3.4 liters and a pressure of 1.05 atmospheres at 25 °C. How many moles of helium gas are in the balloon? How many grams of gas?

10.5 Diffusion and Effusion

13. What is the difference between diffusion and effusion?

10.6 Gas Stoichiometry

14. Propane gas (C_3H_8) reacts with oxygen according to the balanced equation shown below. If 12.0 moles of propane react in this way,

$$C_3H_8\ (g) + 5O_2\ (g) \rightarrow 3CO_2\ (g) + 4H_2O\ (g)$$
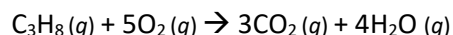
   a. how many moles of water can form?
   b. how many moles of carbon dioxide can form?
   c. at STP, what volume of CO_2 can form?
   d. are more moles of gas produced or consumed in this reaction?

15. If 50.0 grams of $NaHCO_3$ reacted as shown, how many moles of CO_2 would form? At 1.2 atmospheres of pressure and a temperature of 52.3 °C, what volume would this occupy?

$$NaHCO_3\ (s) \rightarrow NaOH\ (s) + CO_2\ (g)$$