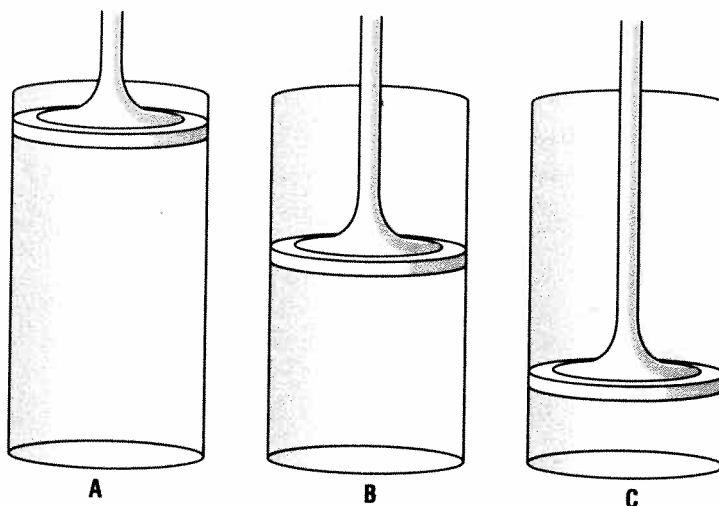


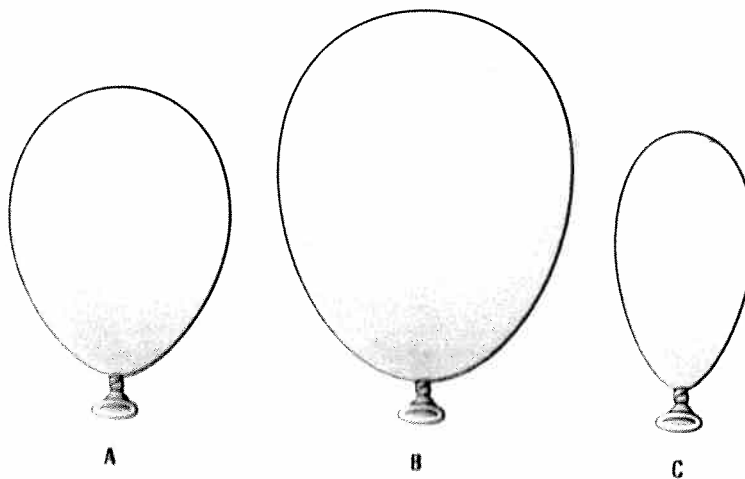


Gases Practice Problems

- There are three cylinders drawn in the space below. The sizes of the cylinders can be changed by raising or lowering the piston. The volumes of the cylinders are labeled. Draw 15 particles in each cylinder to represent the particles of a gas. Remember that a gas expands to fill its container.



- How do the number of particles in each cylinder vary with the volume of the cylinder?
- How does the volume of the cylinder affect the pressure within the cylinder? Explain your answer.
- Three balloons have been drawn in the space below. Initially all of the balloons were exactly the same size and they were filled with exactly the same amount of air. One balloon has been heated, one balloon is at room temperature, and one balloon has been cooled. Fill each balloon with 15 particles to represent the particles of a gas. Then label which balloon has been heated, which is at room temperature, and which has been cooled.



5. In which balloon are the particles the farthest apart? _____ Why?
6. Make a general statement that reflects how the temperature of a gas is related to its volume.
7. As the temperature of a gas decreases, its volume decreases until a temperature of absolute zero (0 K) is reached. Using the kinetic-molecular theory, explain why the volume of a gas should eventually reach 0 L as the temperature decreases. Be sure to also mention the speed of particles at temperatures above and equal to absolute zero.
8. A weather balloon is filled with helium to a volume of 250 L at sea level, where the pressure is 760 mmHg. Assuming no temperature change, will the volume of the balloon increase or decrease as the balloon rises to a height of 22 km, where the pressure is only 300 mmHg? Determine the volume of the balloon at 22 km. Show all of your work.
9. A sample of chlorine gas occupies a volume of 50 mL at 500 mmHg and 5°C. To what temperature must this gas be changed to increase the volume to 75 mL if the pressure is changed to 1.1 atm? Show all of your work.
10. If a gas occupies a volume of 720 mL at 10°C, at what temperature will it occupy a volume of 1.0 L if the pressure remains constant? Show all of your work.



The Gas Laws

Solve each problem below, showing all of your work on a separate sheet of paper.

1. A gas occupies a volume of 75 mL when the pressure is 380 mmHg. What volume does the gas occupy at 1140 mmHg?
2. The volume of a gas is 1164 mL at 18°C. What is its volume at standard temperature?
3. A gas has a volume of 1140 mL at 37°C and 620 mmHg pressure. Calculate its volume at STP.
4. If 600 mL of hydrogen is collected at 27°C, what volume will the gas occupy at -3°C?
5. Given 700 mL of oxygen at 7°C and 80 cmHg pressure, what volume does it have at 27°C and 50 cmHg pressure?
6. Nitrogen occupies 150 mL at 795 mmHg pressure. What volume will it occupy at 750 mmHg pressure?
7. The pressure of the air in a can of hairspray is 80 psi. If the temperature was increased from 70°C to 105°C, what pressure would the can then have?
8. A balloon contained 1 L of air. Suddenly the volume dropped to 790 mL when the temperature of the air dropped to 67°C. What was the original temperature of the air in the balloon?
9. Describe the relationship between volume and temperature of a gas.
10. Describe the relationship between volume and pressure of a gas.
11. Describe the relationship between pressure and temperature of a gas.