

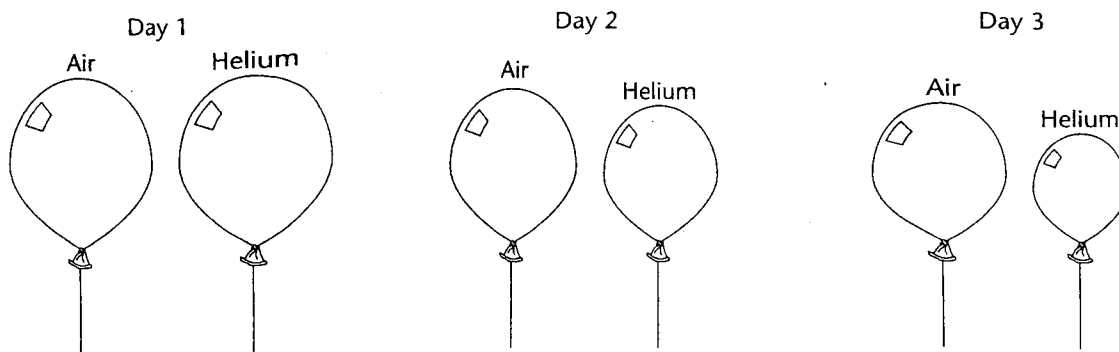
**SECTION 14-3**

**ENRICH**

# The Mass of a Gas

You know that matter can be either solid, liquid, or gas. It's easy to see that solids and liquids have mass and take up space, but what about gases? You're surrounded by gases everyday. The air that you breathe is a mixture of gases, made up mostly of oxygen and nitrogen gas. Gases must take up space. You prove this each time you blow up a balloon. But do particles of gas have mass? Is a particle of oxygen gas the same size as a particle of another gas?

Two balloons are pictured in the figure below. One is filled with air, and one is filled with an equal number of particles of helium gas. As the balloons expand, the balloon material stretches. Over time, the gas particles inside the balloon slowly escape through pores, tiny spaces in the balloon material. The balloons are kept for three days. As time goes by, the balloons change size, as shown by the illustration.



Answer the following questions on the back of this sheet or on a separate sheet of paper.

1. Which balloon lost more gas? How can you tell?
2. Based on the figure, what can you say about the size of a particle of helium gas compared to the size of a particle of oxygen or nitrogen gas? Explain your answer.
3. Lighter particles travel faster than heavier ones, when an equal force is applied to each. Imagine hitting a marble and a baseball with a baseball bat, each hit with the same force. What can you infer about the speed of helium particles compared with the speed of oxygen or nitrogen particles, when the same force is applied to them?
4. How might the speed at which a gas particle moves affects how quickly that gas particle escapes from the balloon? Explain your answer.

*The helium filled balloon lost more gas. It is smaller.*

*Because the helium filled balloon lost its gas faster, + it's smaller you that the helium particles are smaller and escape more easily.*

*The helium particles move quicker and are smaller therefore escaping more frequently.*

*More speed means more gas will escape.*

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