Section 13.3

Using a Model to Describe Gases

Objectives

1. To understand the relationship between laws and models (theories)
2. To understand the postulates of the kinetic molecular theory
3. To understand temperature
4. To learn how the kinetic molecular theory explains the gas laws
5. To describe the properties of real gases

Section 13.3

Using a Model to Describe Gases

A. Laws and Models: A Review

Let's Review

Scientific Method

- A law is a generalization of observed behavior.
- Laws are useful → We can predict behavior of similar systems.

Section 13.3

Using a Model to Describe Gases

A. Laws and Models: A Review

- A model can never be proved absolutely true.
- A model is an approximation and is destined to be modified.

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B. The Kinetic Molecular Theory of Gases

Assumptions of the Kinetic Molecular Theory of Gases

1. Gases consist of tiny particles (atoms or molecules).
2. These particles are so small, compared with the distances between them, that the volume (size) of the individual particles can be assumed to be negligible (zero).
3. The particles are in constant random motion, colliding with the walls of the container. These collisions with the walls cause the pressure exerted by the gas.
4. The particles are assumed not to attract or to repel each other.
5. The average kinetic energy of the gas particles is directly proportional to the Kelvin temperature of the gas.

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C. The Implications of the Kinetic Molecular Theory

- Meaning of temperature – Kelvin temperature is directly proportional to the average kinetic energy of the gas particles
- Relationship between Pressure and Temperature – gas pressure increases as the temperature increases because the particles speed up
- Relationship between Volume and Temperature – volume of a gas increases with temperature because the particles speed up

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D. Real Gases

- Gases do not behave ideally under conditions of high pressure and low temperature.
- Why?

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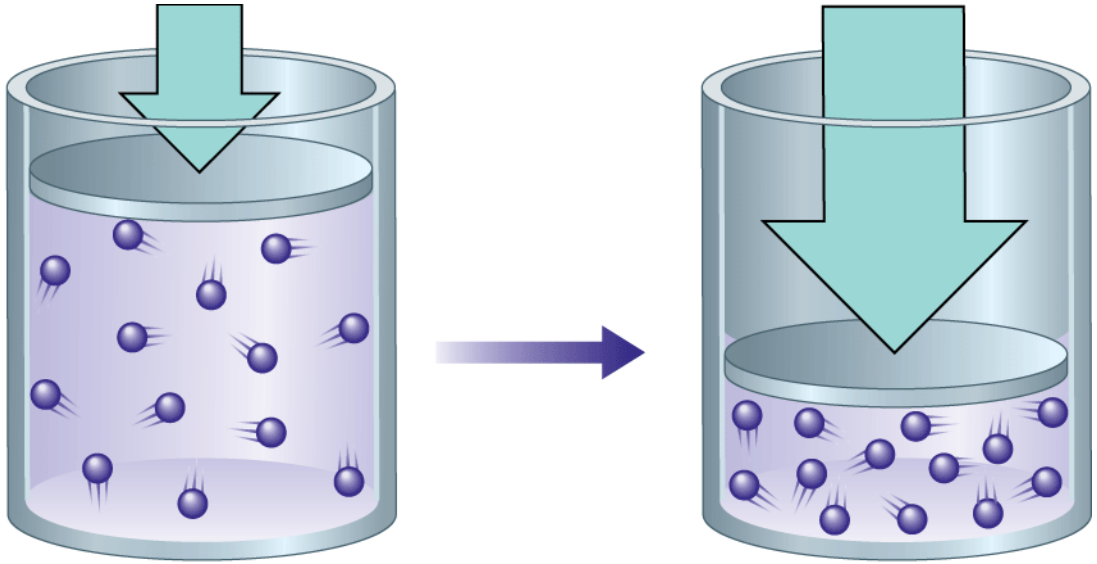
D. Real Gases



- At high pressure the volume is decreased
  - Molecule volumes become important
  - Attractions become important