

Physical Characteristics of Gases

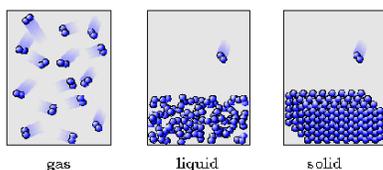
Mr. Sudbury

The Kinetic Molecular Theory

- ▶ The Kinetic Molecular Theory is based on the idea that particles of matter are always in motion.
- ▶ It explains the properties of solid, liquid, and **gases**



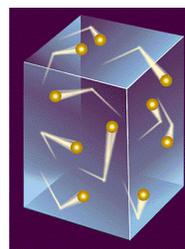
States of Matter



- ▶ The Kinetic Molecular Theory provides a model of an ideal gas.

Ideal Gas

- ▶ An Ideal gas is an imaginary gas that perfectly fits the assumptions of the kinetic-molecular theory.



5 Assumptions of K-MT

1. Gases consist of large numbers of tiny particles that are far apart relative to their size.
2. Collisions between gas particles and between particles and container walls are elastic collisions.
 - In an elastic collision, there is no loss of kinetic energy.

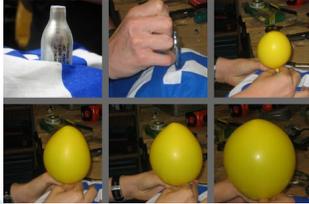
5 Assumptions of K-MT

3. Gas particles are in continuous rapid, random motion. (They have KE, the E of motion.)
4. There are no forces of attraction or repulsion between gas particles.
5. The average KE of gas particles depends on the temperature of the gas.
 - That means all gases at the same temp have the same average KE.

The K-MT & the Nature of Gases

Expansion

- Gases do not have a definite shape or volume, they completely fill any container they are in.



The K-MT & the Nature of Gases

Fluidity

- Because particles are NOT attracted to one another, they easily glide past one another.
- Fluids flow easily.

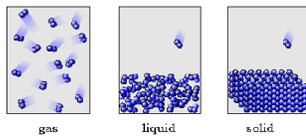


The K-MT & the Nature of Gases

Low Density

- The density of a gas is about 1/1000th the density of the same substance as a liquid or solid. (Because the particles are so far apart.)

States of Matter

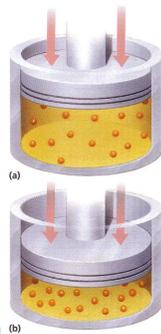


The K-MT & the Nature of Gases

Compressibility

- Compressing a gas is taking the particles that were very far apart and crowding them very close together.
- Pressurized containers can hold up to 100 times the number of particles that a non-pressurized container of the same volume could hold.

Compressibility



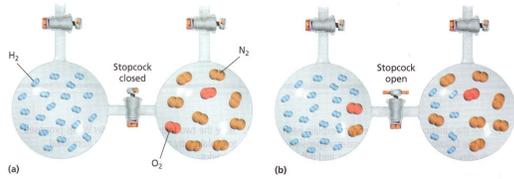
The K-MT & the Nature of Gases

Diffusion

- Diffusion is the spontaneous mixing of the particles of two substances
- Caused by the particles random motion.



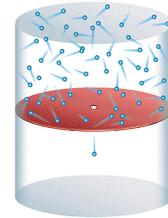
Diffusion



- ▶ Heavier Molecules diffuse more slowly

The K-MT & the Nature of Gases

- ▶ Effusion
 - A process by gas particles pass through tiny openings.



Ideal vs. Real Gas

- ▶ In a perfect world, gases behave ideally.
- ▶ A **Real Gas** deviates from the behavior of an ideal gas.
- ▶ A real gas does not behave according to the assumption of the kinetic molecular theory.

The End

- ▶ Ideal gases follow the KMT.
- ▶ KMT - 5 assumptions.

