

Chapter 3 – States of Matter

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Three States of Matter

Properties of Matter

- Matter has mass
- Matter takes up space, or has volume

States of Matter

- The physical forms in which matter can exist
- Solid, liquid, gas (and plasma – gas with an electrical charge)

Particles of Matter

- Matter is made of tiny atoms and molecules
- Matter is made up of tiny particles called *atoms* and *molecules*.
 - These particles are always in motion and are always bumping into one another

Particles of Matter, continued

- Particles of a solid
 - Move very slowly
 - Stay close together
 - Vibrate in place
- Particles of a liquid
 - Move a little faster
 - Close together, but slide past each other
- Particles of a gas
 - Move fast enough to overcome most attraction
 - Far apart and move independently

Models of a Solid, a Liquid, and a Gas



Particles of a solid do not move fast enough to overcome the strong attraction between them. So, they are close together and vibrate in place.



Particles of a liquid move fast enough to overcome some of the attraction between them. The particles are close together but can slide past one another.



Particles of a gas move fast enough to overcome almost all of the attraction between them. The particles are far apart and move independently of one another.

Solids

- Have definite shape and volume
- Crystalline
 - Particles occur with repeating patterns of rows
 - Ex: iron, diamond, ice
- Amorphous
 - Particles have a special arrangement, but NOT a pattern
 - Ex: glass, rubber, wax

Liquids

- Definite volume, but takes the shape of its container
- Surface Tension
 - Makes liquid form drops
 - Different liquids have different surface tensions
- Viscosity
 - Resistance to flow
 - Ex: honey vs. water

Gases

- No definite shape or volume
- Particles move quickly
- Particles can break away from one another because there is less attraction
- Amount of empty space between particles can change