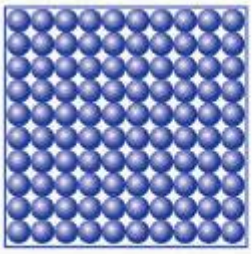
States of Matter – Chapter 2: Section 1

states of matter – the physical form that a substance exists

example: water – liquid (water), solid (ice), gas (steam)

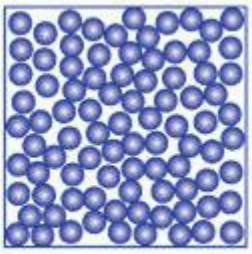
matter – made up of particles called <u>atoms</u> and <u>molecules</u>

- Particles always moving



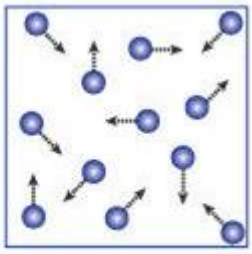
Solid

Particles of a solid don't move fast



Liquid

Particles of a liquid move little faster



Gas

Particles of a gas far apart, moving

solid – keeps original shape and volume

- Particles close together
- Attraction between particles stronger than other particles of same substance
- Vibrate in place

Two kinds of solids

1. **crystalline solids** – orderly, three-dimensional arrangement, repeating pattern of rows

   iron, diamond, ice

2. **amorphous solid** – do not have special arrangement, no pattern

   glass, rubber, wax

liquid – definite volume, takes the shape of the container

- particles move fast enough to overcome some of the attraction
- particles slide past each other

Liquids Have Unique Characteristics

1. **surface tension** – force that acts on the particles at the surface of a liquid
   - **spherical drop** – like beads of water
   - **flat drop** – like gasoline
2. **viscosity** – liquids resistance to flow
   - the stronger the attraction between molecules the more viscous
     - Example: honey is more viscous than water, honey flows slower than water

Gases – state of matter that has no definite shape or volume

- Particles can completely break away from each other
- Less attraction between particles of the same substance
- Amount of space between particles can change
  Example: helium particles in a tank verses in a helium filled balloon

Behavior of Gases – Section 2

Gases

- have a large amount of space between them
- the space that gas particles occupy is the gas's volume
- behavior of particles of gas depends on temperature and pressure

Temperature – measure of how fast the particles in an object are moving

- **faster** the particles are moving, the more energy they have

Example: Parade Balloon

Hot day

– particles of gas moving faster hitting inside walls of balloon harder

- gas is expanding and pushing on the inside walls with more force

Cool day

- particles of gas have less energy

- will not push as hard on the walls of the balloon

- need more gas to fill the balloon

Volume – the amount of space an object takes up

- Particles of gas can be compressed, or squeezed together into a smaller volume

- particles of liquid <u>cannot</u> compressed as much as particles of gas

Pressure – the amount of force exerted on a given area of surface (how many times the particles of gas hit the inside of the container

Same size container: basketball verses beach ball

Basketball

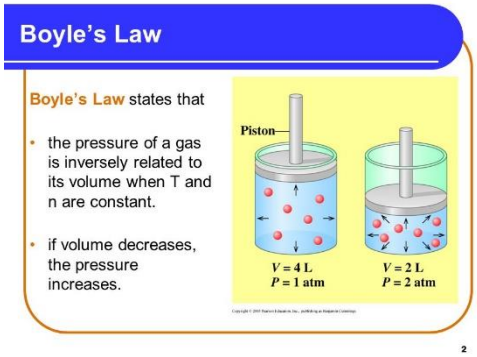
high pressure – more particles of gas in the basketball, particles closer together, particles collide with the inside of the ball at a faster rate
low pressure – beach ball has fewer particles of gas, farther apart, collide with other particles in the beach ball slower

Gas Behavior Laws – temperature, pressure, and volume of gas are all linked

Gas Laws – the relationship between temperature, pressure, and volume

Boyle's Law – relationship between the volume and pressure of a gas

- as the pressure of gas increases, the volume decreases by the same amount (inversely related)
- as one goes up the other comes down



Charles's Law – the volume of gas changes in the same way that the temperature of the gas changes

- temperature increases, volume increases
- temperature decreases, volume decreases