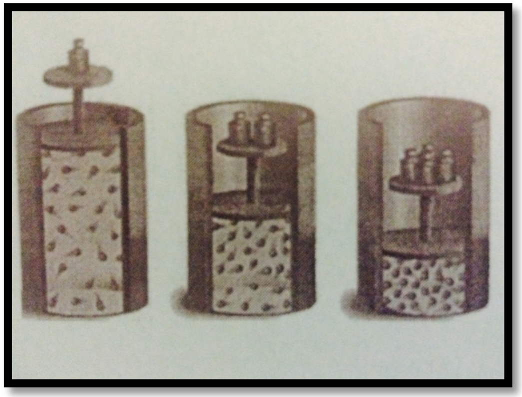
Gas Laws (Pressure, Temperature, and volume)

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

Shirin, Jessica

BOYLES LAW

$$P_1 \cdot V_1 = P_2 \cdot V_2$$



- (Pressure and volume Relationship)
- Amount of gas and temperature remained constant
- This is an inverse relationship because if volume increases then pressure decreases(more space, lower pressure),and if pressure increases, volume would decrease (less space, higher pressure)
- As you can see pressure is the result of collisions, which means more gas particles result in more collisions and that would cause it to have more pressure
- The first picture the gas particles takes time to hit the wall of the container(more space), but the third picture is the opposite, it hits the wall of the container quicker and moves faster, because there are less space for the particles to move/travel.
- When it collides on the wall of the container it experts force which causes them to go in random motion.

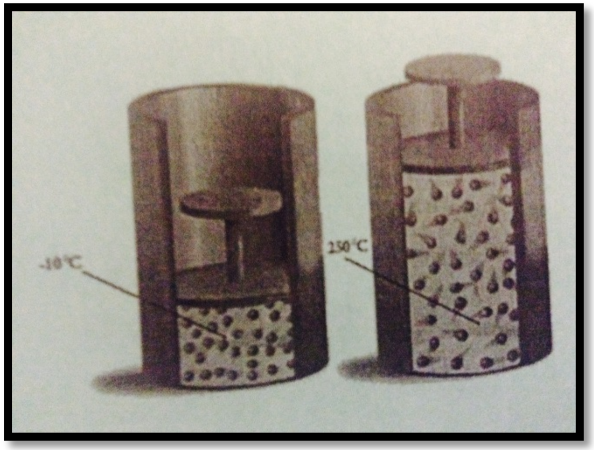
Example

- As you can see the balloon is an example for pressure and volume.
- When you squeeze the balloon the volume decreases while the pressure increases
- This experiment would be an inverse relationship

Jacques Charles Law

- Volume and temperature relationship
- (amount of gas and pressure were held constant)
- This is an direct relationship, because if temperature decreases then volume would also decrease, and also the other way around if temperature increase volume will also increase.
- Effect on volume by heating or cooling a gas.

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$



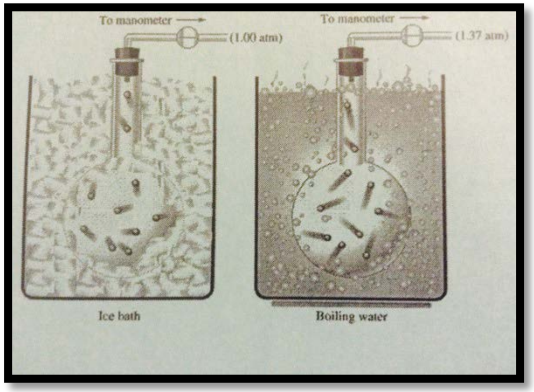
Example

- As you can see ice cubes would be an example of an volume and temperature
- when you pour water into the ice cube tray it will freeze into the shape of the container that it has been poured into. If you leave it out it will start melting and still keep its shape
- The decrease of temperature causes water to freeze but the volume will be held at a constant (if done in vacuum)

Joseph Gay-Lussa's Law

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

- Pressure and Temperature Relationship.
- (Constant volume and amount of gas.
- This is an direct relationship, which means if pressure is decreased then temperature also decreases, and if pressure increases same thing happens to temperature it will also increase.



- As you heat up the molecules up they end up moving faster, and that causes it to collide with the walls of the container more often, and in the ice bath the molecules don’t often hit the wall of the container because its in ice bath and they particles are moving slower.

Example

- As you can see this would be a pressure and temperature example
- When heat is applied to the air in the balloon it will expand
- Since the hot air in the balloon is lighter and less dense than the cool air around the balloon, the heated air causes the whole balloon to rise.

Conclusion

- In conclusion combining the gas law Boyles law, Charles law, and Gay-Lussac’s law can be put into one formula to help to determine the relationships between pressure, temperature, and volume.
- As you can see this example shows all three gas laws into one experiment.

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$