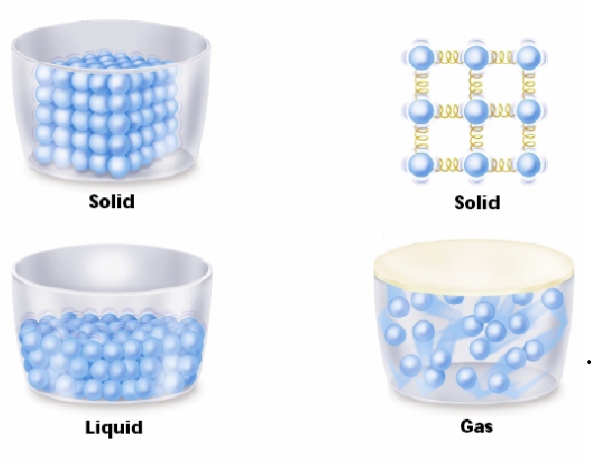


5 States of Matter

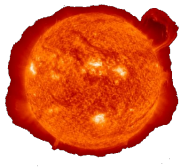
increasing energy

1) ***Bose-Einstein Condensate***-occurs near absolute zero (very low energy state)
2) ***Solid*** ☆
3) ***Liquid*** ☆
4) ***Gas*** ☆
5) ***Plasma***-occurs when electrons are separated from their atoms or molecules (very high energy state)
Most common state of matter in the universe

Plasma Examples

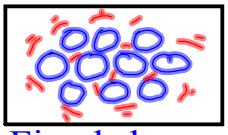
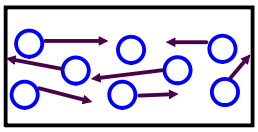
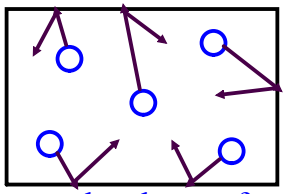
Plasma Ball

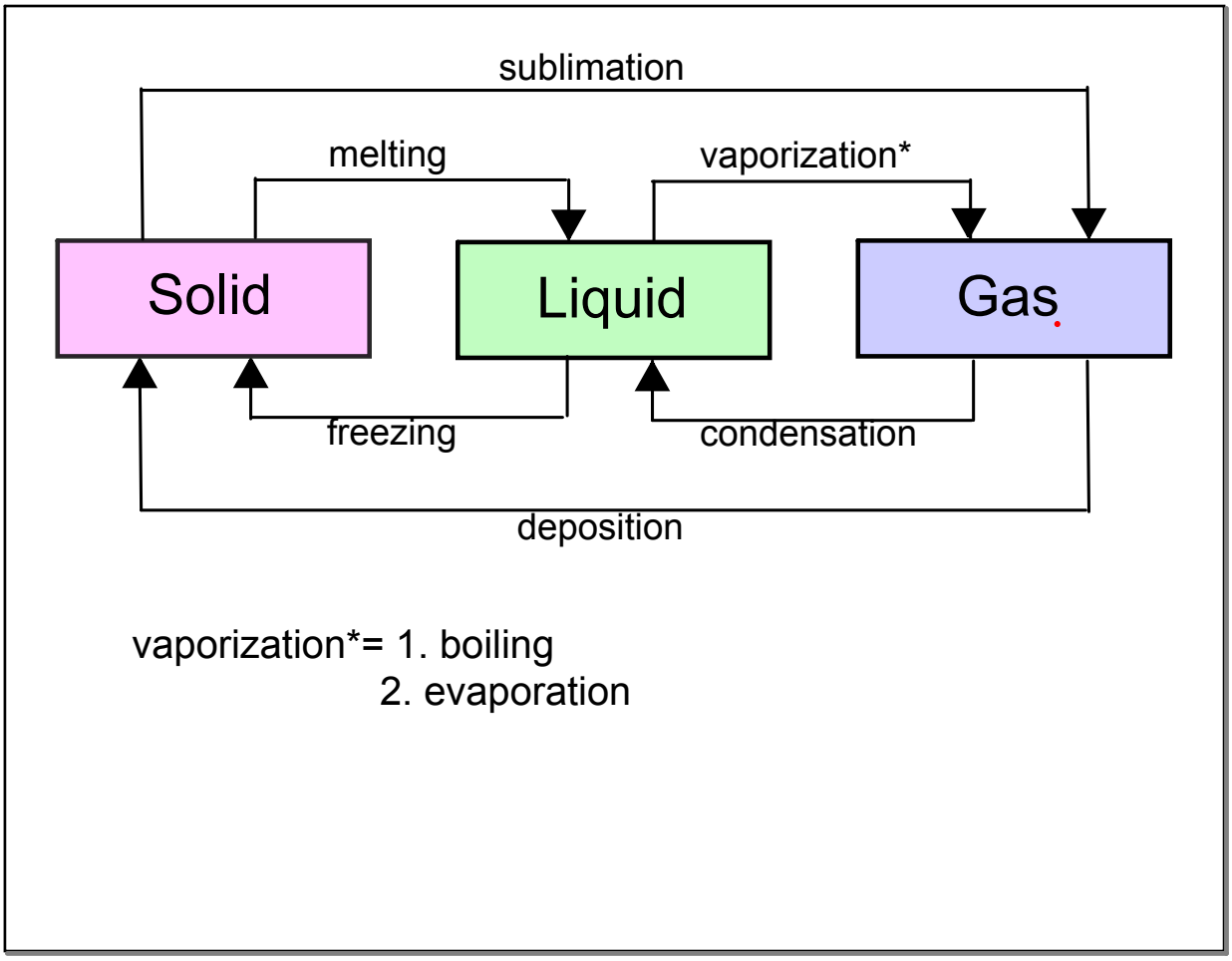

Aurora's


Sun / Stars


Lightning

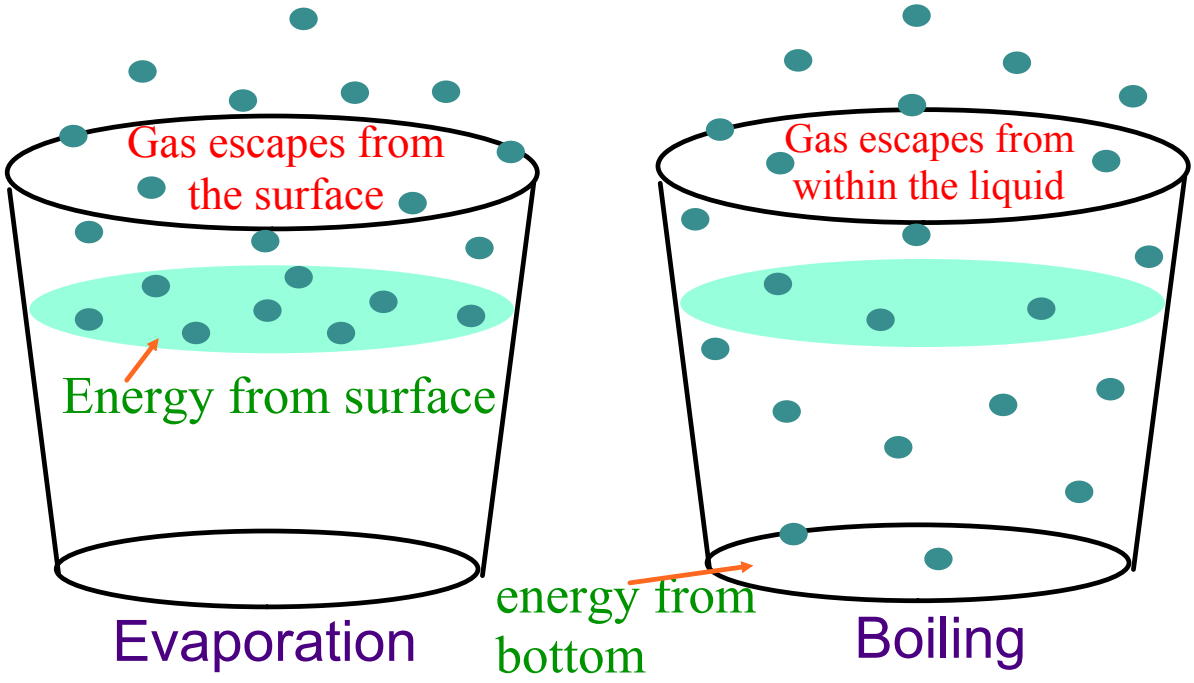
http://www-spof.gsfc.nasa.gov/Education/FAQs7.html#q97

Solid	Liquid	Gas
Tightly packed in "fixed "positions Vibrate in place  Fixed shape Fixed volume **Amorphous Solids** (have no exact boiling or melting points) (glass) **Crystalline Solids** Have def. melting and boiling points Have regular repeating shape	particles can slide past one another. A little farther apart than solids  Take shape of container Fixed volume	particles are very spread apart very energetic (bounce around)  - take shape of their container - take the volume of their containers **Pressure:** The force that gas particles exert over the area of their containers - measured in: Pascals atmospheres torr



vaporization*= 1. boiling
2. evaporation

Types of Vaporization



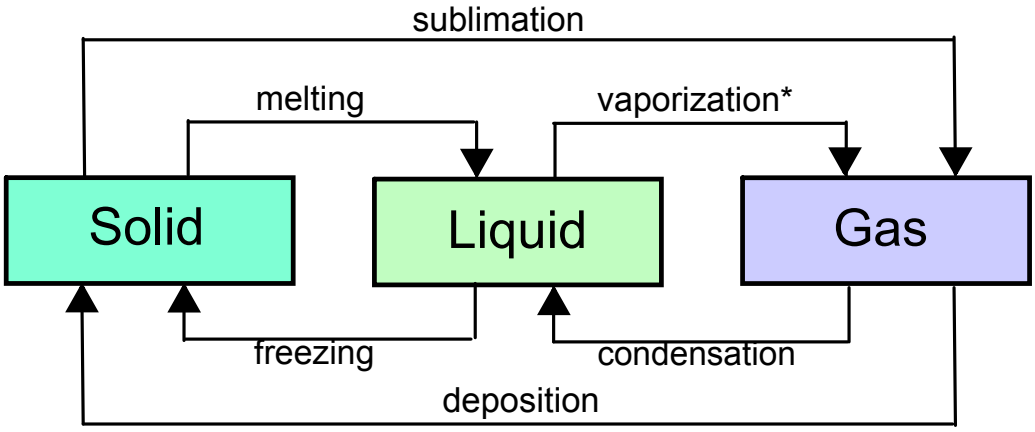
Exothermic- process *releases* energy

energy "**ex**its" the system

Endothermic- process *absorbs* energy

energy "**en**ters" the system

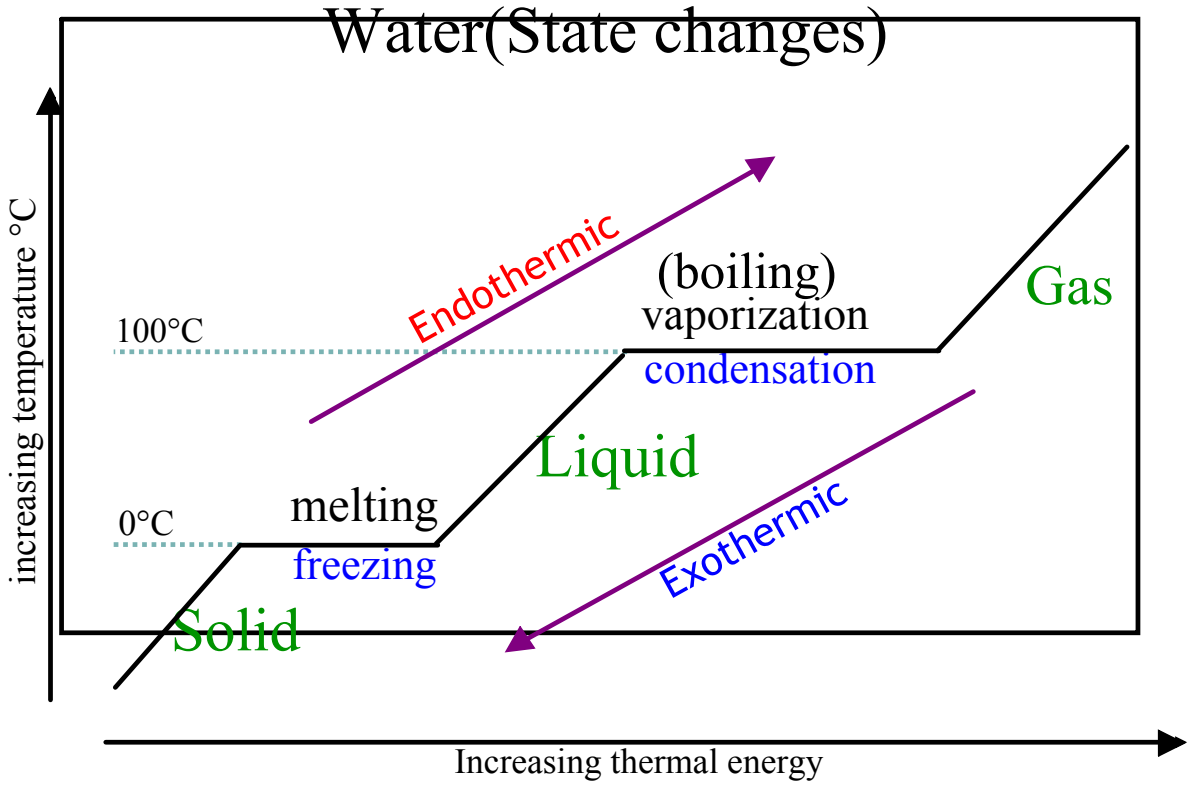
Endothermic



Exothermic

vaporization*= 1. boiling happens at the boiling point
2. evaporation-happens below the boiling point

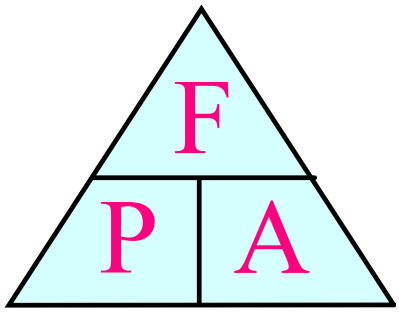
Water(State changes)



☆Questions☆

1. A solid *gains / loses* energy when it becomes a liquid
   - gains-liquids have more energy than solids
2. How many states of matter exist at 0°C? At 100°C?
   - 2, solid and liq. exist at 0°C & 2, liq. and gas exist at 100°
3. What happens to to the thermal energy of the water while it changes from solid to liquid?
   - it rises steadily
4. What happens to the temperature of the water while it changes from solid to liquid?
   - it stays at 0°C and does not rise until it is completely melted
5. Does it require more energy for ice to become liquid OR liquid to become vapor(gas)?

Pressure = $\frac{\textbf{Force}}{\textbf{Area}}$



- collisions that occur between container walls and other particles
- measured in kPa (kilopascal)

What Can affect Pressure?

A change in-

1. Temperature
2. Volume (space in container)
3. # of Particles
   ex: adding air to a tire

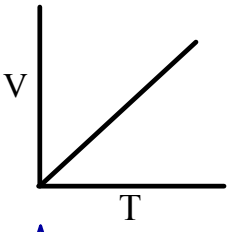
GAS LAWS

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$ *Combined Gas Law*

CHARLES' LAW

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

P = CONSTANT

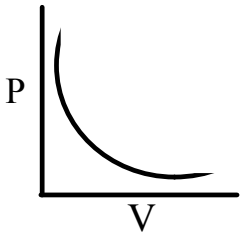


Direct Relationship

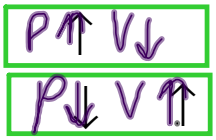
BOYLE'S LAW

$$P_1 V_1 = P_2 V_2$$

T = CONSTANT



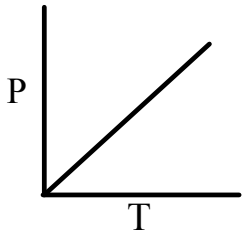
Inverse Relationship



GAY-LUSSAC'S LAW

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

V = CONSTANT



Direct Relationship