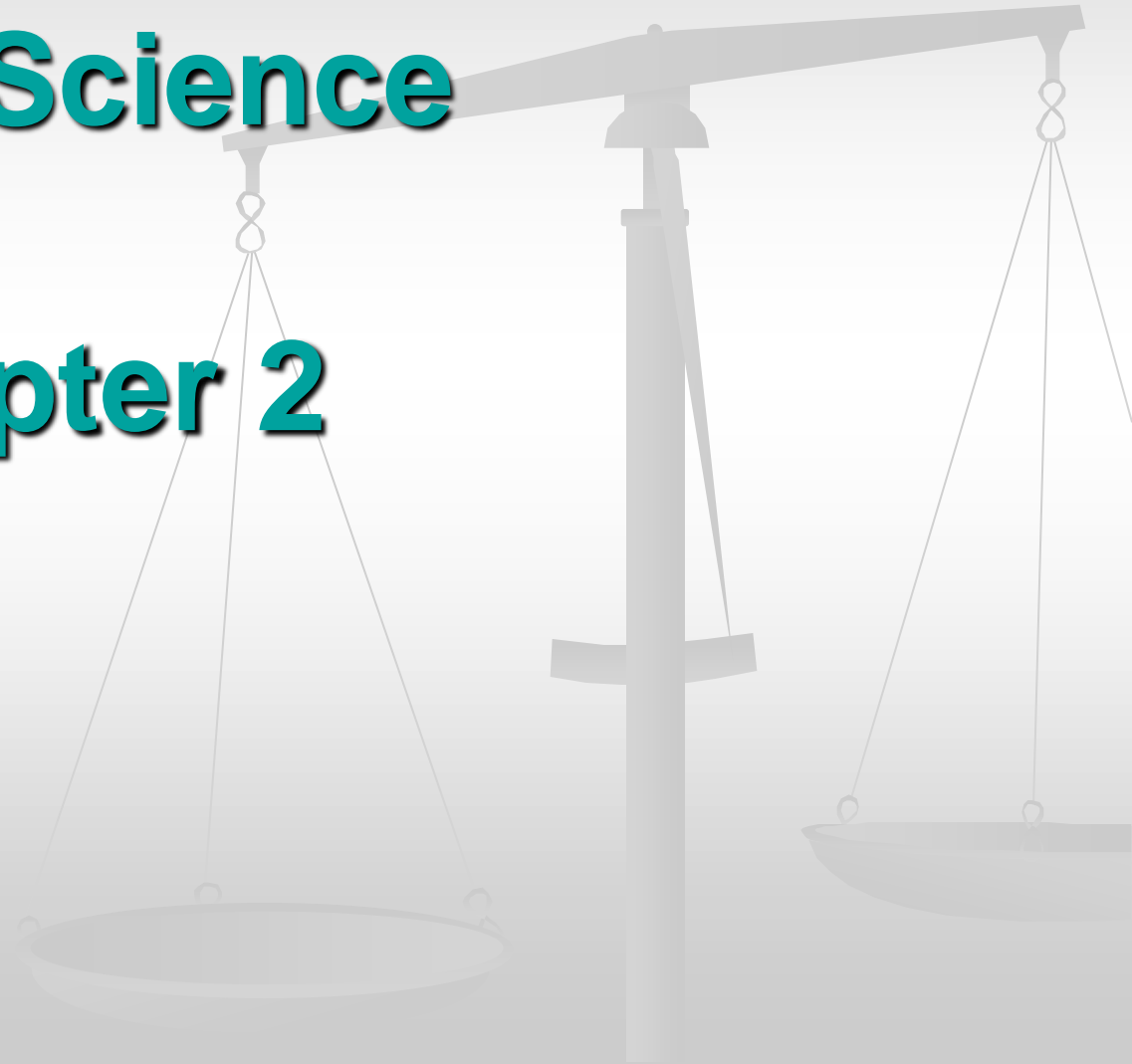


# Earth Science

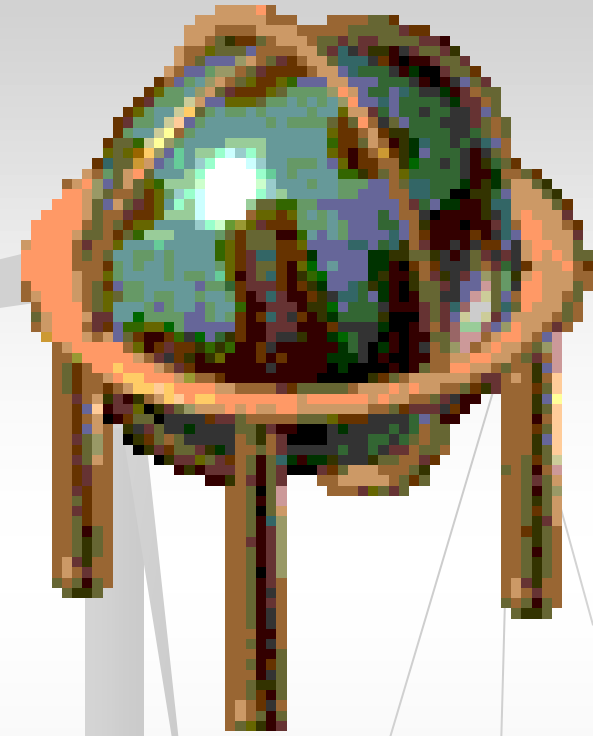
## Chapter 2



# Matter and Its Changes



# Matter:



It's what the world's made of.

# Atoms – the building blocks of matter

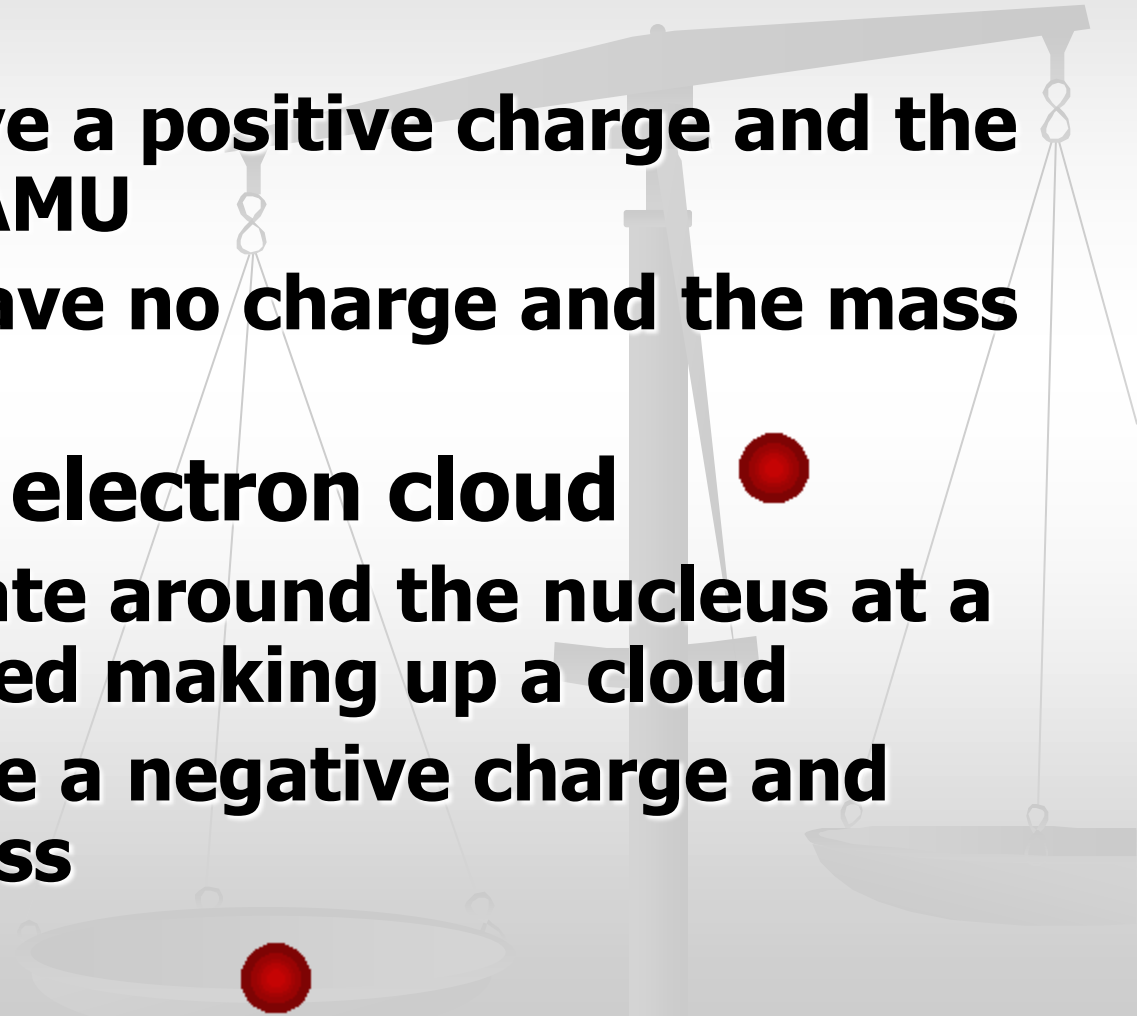
## Structure of the atom

### ■ Nucleus

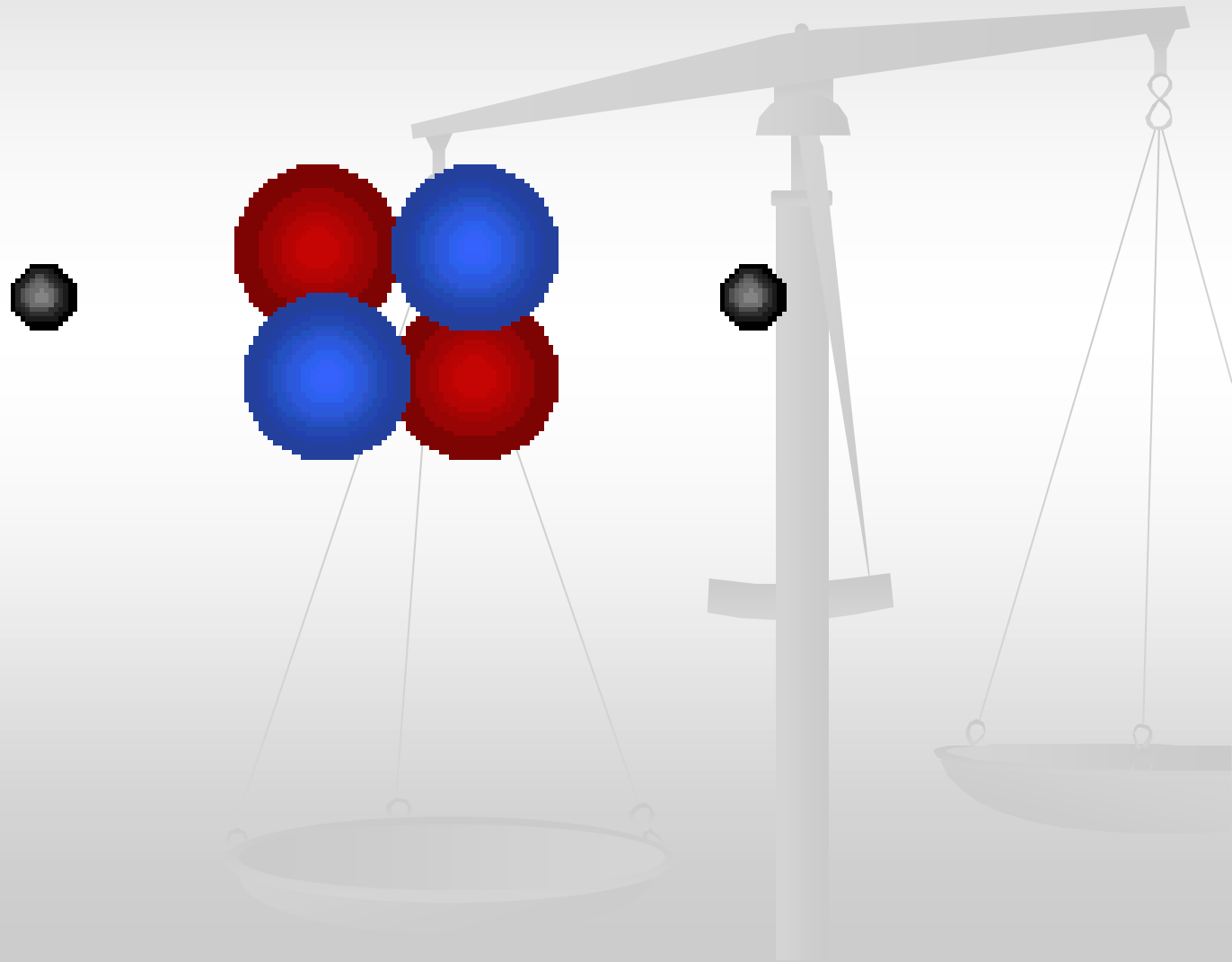
- ■ Protons – have a positive charge and the mass of one AMU
- ■ Neutrons – have no charge and the mass of one AMU

### ■ Electrons and electron cloud

- ■ Electrons rotate around the nucleus at a very high speed making up a cloud
- Electrons have a negative charge and almost no mass

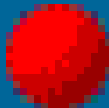
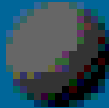



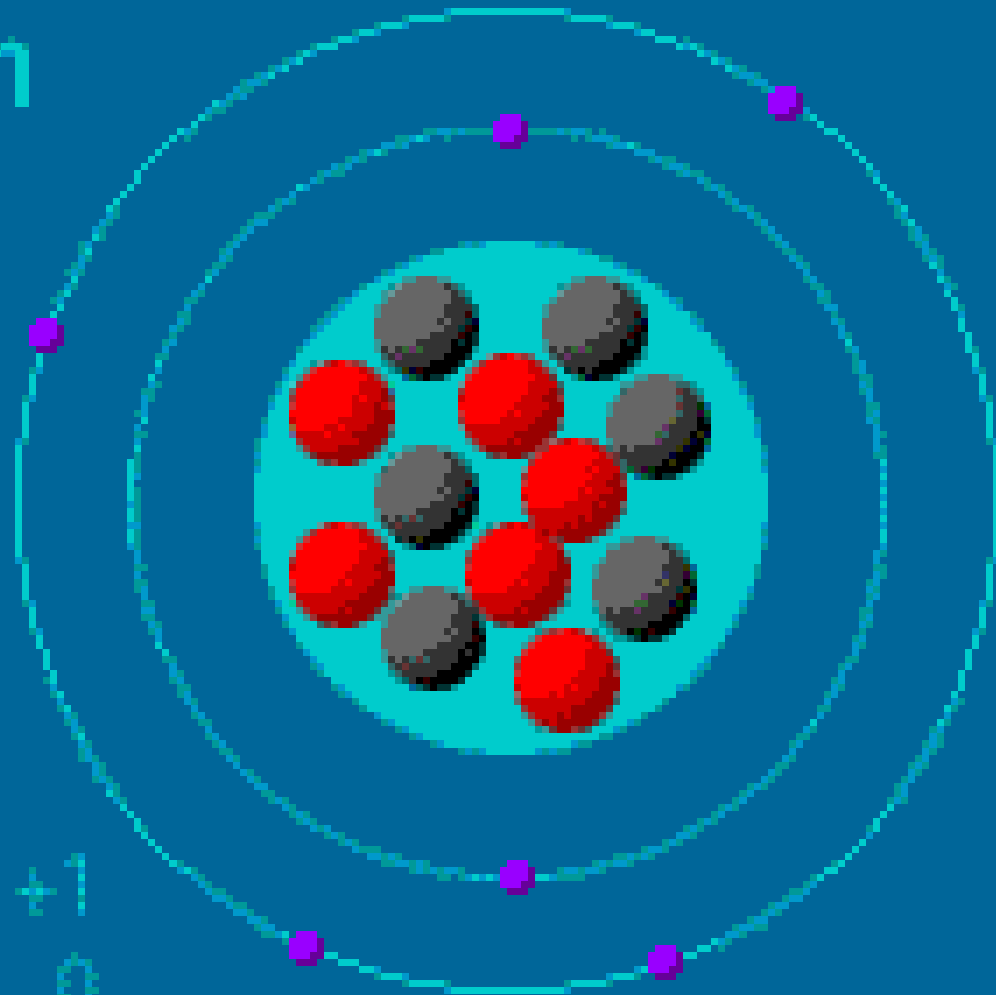
# MODEL OF THE ATOM



# Model of Atom

## Carbon

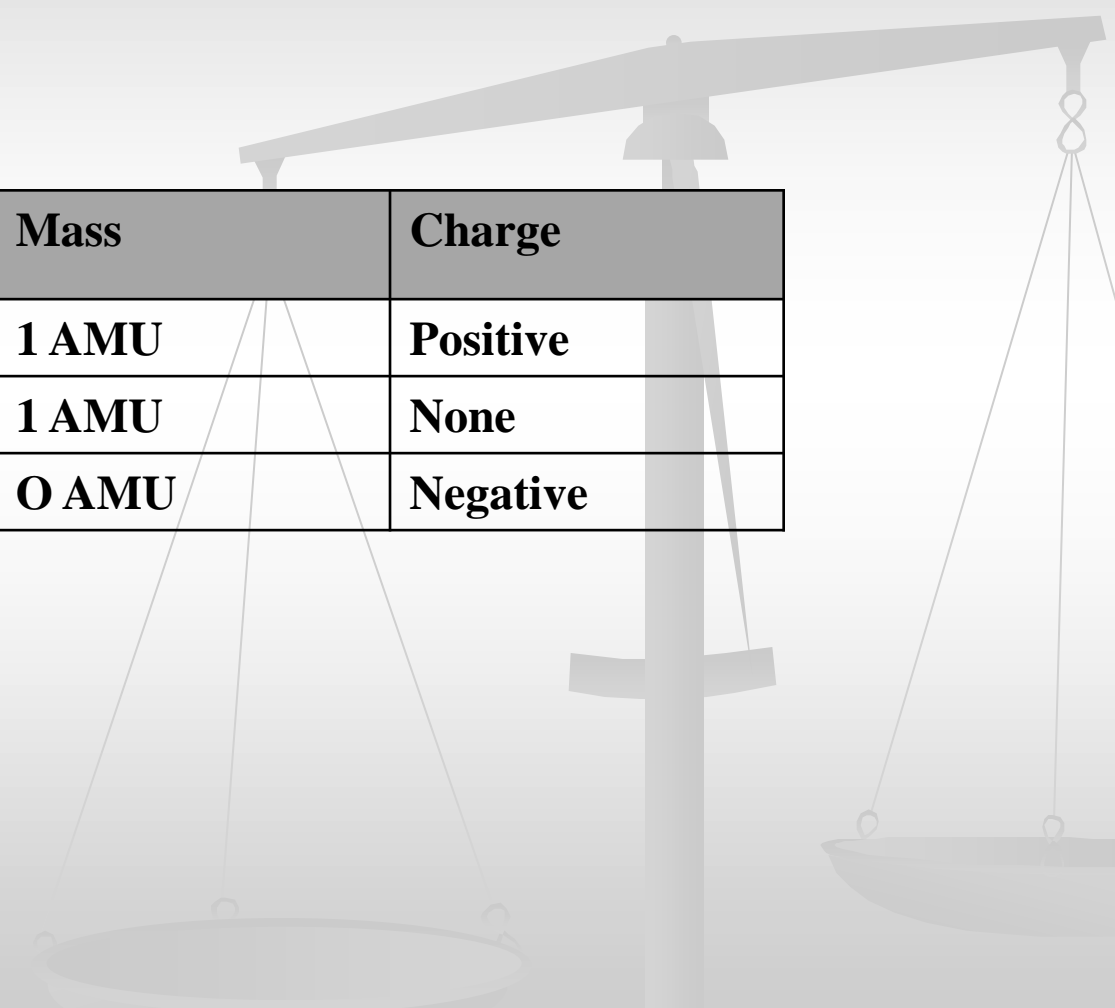
-  protons +1
-  neutrons 0
-  electrons -1



not to scale

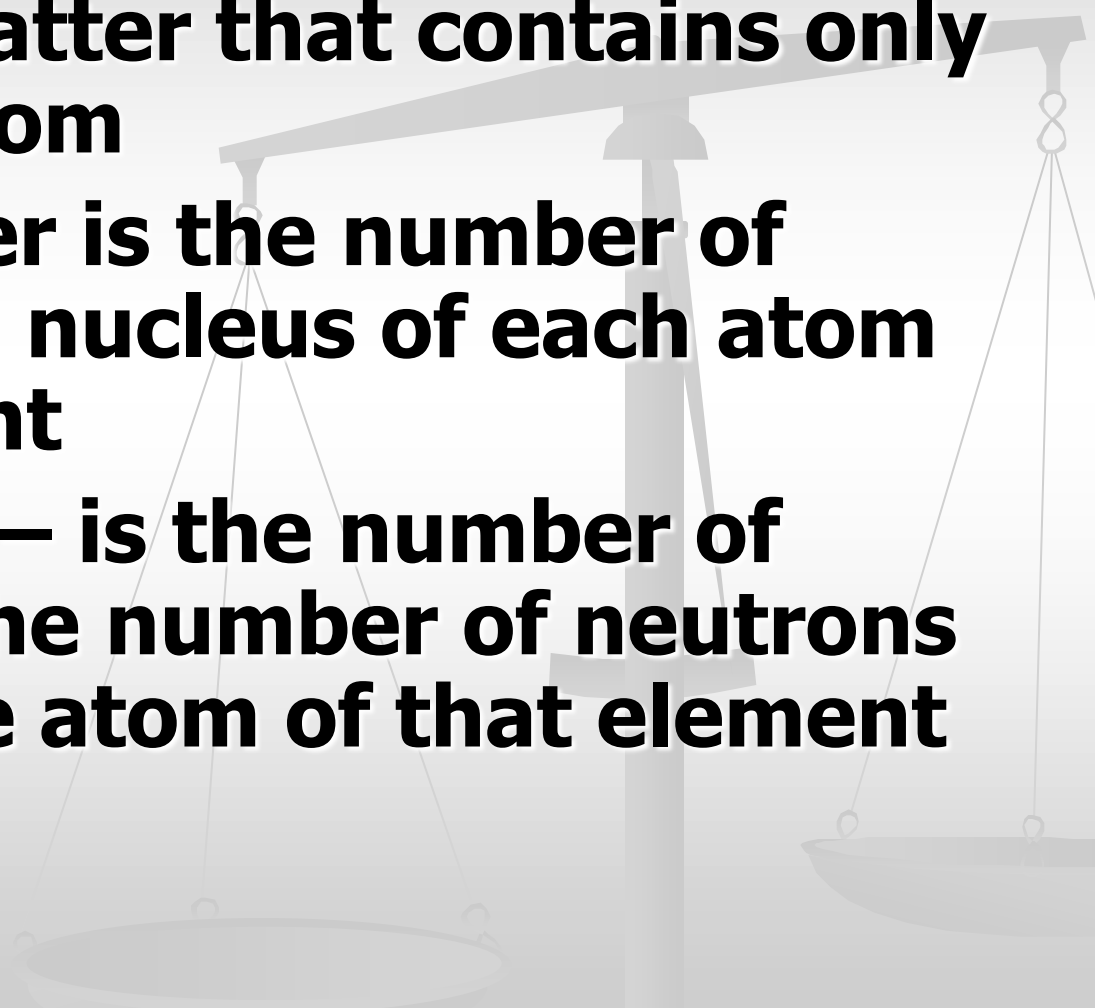


# Atomic Particle Table



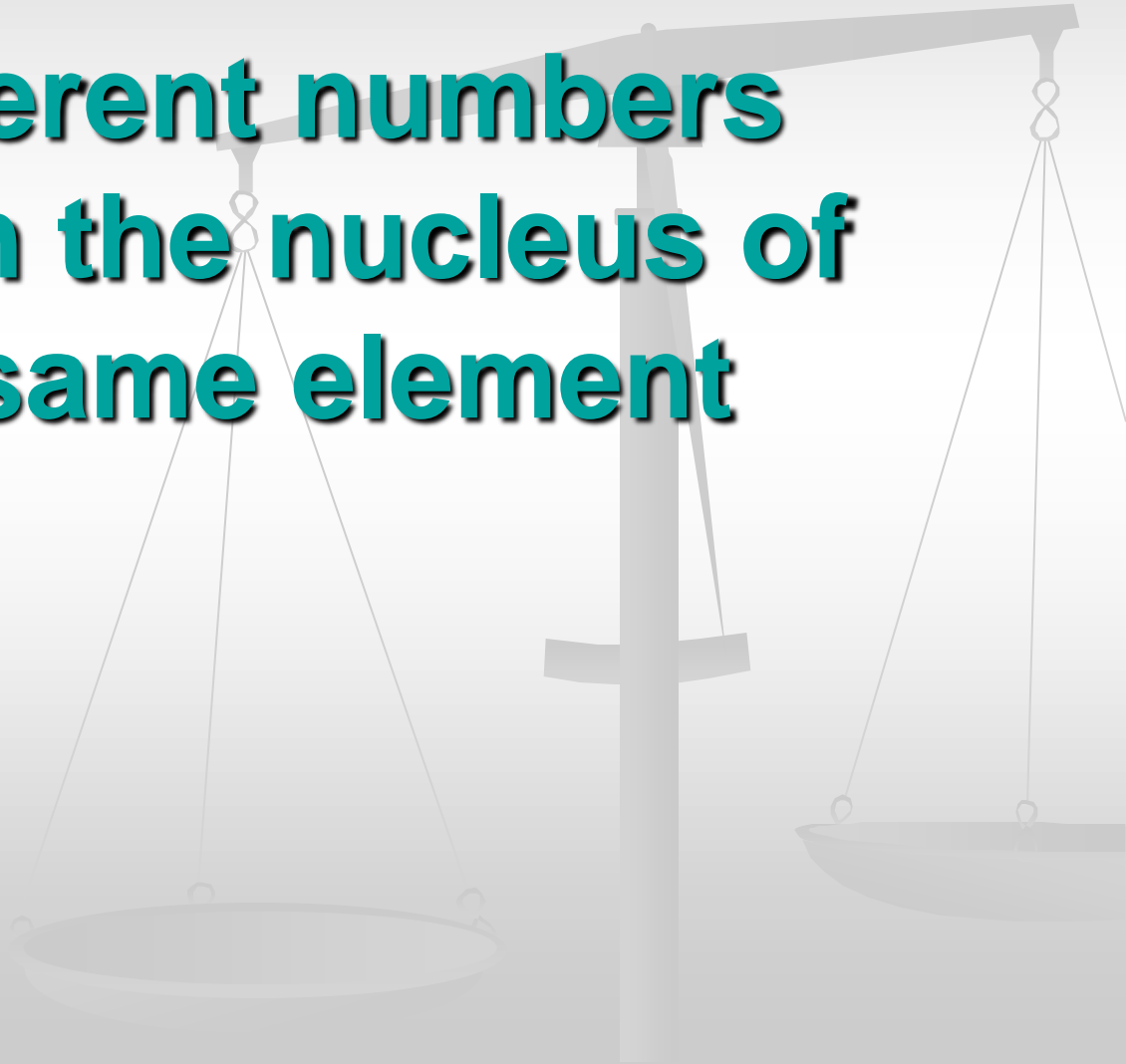
	<b>Mass</b>	<b>Charge</b>
<b>Protons</b>	<b>1 AMU</b>	<b>Positive</b>
<b>Neutrons</b>	<b>1 AMU</b>	<b>None</b>
<b>Electrons</b>	<b>0 AMU</b>	<b>Negative</b>

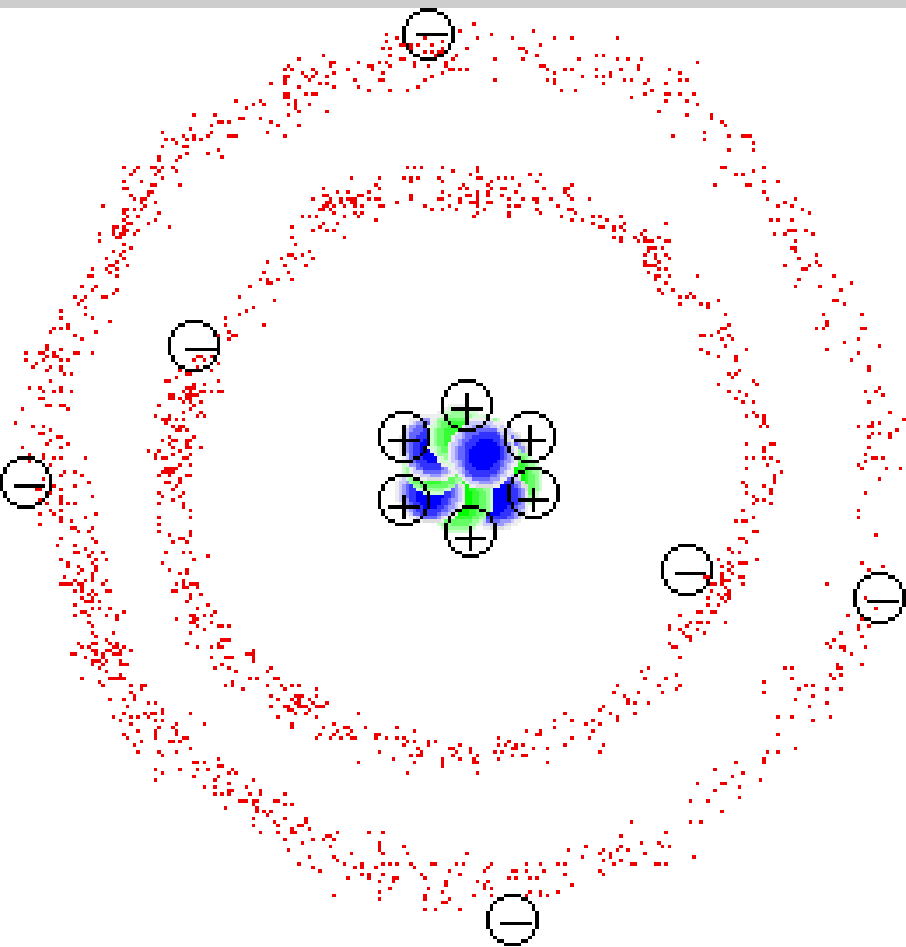
# Elements and the periodic Table

- **Elements – matter that contains only one kind of atom**
  - **Atomic number is the number of protons in the nucleus of each atom of that element**
  - **Mass number – is the number of protons and the number of neutrons in the average atom of that element**
- 

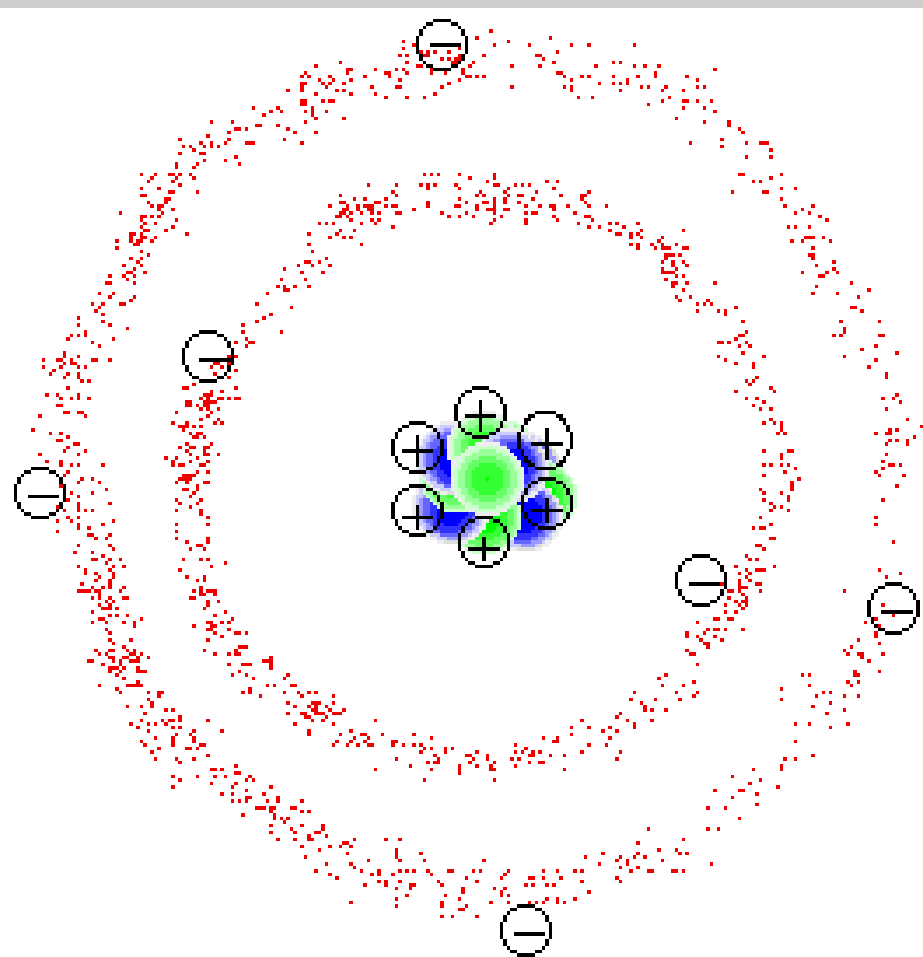


**Isotope – Different numbers  
of Neutrons in the nucleus of  
atoms of the same element**





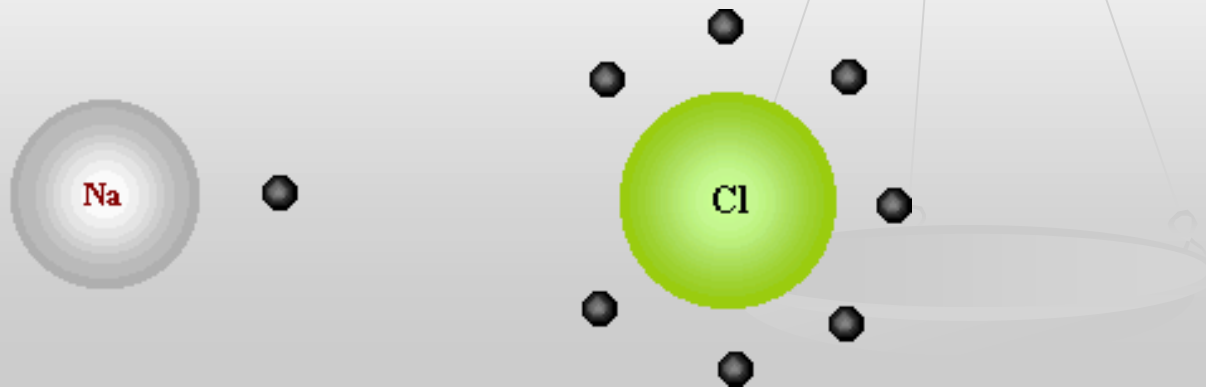
<sup>12</sup>Carbon  
6 protons  
6 neutrons  
6 electrons



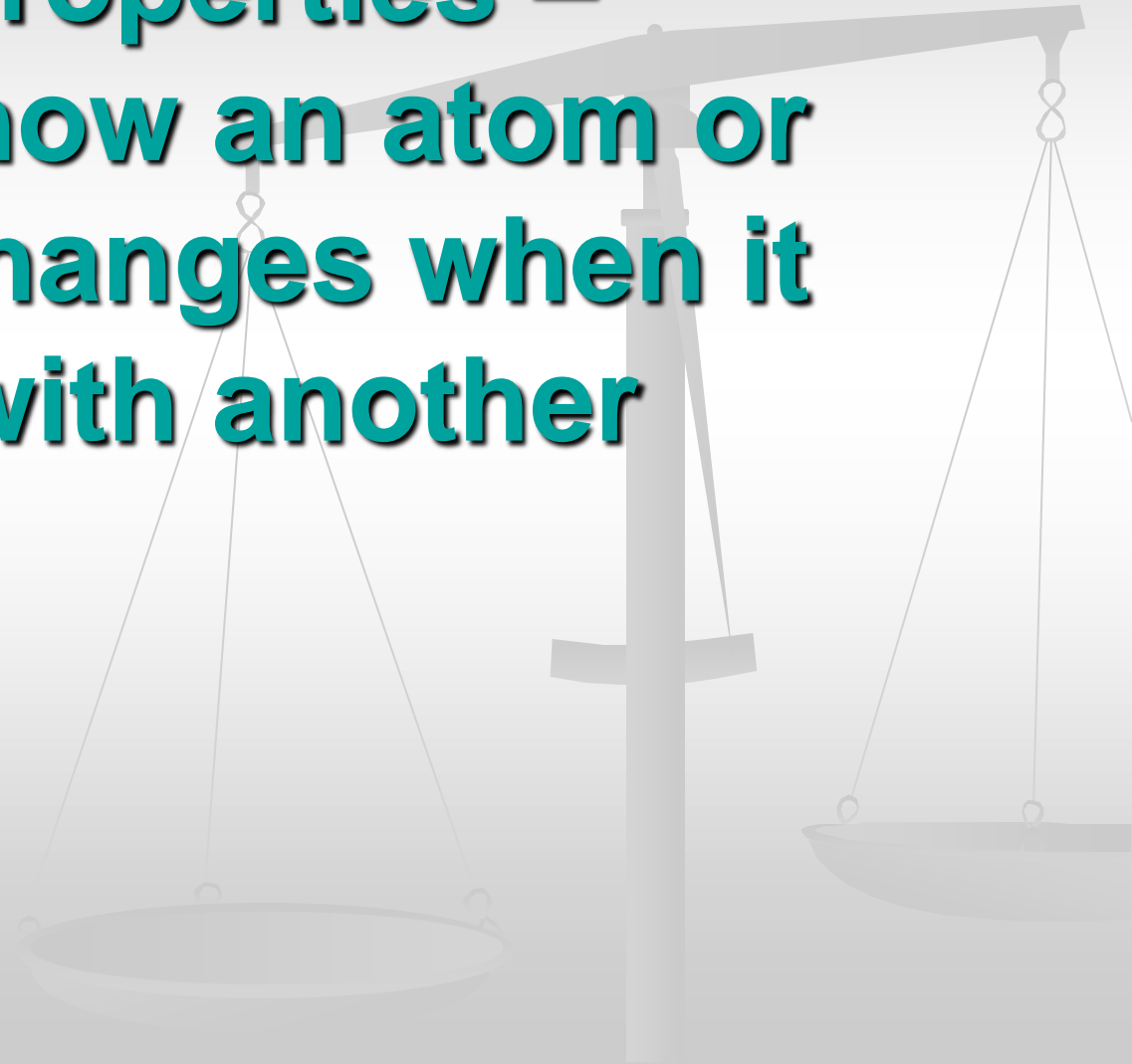
<sup>14</sup>Carbon  
6 protons  
8 neutrons  
6 electrons

# How chemical compounds are formed

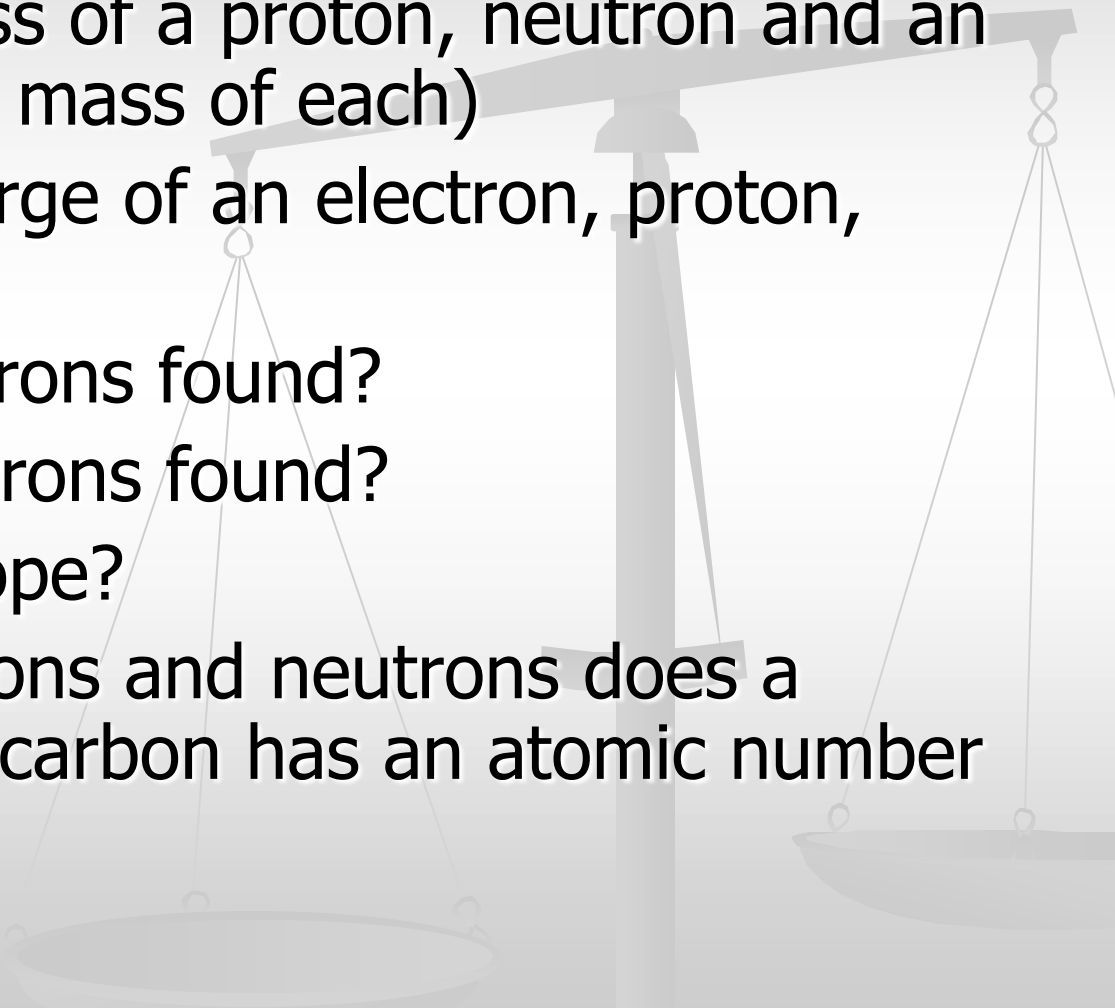
- **Compound is the result of electrons shared or transferred**
- **Molecule – is the result of atoms combining by sharing electrons**
- **Ions – Is an electrically charged atom that is the result of gaining or losing electrons**
- **Ionic compound – is the result of atoms combining by a transfer of electrons**



**Chemical Properties –  
describes how an atom or  
chemical changes when it  
combines with another  
chemical.**

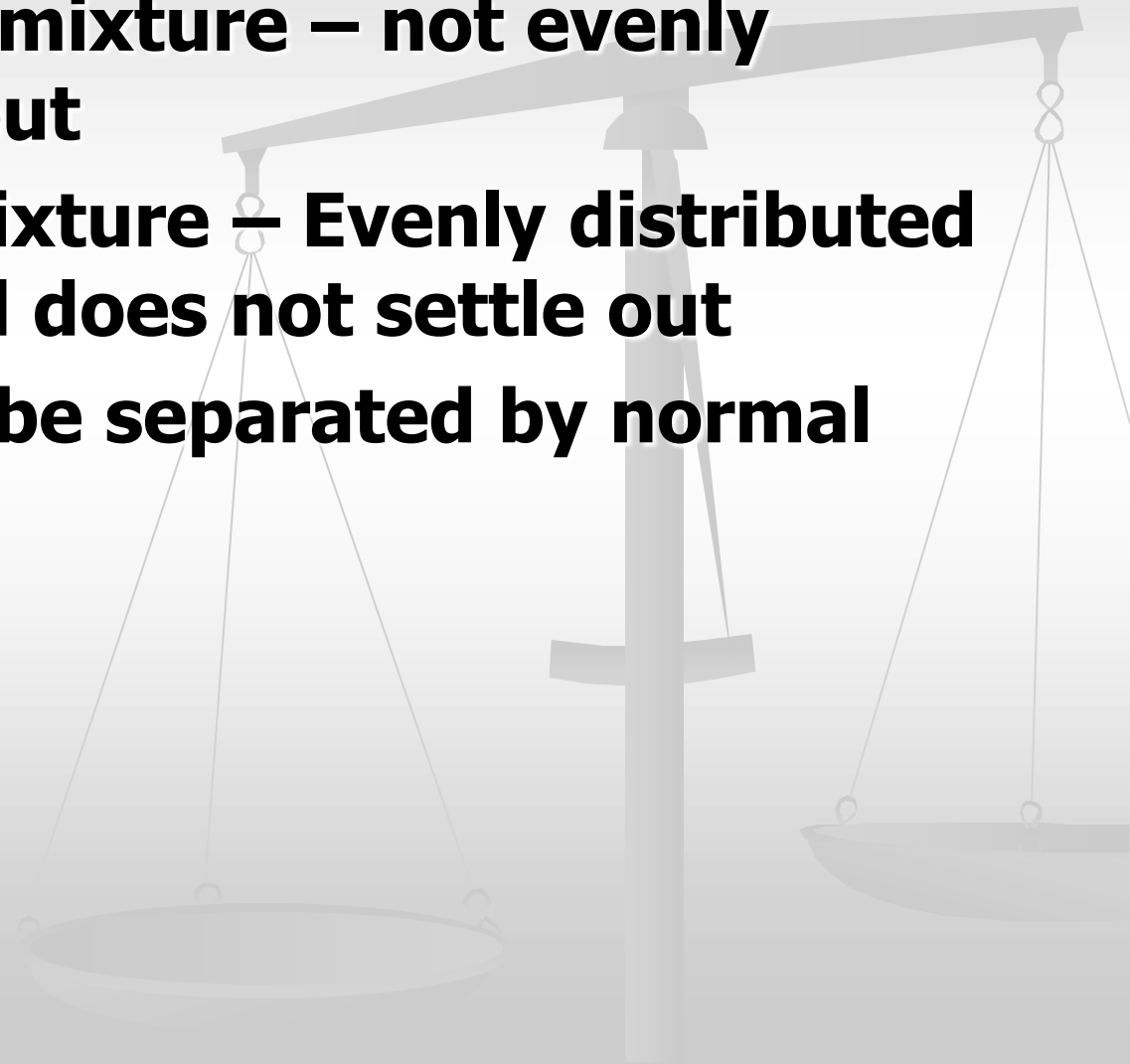


# Quiz

- 1. What is the mass of a proton, neutron and an electron. (give the mass of each)
  - 2. What is the charge of an electron, proton, and neutron.
  - 3. Where are neutrons found?
  - 4. Where are electrons found?
  - 5. What is an isotope?
  - 6. How many protons and neutrons does a carbon 14 atom if carbon has an atomic number of 6?
- 

# Mixtures- different things put together that do not chemically combine

- **Heterogeneous mixture – not evenly mixed throughout**
- **Homogenous mixture – Evenly distributed through out and does not settle out**
- **All mixture can be separated by normal physical means.**
  - **Evaporation,**
  - **sifting**
  - **boiling**

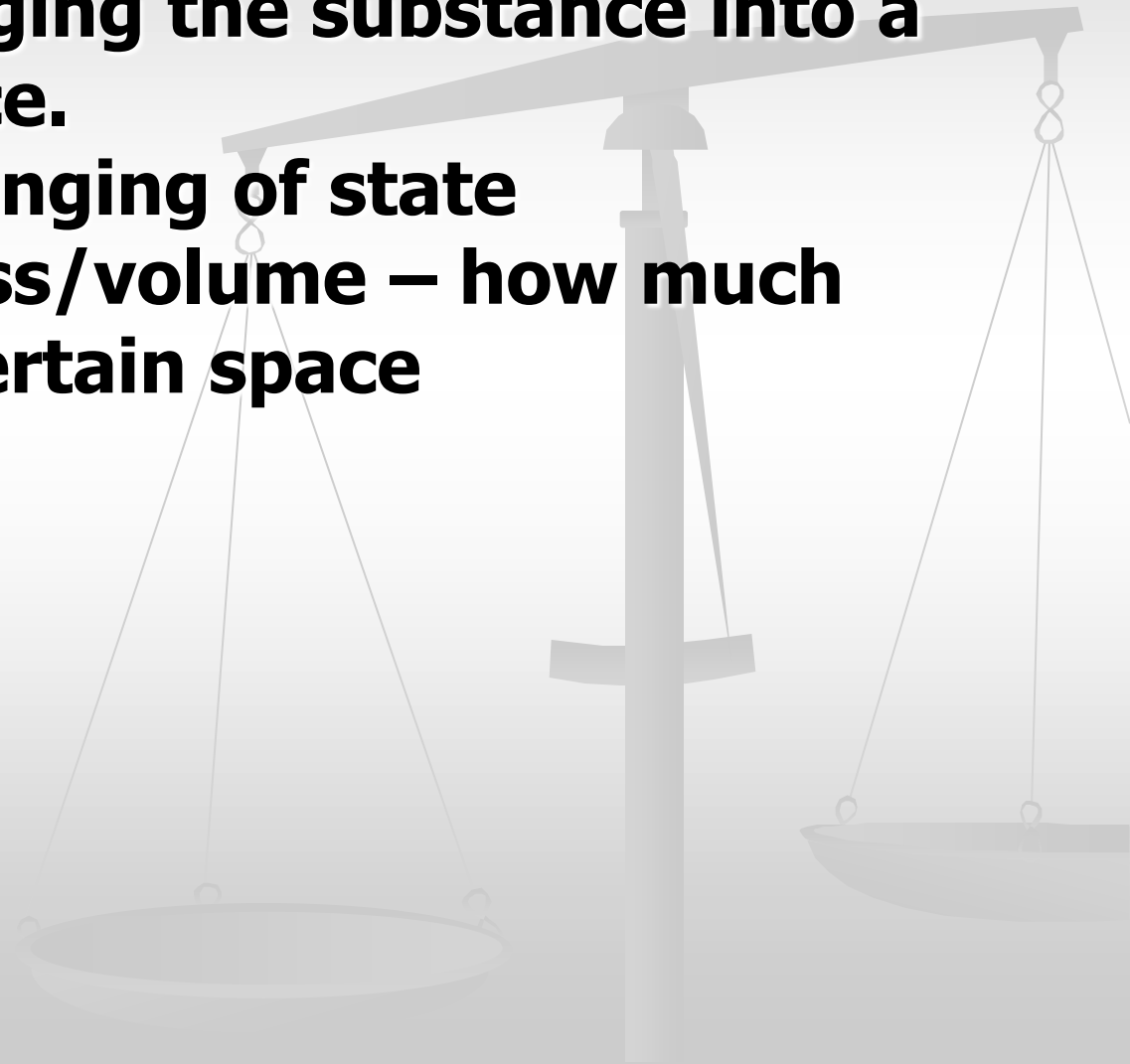


# ■ **Physical properties of matter**

- **Physical properties can be observed without changing the substance into a new substance.**

**Example: Changing of state**

**Density – Mass/volume – how much stuff is in a certain space**



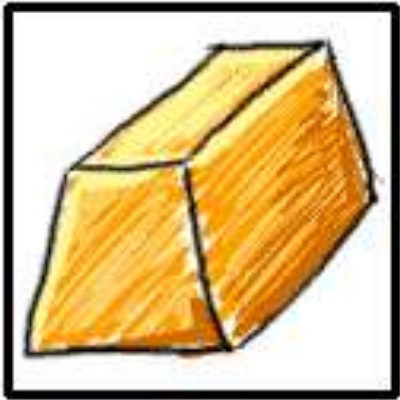
# STATES of matter?



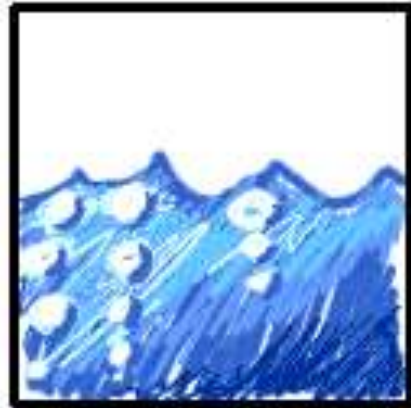
What would it take for matter to move from one state to another?



# What do you know about matter?



Solids



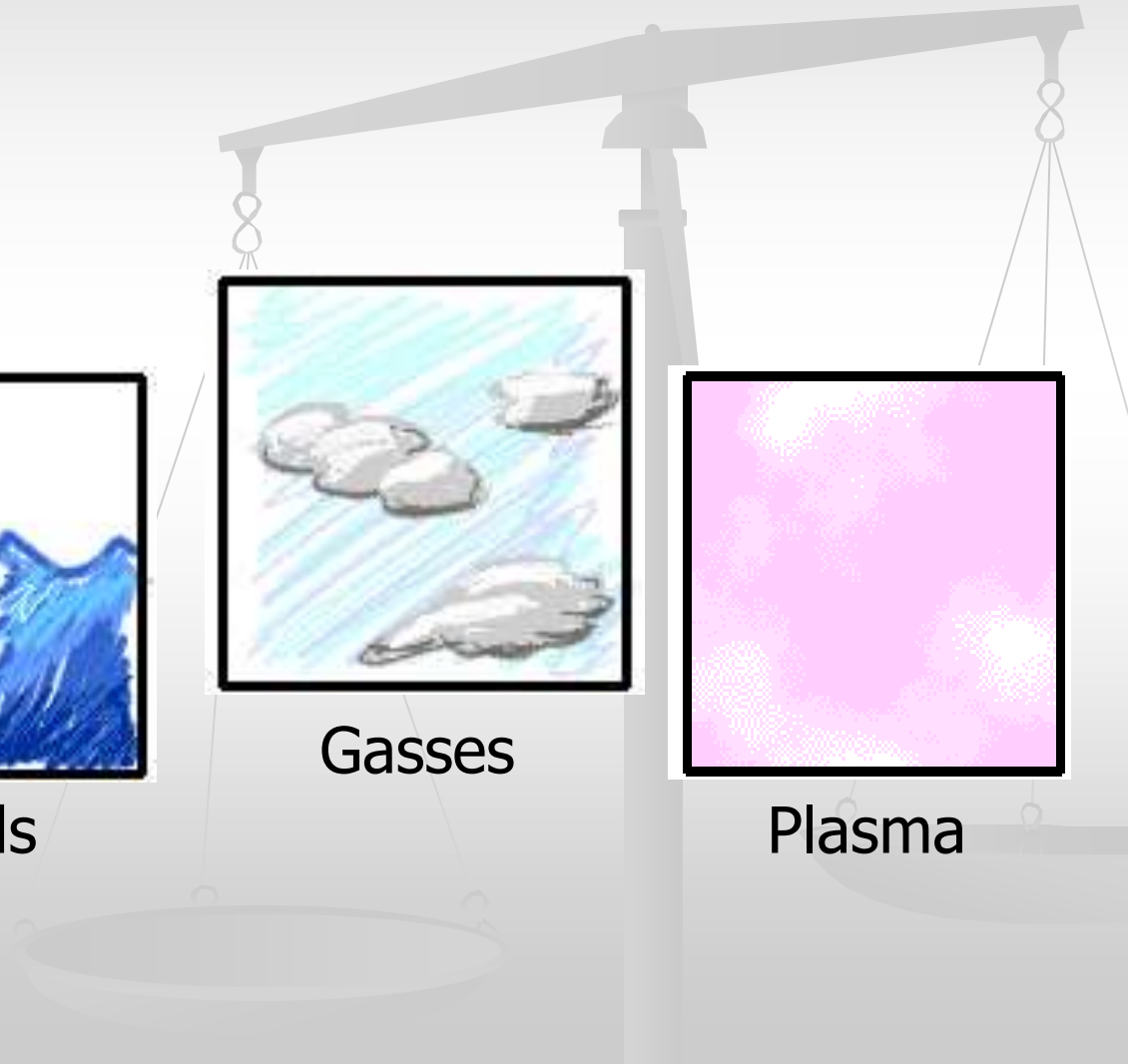
Liquids



Gasses

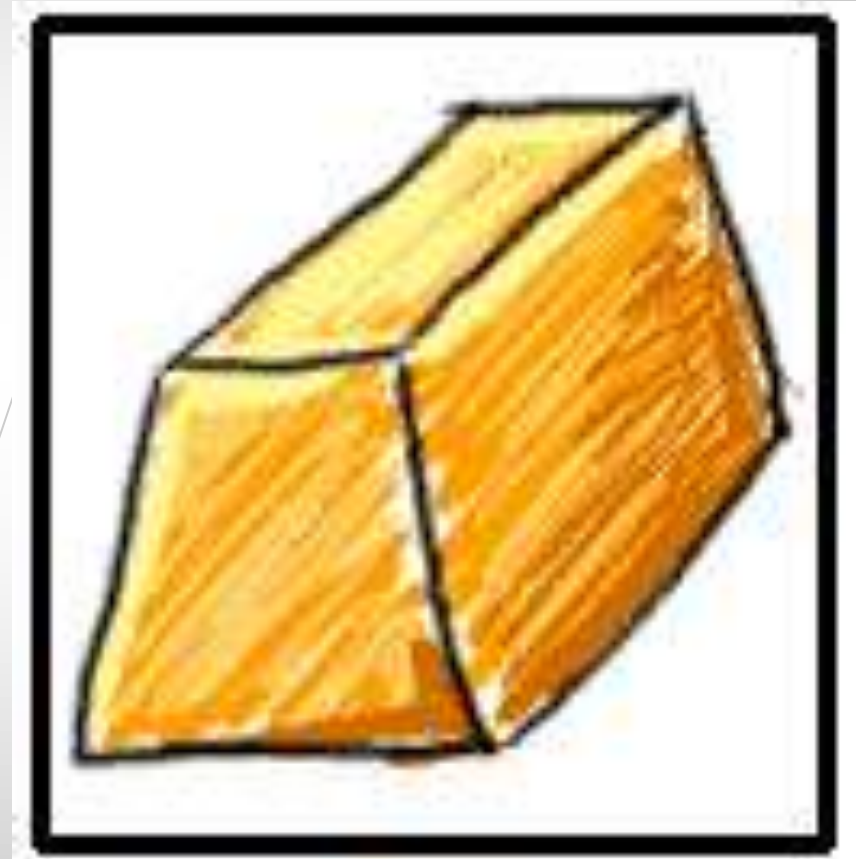


Plasma



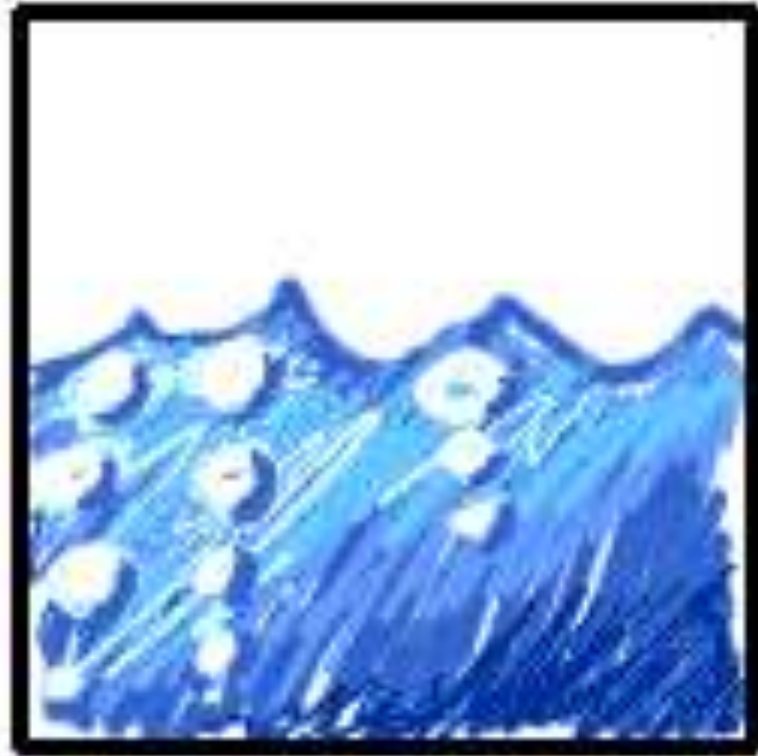
# Solids

- Solids hold their own shape.
- Solids have mass.
- Solids take up space.



# Liquids

- Liquids take the shape of their container.
- Liquids have mass.
- Liquids take up space.



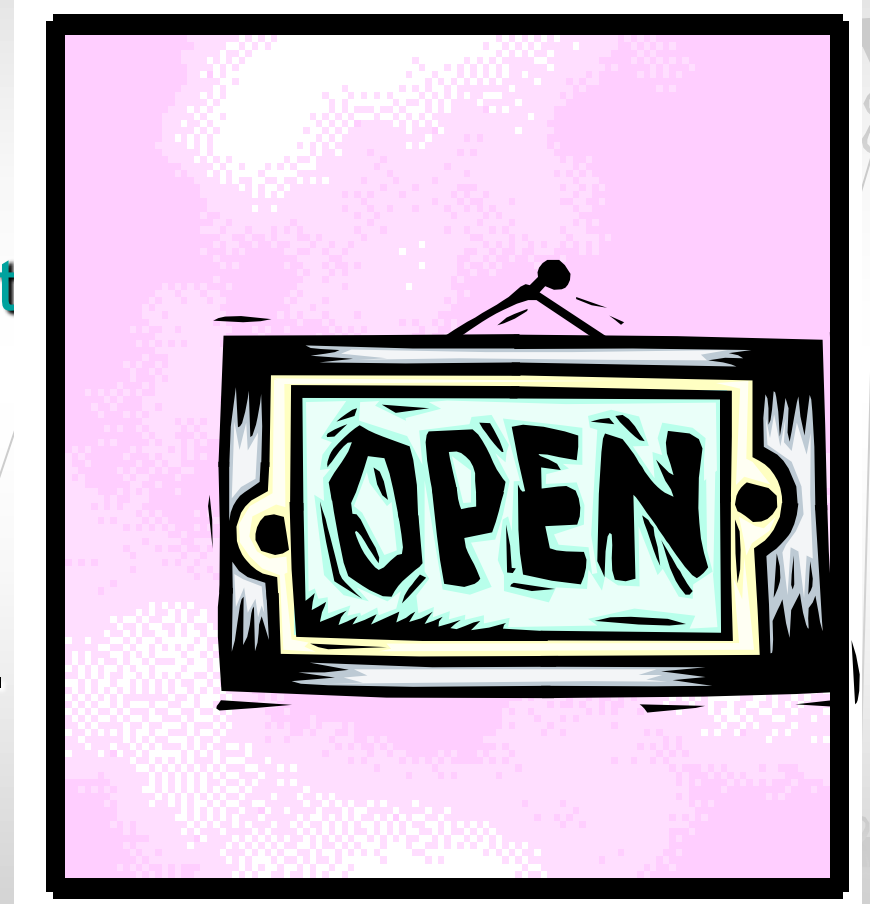
# Gasses

- Gasses spread out to fill the entire space given.
- Gasses have mass.
- Gasses take up space.



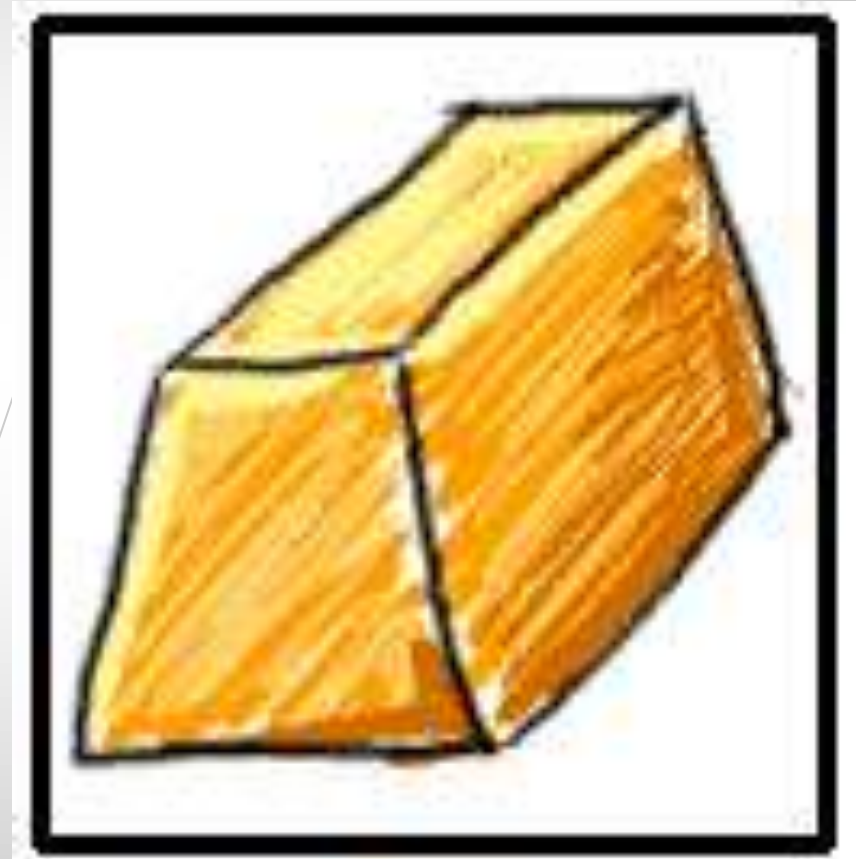
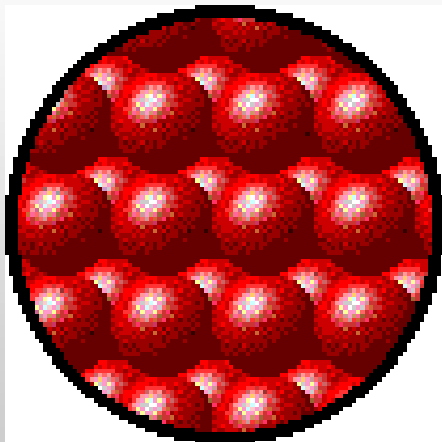
# Plasma

- Lightning is a plasma.
- Used in **fluorescent light bulbs** and Neon lights.
- Plasma is a lot like a gas, but the particles are electrically charged.



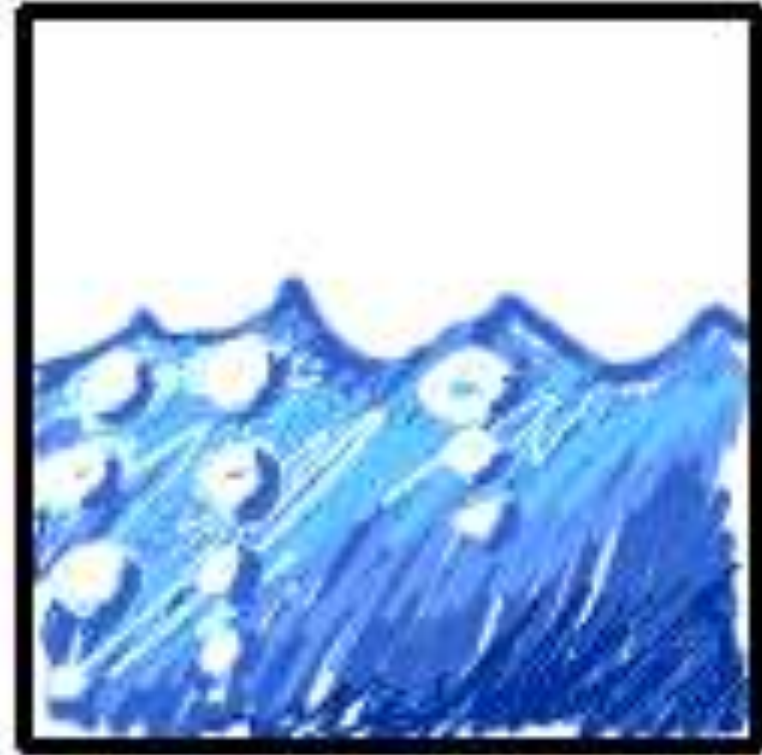
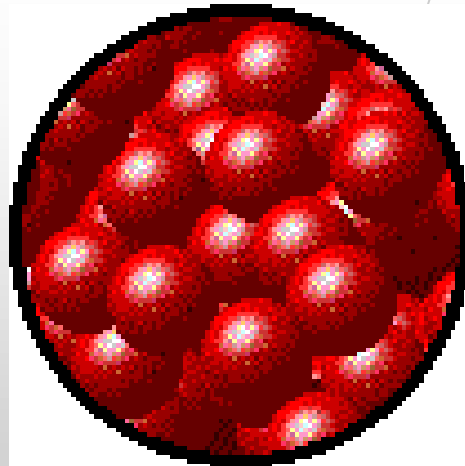
# Particles in Solids:

- Are packed tightly together
- Have very little energy



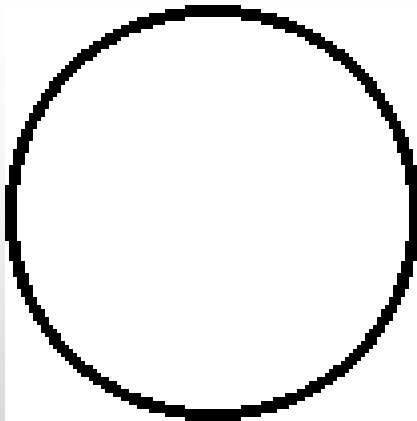
# Particles in Liquids:

- Are loosely packed
- Have medium energy levels



# Particles in Gasses:

- Move freely
- Have LOTS of energy





# Particles in Plasma:

- Are electrically charged
- Have **EXTREMELY** high energy levels



# Some places where plasmas are found...

1. Flames

A close-up photograph of a fire with bright orange and yellow flames against a dark background. The flames are intense and appear to be part of a larger fire.



## 2. Lightning

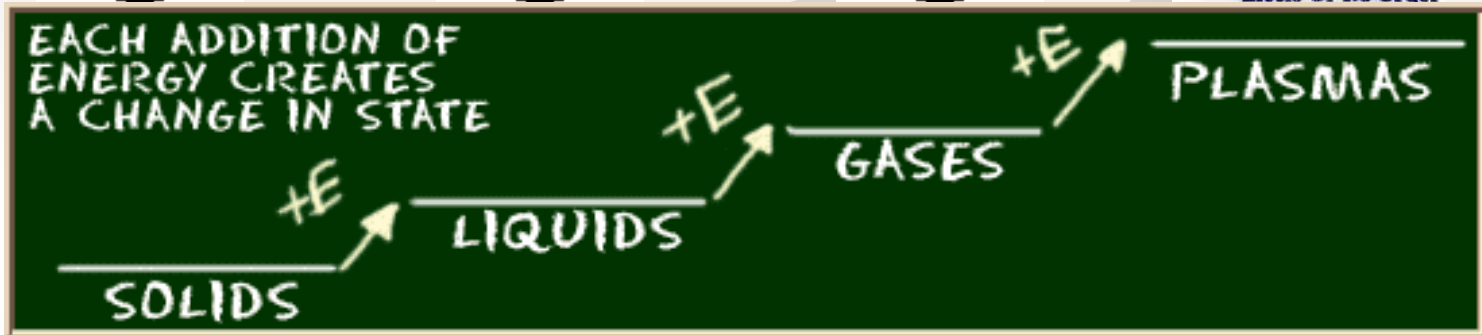
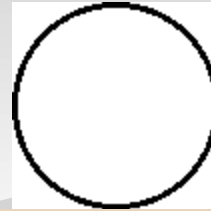
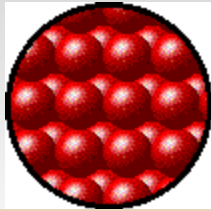
### 3. Aurora (Northern Lights)



**The Sun is an example of a star in its  
plasma state**



# STATES OF MATTER



SOLID

Tightly packed, in a regular pattern  
Vibrate, but do not move from place to place

LIQUID

Close together with no regular arrangement.  
Vibrate, move about, and slide past each other

GAS

Well separated with no regular arrangement.  
Vibrate and move freely at high speeds

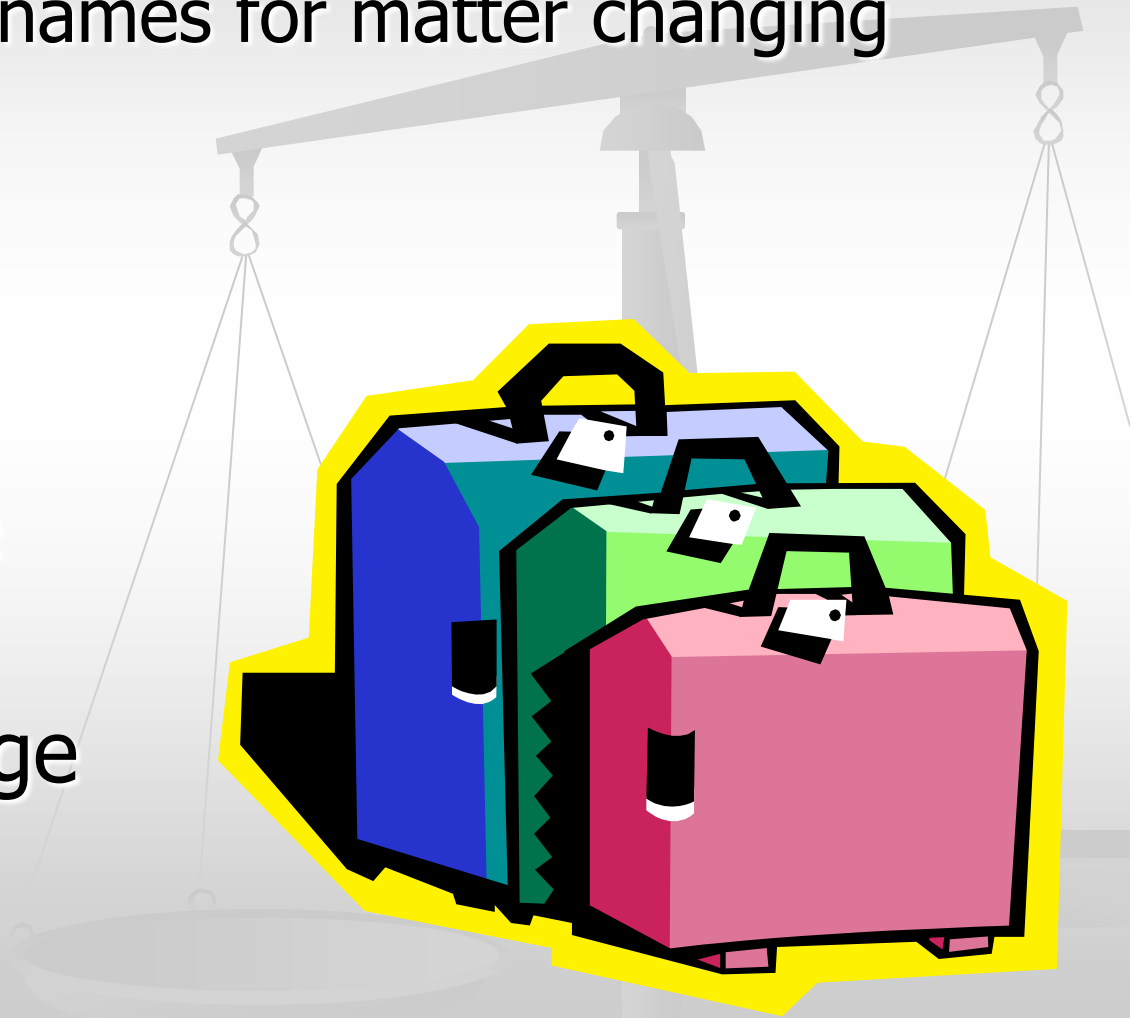
PLASMA

Has no definite volume or shape and is composed of electrical charged particles

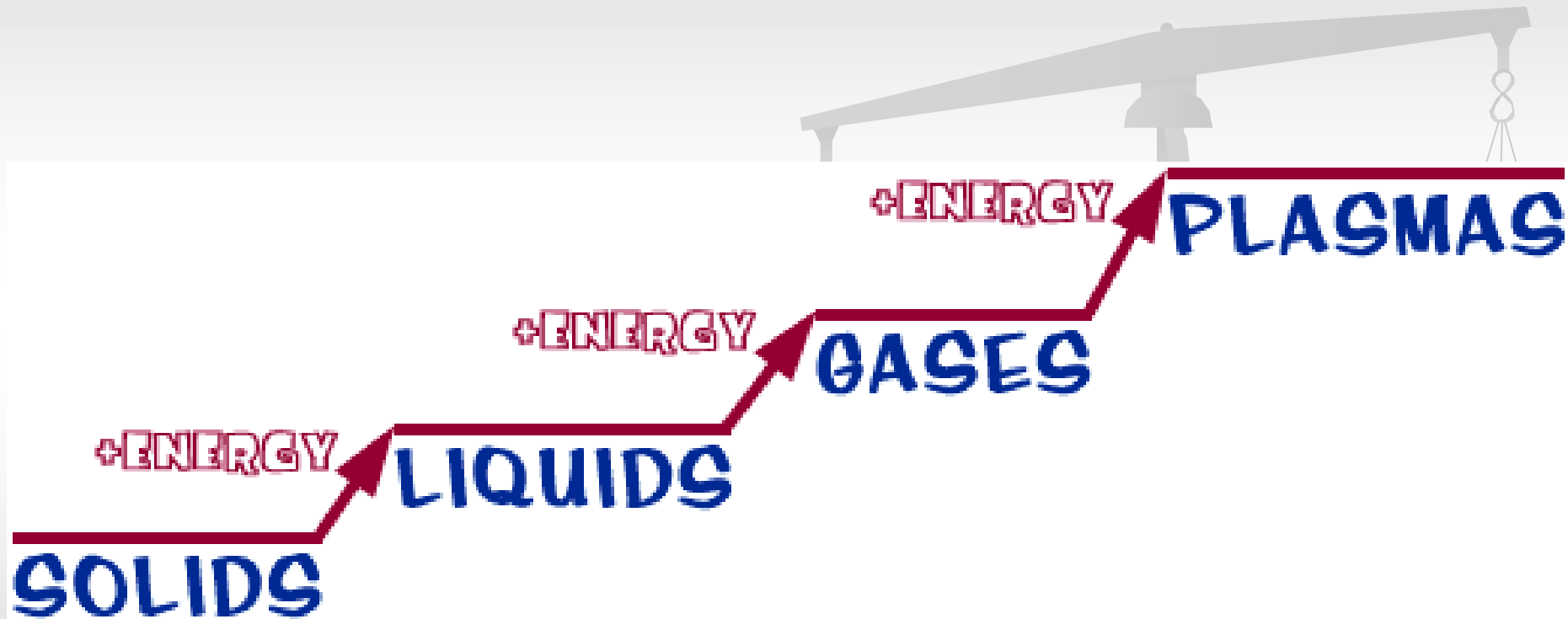


# Changing States

- There are several names for matter changing states:
  - State change
  - Phase change
  - Physical change

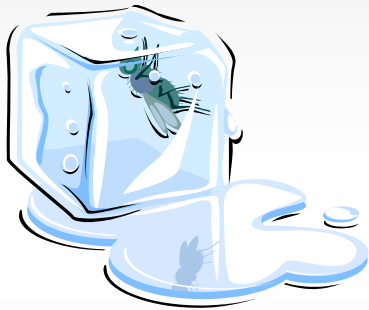
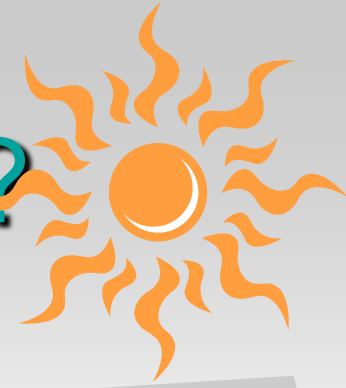


# Energy determines the state!





# What will happen? Why?

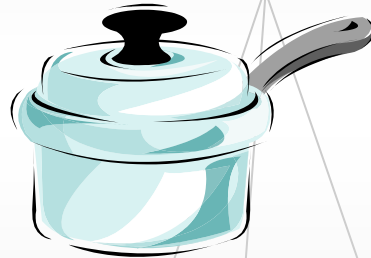


Here's how it works:

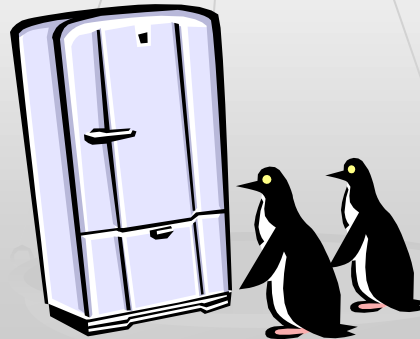


# Add or Subtract Energy. . .

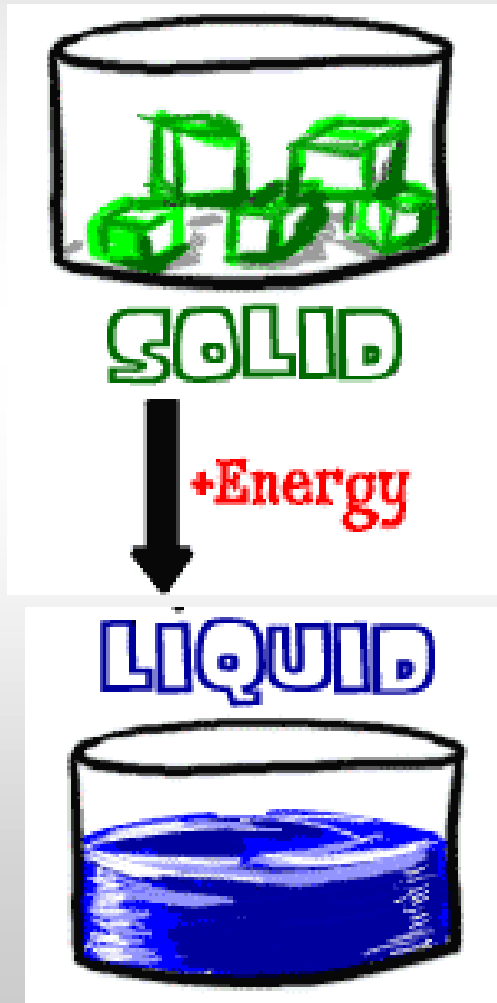
When energy is added, particles move faster!



When energy is taken away, particles move slower!

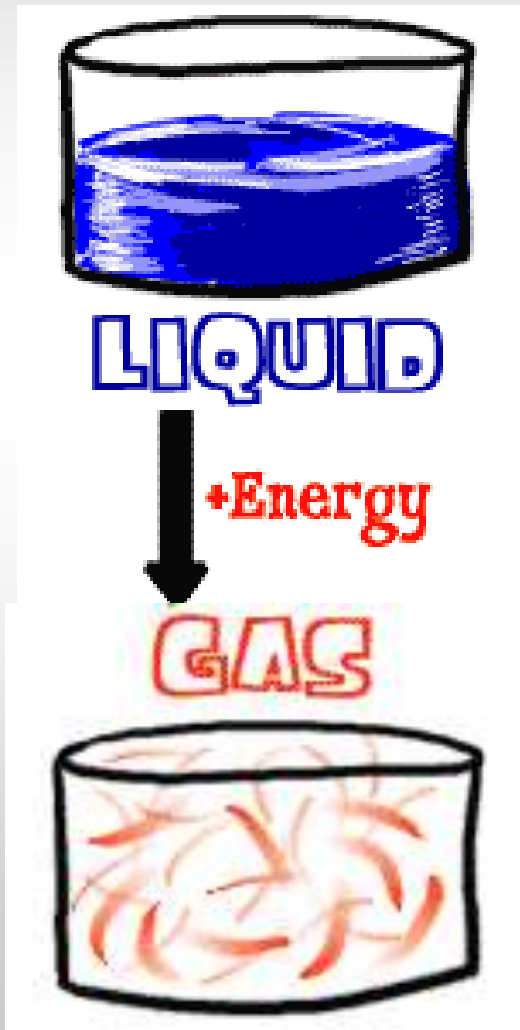


# Solid + Energy = ?



- When energy is added to **solids**, they become **liquids**!
- Examples?

# Liquid + Energy = ?



- When energy is added to **liquids**, they become **gasses**!
- What examples can you think of?

# Changes of state of matter

- **Freeze**
- **Melt**
- **Evaporate**
- **Condensation**
- **Sublimation**

