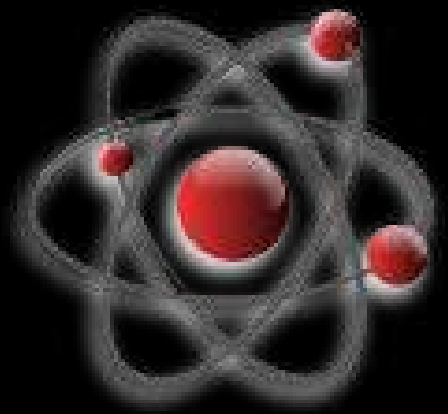
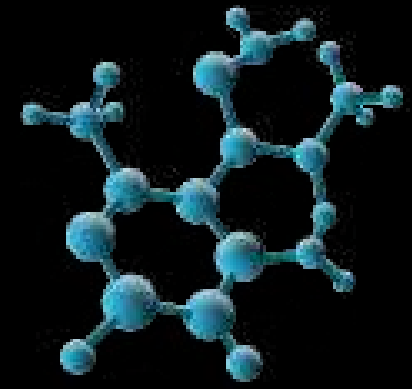




MASS

&

MATTER

Physical Science

Students will verify that an object is the sum of its parts.

a. Demonstrate that the mass of an object is equal to the sum of its parts by manipulating and measuring different objects made of various parts.

b. Investigate how common items have parts that are too small to be seen without magnification.

Students will explain the difference between a physical change and a chemical change.

a. Investigate physical changes by separating mixtures and manipulating (cutting, tearing, folding) paper to demonstrate examples of physical change.

b. Recognize that the changes in state of water (water vapor/steam, liquid, ice) are due to temperature differences and are examples of physical change.

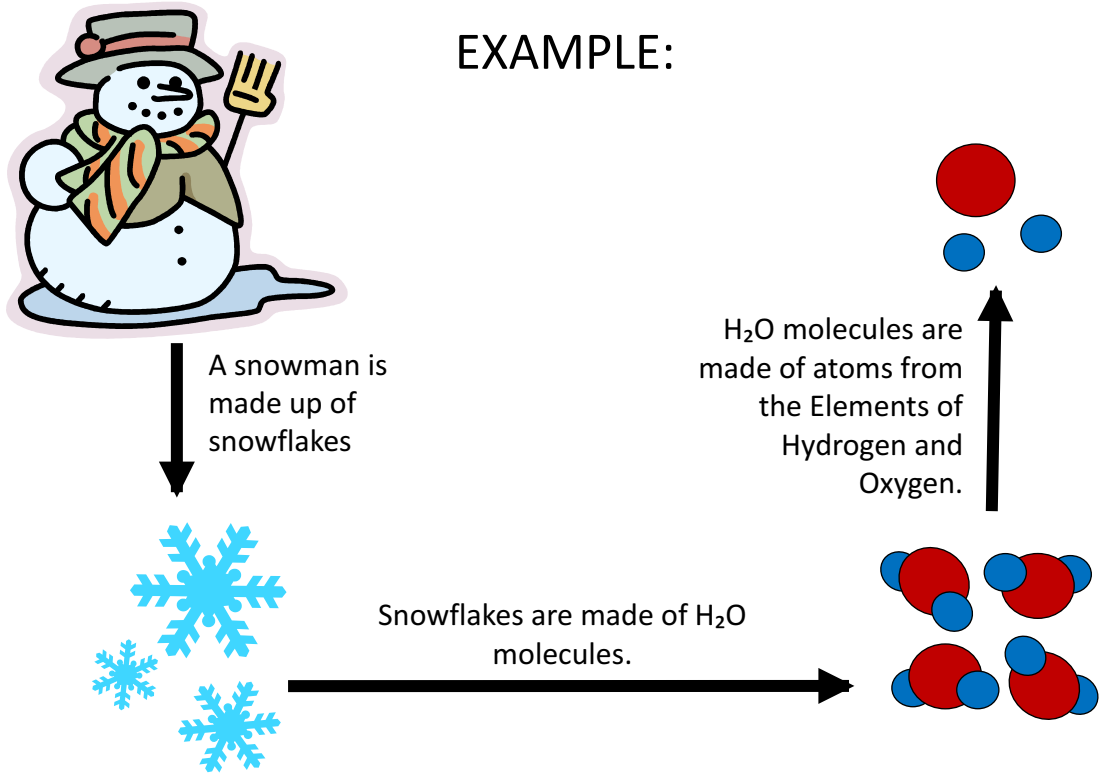
c. Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change.

S5P1: Students will verify that an object is the sum of its parts.

b. Investigate how common items have parts that are too small to be seen without magnification.

Objects can be broken down to smaller parts that cannot be seen with the naked eye. An object can be broken down into smaller parts, such as cells, and those cells can be broken down into molecules and elements, which can then be broken down into individual atoms. Everything is made of smaller parts that cannot be seen without magnification.

EXAMPLE:



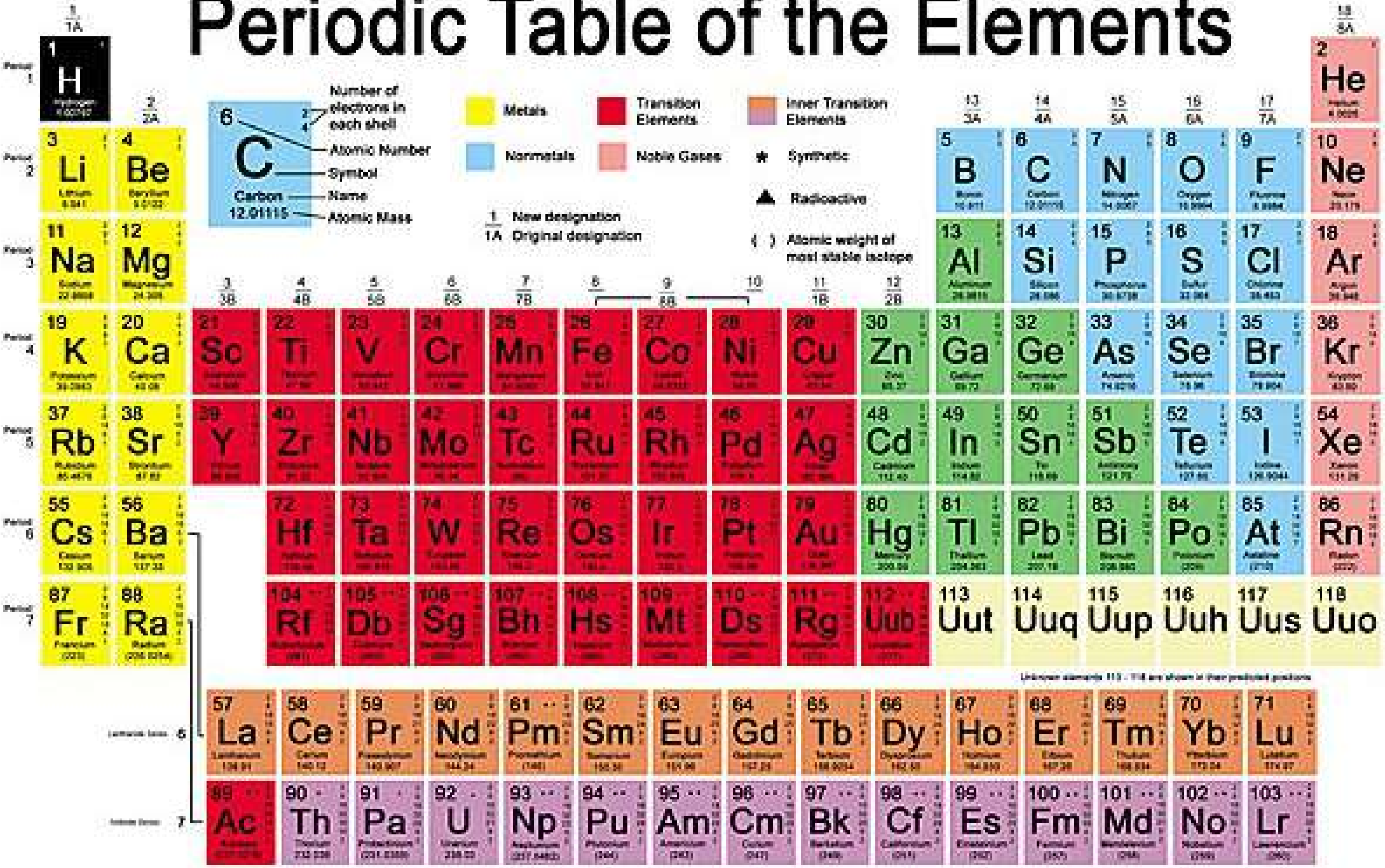
---Vocabulary---

Atom: the smallest possible particle of an element

Molecule: a single particle of matter made up of two or more atoms joined together

Element: a substance made of just one kind of atom

Periodic Table of the Elements

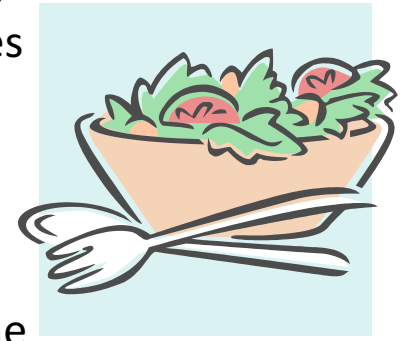


S5P2: Students will explain the difference between a physical change and a chemical change.

a. Investigate physical changes by separating mixtures and manipulating (cutting, tearing, folding) paper to demonstrate examples of physical change.

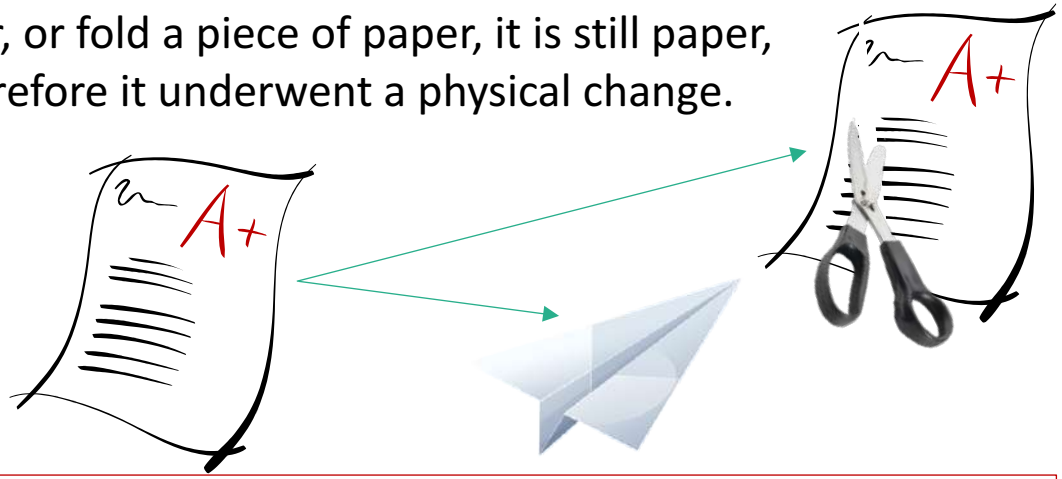
Mixture:

When you put two or more substances together physically, such as when you put tomatoes and lettuce in a salad, the substances can be separated, which means that it is a mixture. Also, if you mix salt and water, you can separate the salt from the water through evaporation, which makes saltwater a mixture.



Physical Change:

If you change the appearance or state of something, but the change does not affect the type of atoms it is composed of or the change is reversible, the object experienced a physical change. For example, if you cut, tear, or fold a piece of paper, it is still paper, therefore it underwent a physical change.



---Vocabulary---

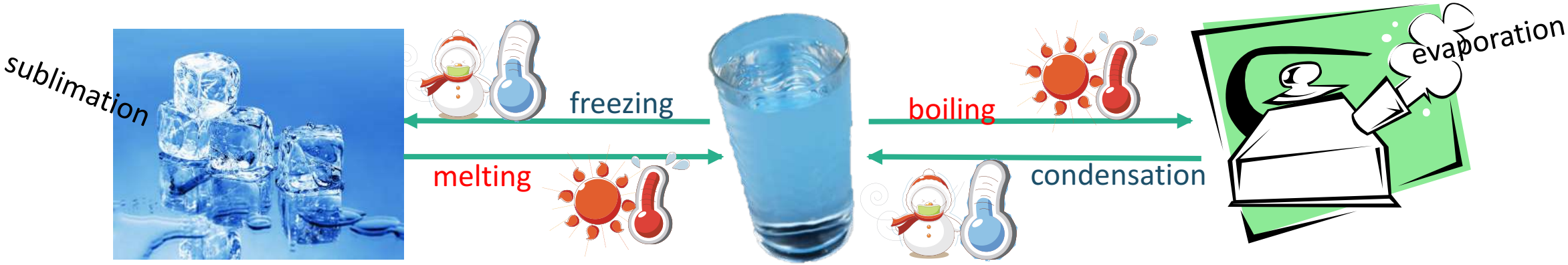
Physical Change: a change that does not result in a new substance

Mixture: matter made up of two or more substances or materials that are physically combined and can be separated

S5P2: Students will explain the difference between a physical change and a chemical change.

b. Recognize that the changes in state of water (water vapor/steam, liquid, ice) are due to temperature differences and are examples of physical change

Water undergoes changes of state very noticeably and so provides a good example of physical change. When water is a room temperature it is a liquid, but when it gets below the freezing point of 32°F or 0°C, it becomes a solid and the water becomes ice. Surprisingly, parts of the ice become gases in the process known as sublimation. When the ice begins to warm above the freezing point, it starts to become a liquid once again. If the liquid reaches the boiling point of 212°F or 100°C, the liquid becomes a gas and the water becomes steam or water vapor. The steam then evaporates into the air. If the temperature drops below the boiling point, the steam will once again become a liquid through the process of condensation. Because all of these changes are reversible and do not alter the substance, they are examples of physical change. Change of state is a physical change dependent on temperature changes.



---Vocabulary---

Change of State: a substance can change its state depending on the conditions surrounding it

S5P2: Students will explain the difference between a physical change and a chemical change.

c. Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change.

When you are examining a substance, you can notice a variety of characteristics. If you are noticing qualities that involve just the object itself, you are examining physical properties. If you are examining characteristics that involve how the object interacts with other substances, you are observing chemical properties.

Physical Properties

luster
mass
color
reflectivity
permeability
volume
density
malleability
texture
size
temperature
magnetism
conductivity
freezing and boiling point
…and more!

Chemical Properties

flammability
reactivity
half-life
explosiveness
oxidization
decomposition
toxicity
chemical stability
corrosion
heat of combustion
radioactivity
…and more!

---Vocabulary---

Physical Property: a trait of a substance by itself

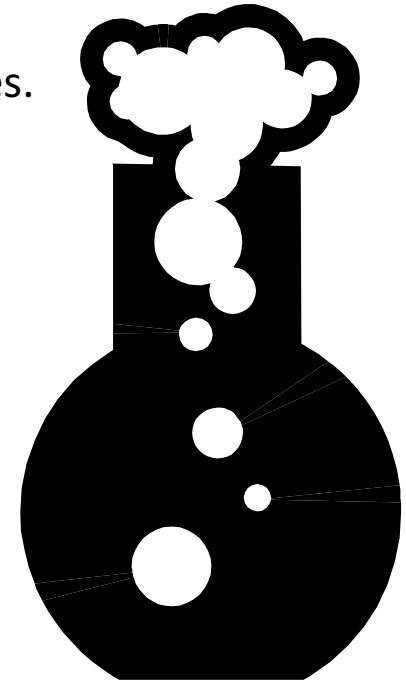
Chemical Property: a characteristic that involves how a substance interacts with other substances

S5P2: Students will explain the difference between a physical change and a chemical change.

c. Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change.

****Watch this video to explore the chemical reactions with Bill Nye!**** https://www.youtube.com/watch?v=smkVzfZmDIU

Chemical reactions, or chemical changes, take two or more substances to create a totally new substance, or substances, that can have completely different properties from the original substances. If you combine two or more elements in a chemical reaction, you can create a compound. This compound is a new substance with its own characteristics separate from the elements that were used to form it.



For example, the salt that you can find in your kitchen was formed through the following chemical reaction:

$$2Na + Cl_2 = 2\ NaCl$$

This chemical reaction takes Sodium, which is a metal that can be toxic or explosive, and Chlorine, a green gas that is poisonous and has a nasty odor, to make Sodium Chloride, a substance necessary for living beings to ingest and used to flavor food.

****Watch this video to explore the differences between physical and chemical changes!**** https://www.youtube.com/watch?v=M8tyjwB42X4

---Vocabulary---

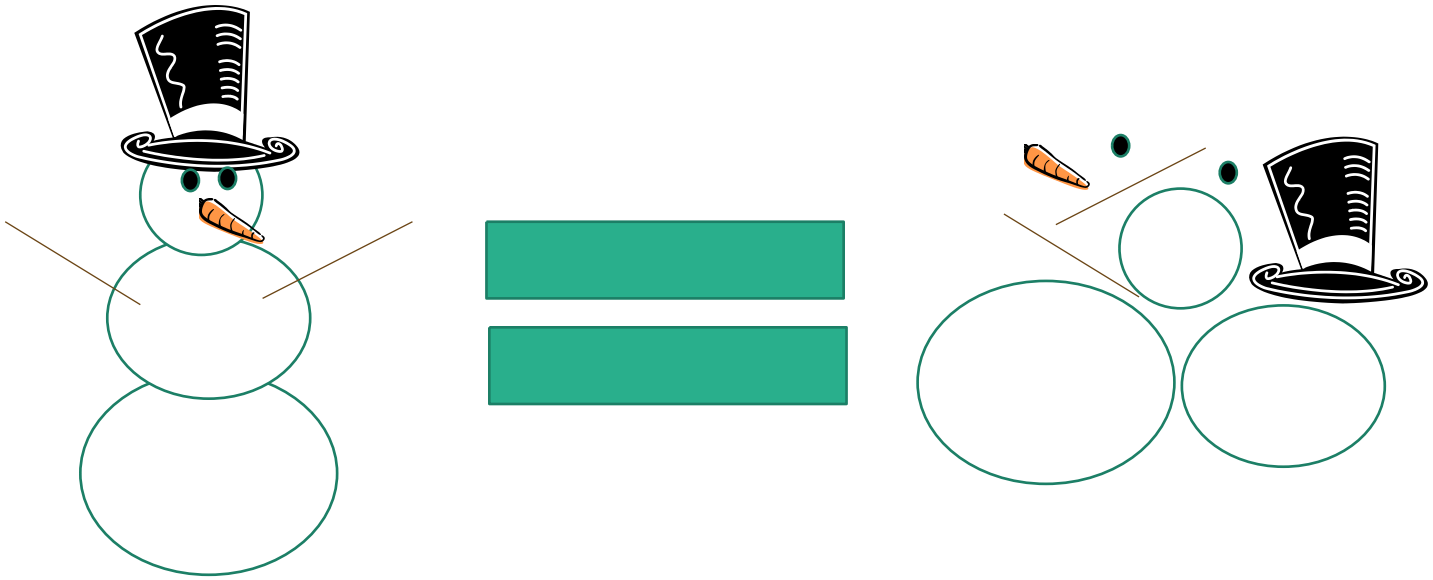
Chemical Change: a change that results in the formation of new substances

Chemical Reaction: another term for chemical change

Compound: a substance made of two or more kinds of atoms that are chemically combined

S5P1: Students will verify that an object is the sum of its parts.

a. Demonstrate that the mass of an object is equal to the sum of its parts by manipulating and measuring different objects made of various parts.



If you break an object down to all of the parts that compose it, it has the same mass as the whole object. In essence, the mass of an object is the same as all of the parts that form it. Even if an object goes through a chemical change, all of the mass of the products will equal the mass of the reactants. Mass can not be created or destroyed.

---Vocabulary---

Law of Conservation of Mass: the total amount of mass remains constant in an isolated system in spite of any physical or chemical changes that may take place

To learn more about mass and matter, visit these websites that focus on 5th grade standards:

http://www.frodonz.com/physicalscience.html

And

http://www.jonathanfeicht.com/physical-changes.html