**Chapter 2 – Classifying Matter (Pages 36-64)**

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***Section 2.1 – Classifying Matter(pages 38-44)***

*Key Concepts:*

* Why are elements and compounds classified as pure substances?
* How do mixtures differ from pure substances?
* What is the main difference among solutions, suspensions, and colloids?

*Vocabulary:*

1. Pure substance
2. Element
3. Atom
4. Compound
5. Heterogeneous mixture
6. Homogeneous mixture
7. Solution
8. Suspension
9. Colloid

*In need of volunteers:*

* Each piece of clothing has a care label, which lists recommended cleaning methods for the clothing.
* If you can locate your shirts label (appropriately, of course!), read it and identify what material your shirt is made of and the specific care instructions.
* Why is it necessary to put care instructions on a label?

*Composition*

* Cotton, wool, polyester, nylon, etc. all have different properties requiring different care instructions.
* Based upon their composition (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_), materials can be divided into two categories: pure substances and mixtures.

*Pure Substances*

* **Pure substance (or simply a substance): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Every sample of a given substance has the same properties because a substance has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Every pinch of salt tastes equally salty just like each pinch of table sugar tastes equally sweet.
* Substances can be classified into two categories (elements and compounds):
	+ Elements
		- Although there are millions of known substances, there are only \_\_\_\_\_\_\_\_\_\_\_ known elements.
		- An **element** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* An element has a fixed composition because it contains only one type of **atom:** \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* No two elements contain the same type of atom
				+ Oxygen only contains oxygen atoms, copper only contains copper atoms, helium only contains helium atoms
		- Examples of elements:
			* At room temperature, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ including thinks such as carbon and aluminum.
			* Some elements are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ such as oxygen and nitrogen.
			* Only two elements are liquids at room temperature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Symbols for elements:
			* In 1813, Jons Berzelius, a Swedish chemist, suggested that chemists use symbols to represent each element.
			* Each symbol has either \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with the first letter always being capitalized. The second letter is always lowercase.
			* Some symbols are easy to understand, others are not.
				+ Carbon – \_\_\_\_\_\_\_\_\_
				+ Aluminum – \_\_\_\_\_\_\_\_\_\_\_\_
				+ Gold – \_\_\_\_\_\_\_\_\_\_\_\_ (Latin name: Aurum)
			* Symbols allow scientists who speak different languages to communicate without confusion.
				+ World-wide the symbol for nitrogen is \_\_\_\_\_\_\_\_\_\_
				+ However, what we know in English as nitrogen is known as:

Azote in France

Stickstoff in Germany

Nitrógeno in Mexico

* + Compounds
		- **Compound:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- The properties of a compound differ from those of the substances from which it is made.
			* Example: Water – composed of elements hydrogen and oxygen
				+ Hydrogen – \_\_\_\_\_\_\_\_\_\_\_\_\_ at room temperature, fuel for a fire
				+ Oxygen – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at room temperature, fuel for a fire
				+ Water – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at room temperature, does not burn, can extinguish a fire
		- A compound always contains two or more elements joined together in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Water or H2O – always two hydrogen atoms with one oxygen atom

*Mixtures*

* Recipe Example
* The properties of a mixture can vary because the composition of a mixture is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Mixtures tend to retain some of the properties of their individual substances; however, the properties of the mixture are less constant than the properties of the individual substances.
	+ Mixture can be classified by how well the parts of the mixture are distributed throughout the mixture.
	+ Two classifications of mixtures: heterogeneous and homogeneous
		- **Heterogeneous mixtures:**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Examples: salsa, sand, dirt, Italian salad dressing, salad
		- **Homogeneous mixtures:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Appear to contain only one substance.
			* Examples: Stainless steel, tap water, kool-aid, swimming pool water
	+ The size of the particles in a mixture has an effect on the properties of the mixture.
		- Based on the size of its largest particles, a mixture can be classified as a solution, suspension, or a colloid.
		- **Solutions:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* The particles in a solution are too small to settle out of the solution, be trapped by a filter, or scatter light.
				+ Liquid solutions are easy to recognize – they do not separate into distinct layers over time.
				+ If you poor a liquid solution through a filter, none of the substances in the solution are trapped in the filter.
				+ You can see through solutions that are liquids because light passes through them without being scattered in all directions.
		- **Suspensions:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* The particles in a suspension settle out of the liquid, can be filtered, and are large enough to scatter light – think of a mixture of sand and water.
				+ “Shake well before using” indicates that over time the larger particles will separate out over time.
				+ The larger particles can be trapped by a filter while the liquid portion can pass through.
				+ Because larger particles can scatter light in all directions, suspensions are cloudy.
		- **Colloids:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Like solutions, colloids do not separate into layers and you cannot use a filter to separate the parts of a colloid.
			* Like suspensions, colloids particles are large enough to scatter light.
			* Examples: Fresh cow’s milk vs. homogenized milk
			* Example: Fog

***Section 2.2 – Physical Properties (pages 45-51)***

*Key Concepts:*

* What are some examples of physical properties?
* How can knowing the physical properties of matter be useful?
* What processes are used to separate mixtures?
* When does a physical change occur?

*Vocabulary:*

1. Physical property
2. Viscosity
3. Conductivity
4. Malleability
5. Melting point
6. Boiling point
7. Filtration
8. Distillation
9. Physical change

*Examples of Physical Properties*

* **Physical property:**  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Examples include:
	+ **Viscosity:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- The greater the viscosity, the slower the liquid will flow.
		- Liquids like honey and corn syrup have a high viscosity while liquids like water and vinegar have low viscosity.
		- The viscosity of a liquid usually decreases when it is heated – cooking oil in a frying pan.
	+ **Conductivity:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Material’s that have high conductivity (metals) are called conductors.
		- If a material is a good conductor of heat, it is also usually a good conductor of electricity.
	+ **Malleability:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Most metals are malleable and can be easily shaped without shattering, unlike items that are made out of glass that are brittle (shatter when struck)
	+ **Hardness:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Example: a stainless steel kitchen knife can scratch a copper sheet because the stainless steel is harder than the copper.
		- Diamond is the hardest known material and is typically used on the edges of grinding wheels.
	+ **Melting Point:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ **Boiling Point:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **Substance** | **Melting Point (°C)** | **Boiling Point (°C)** |
| **Hydrogen** | -259.3 | -252.9 |
| **Nitrogen** | -210.0 | -195.8 |
| **Ammonia** | -77.7 | -33.3 |
| **Octane**  | -56.8 | 125.6 |
| **Water** | 0.0 | 100.0 |
| **Acetic Acid (Vinegar)** | 16.6 | 117.9 |
| **Table Salt** | 800.7 | 1465 |
| **Gold** | 1064.2 | 2856 |

* + **Density:** can be used to test the purity of a substance (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).
		- The density of a substance at room temperature is a constant value.
			* Gold Crown Example

*Using Physical Properties*

* Physical properties are used to identify a material, to choose a material for a specific purpose, or to separate the substances in a mixture.
* Using Properties to Identify Mixtures:
	+ The steps used to identify a material are similar to the steps used to test for purity.
		- Step one: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Step two: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Step three: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Examples of usefulness: Page 48: Solving a Crime
* Using Properties to Choose Materials:
	+ Properties determine which materials are chosen for which uses.
	+ Material for shoelaces – would you want wooden shoelaces?

*Using Properties to Separate Mixtures*

* Filtration and Distillation are two common separation methods for mixtures
	+ **Filtration**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* + - Particles of smaller size are able to pass through the holes of the filter while the larger particles are caught in the filter.
		- Examples: Coffee filter, brewed tea, food strainer
	+ **Distillation:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Typically used when the particles in the mixture are too small and all (or a majority of) pass through a filter.
		- One practical application: purification of drinking water

*Recognizing Physical Changes*

* A **physical change** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Phase changes (solid to liquid to gas) are physical changes. The substances have simply changed form.
	+ Other examples include slicing (cutting) or crumpling something like paper. The size or shape may change but the composition of the material does not.
	+ Some physical changes can be reversed.
		- Phase changes are reversible.
		- Braided hair can be straightened
		- A wrinkled shirt can be ironed.
	+ Some physical changes cannot be reversed.
		- Cutting of hair
		- Slicing a tomato
		- Peeling an orange.

***Section 2.3 – Chemical Properties (Pages 54-58)***

*Key Concepts:*

* When can chemical properties be observed?
* What observation might indicate that a chemical change has occurred?
* What is the difference between chemical and physical changes?

*Vocabulary:*

1. Chemical property
2. Flammability
3. Reactivity
4. Chemical change
5. Precipitate

*Making Observations:*

* Make as many observations that you can about the burning candle in the front of the room within 1 minute. Write down anything that you think is an observation. Remember every detail of an observation is important in science. Make observations using your 5 senses. Make observations about the materials that are used and what those materials are doing.
* Now identify which of the properties you listed are physical properties.
* The observations that you were unable to identify as physical properties are what type of properties?

*Observing Chemical Properties:*

* **Chemical Property:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Chemical properties can be observed only when the substances in the sample of matter are changing into different substances.
	+ Two common chemical changes: Flammability and reactivity
		- **Flammability**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Materials that have this property (or the ability to burn) can be used as fuel.
				+ Examples: gasoline, paper, wood
			* Sometimes flammability is not a desirable property
				+ Examples: fabric (children’s fabric must have low flammability), housing materials
				+ Items that are listed as “Flame Resistant” are typically difficult to ignite. If they are ignited, they will burn slowly.
		- **Reactivity:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* Let’s look at two very common gases and their reactivity: Oxygen vs. Nitrogen
				+ Oxygen: makes up roughly 22% of the air we breathe

Reacts very easily with other elements

Common reaction between oxygen with iron and water: \_\_\_\_\_\_\_\_\_\_\_\_

Rust weakens the iron it is formed on.

* + - * + Nitrogen: makes up roughly 78% of the air we breathe

Very low reactivity

Seawater stored in steel tanks – page 55

*Recognizing Chemical Changes*

* **Chemical change**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \*Three common types of evidence for a chemical change are a change in color, the production of a gas, and the formation of a precipitate.
		- A change in color:
			* A change in color is a clue that a chemical change has produced at least one new substance
			* Examples: silver tarnishing, iron rusting, copper changing colors, food changing color when cooked.
		- Production of a gas:
			* When certain chemicals are combined together, a gas may be a product
			* Examples: vinegar and baking soda, baking powder in a cake recipe
			* What about boiling water? Is a gas being produced? Is this chemical or physical?
		- Formation of a precipitate:
			* **Precipitate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
			* The chemical change alters the structure of some of the substances and causes them to stick together in clumps.
			* Examples: curdling of milk, cottage cheese

*Is a Change Chemical or Physical?*

* Before you decide whether or not a chemical change has occurred, ask yourself this question: *Are different substances present after the change takes place?*
* When matter undergoes a chemical change, the composition of the matter \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* When matter undergoes a physical change, the composition of the matter \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_