**Organization of Matter**

**What is matter?**

Matter is anything that has \_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_.

Made up of \_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: smallest particle of matter and the simplest form of an element. Ex:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_a pure substance made up of only *one type of atom. (*Ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

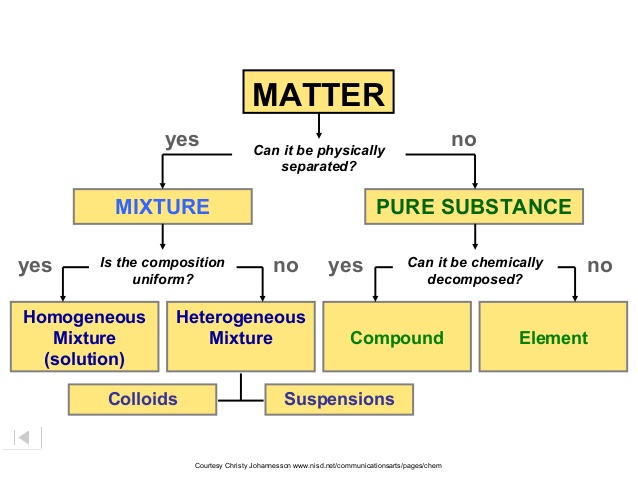
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Elements are arranged in the Periodic Table by their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(the number of electrons OR protons inside the atom)

**Combining atoms to make molecules**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a group of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ atoms that are chemically bonded Ex: A molecule of water (H2O) is made from a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between \_\_\_\_\_\_\_\_\_\_\_ of hydrogen and \_\_\_\_\_\_\_\_\_\_\_of oxygen

**Chemical Formulas**

* Molecules are represented by their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* This shows the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of each atom that composes the molecule.
* Each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the periodic table.
* The number of each atom is written directly after the symbol. (the number 1 is not written)

Matter is divided into two broad categories:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Pure Substances:**

Pure Substances: Made up of only **ONE** \_\_\_\_\_\_\_\_\_\_\_\_\_\_of particle regardless of whether they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. **\*\***Made up of elements and compounds.

**Compound is a** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ made up of **one type of molecule** containing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ different atoms bonded togetherEx. Table salt (NaCl) is sodium and chlorine.

* Compounds \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into their individual \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

E.g. Water (H2O) can be broken down into hydrogen and oxygen using a process called electrolysis

|  |  |  |  |
| --- | --- | --- | --- |
| **Atoms** | **Elements** | **Molecules** | **Compounds** |
| **Building blocks of life**  **Simplest form of the element**  **Examples**   * **2 nitrogen atoms (2 N)** * **3 Oxygen atoms (3 O)** * **4 hydrogen atoms (4 H)** | **Is a substance that cannot be broken down.**  **Made up of identical atoms**  **Examples**   * **Element nitrogen (N)** * **Element oxygen (O)** * **Element Hydrogen (H)** | **Two or more atoms bonded together chemically**  **Examples**   * **A molecule of water (H2O)** * **2 molecules of carbon dioxide (2 CO2)** * **A molecule of oxygen (O2)** | **Two or more different elements bonded together**  **Examples**   * **H2O** * **CO** * **CO2** * **C6H12O6**   **\*\*\*A molecule is NOT always a compound**  **\*\*\*A compound IS ALWAYS a molecule.** |

**Mixtures**

Mixtures: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with each other. (contains at least two types of particles)

They \_\_\_\_\_\_\_\_separated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ex. filtration).

Substances in a mixture keep their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Two Categories of Mixtures**

\***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – made up of at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (can see layers)

Examples: oil and water, orange juice with pulp, fruit salad, salsa

\*\***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** – made up of at least \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which **CANNOT** be distinguished \*\*\*

Examples: tap water, salt water, air, orange juice without pulp, and skim milk.

**Types of Homogeneous Mixtures**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a homogeneous mixture in which it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to distinguish the parts Ex:

* **Solute:** a substance that dissolves in another substance Ex: \_\_\_\_\_\_\_\_\_\_
* **Solvent:** a substance that dissolves a solute Ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a homogeneous mixture with at least two different substances that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ under magnification Ex:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Properties of Matter**

**Properties:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ used to identify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Properties help us tell substances apart even though they may look the same.

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** properties we can simply \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ without modifying the nature of the substance.

Ex: color, smell, physical state, melting point, boiling point, mass, texture, taste, ductility, malleability, volume, density, electrical conductivity, solubility.

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** describe how the substance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ex: combustible, reacts to water or acid, corrosion, reacts to contact with flame, reacts to lime water.

Physical and Chemical Properties can be either \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| **Characteristic Property** | **Non-Characteristic Property** |
| A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ property that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to a particular substance.  Helps identify a substance. | A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ property that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to one particular substance.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ help us identify a specific substance. |
| Density, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, DNA, Boiling point, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Mass, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_,  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |

**Changes of Matter**

* Matter around us goes through many changes. Ex. Water evaporates, bread is toasted for your breakfast.
* Changes are divided into two categories:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Physical Change**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is when the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a substance is changed but not the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the substance.
* Does not affect the characteristic properties
  + Ex. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ all are water in a different state.
  + Ex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Chemical Change**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_happens when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_react with each other to produce a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The nature of the substance is modified as are the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + E.g. Iron + Oxygen = Iron oxide (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

**Signs a Chemical Change (reaction) has occured**

1. change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- indicates presence of a new substance

2. Formation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a liquid, or the presence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ e.g. Baking soda and vinegar

3. Formation of a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- New substance formed (when two liquids are mixed and a solid forms and settles at bottom).

4. Change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_- gets warmer or cooler

5. Light is produced

**Chemical Transformations**

* A chemical transformation occurs when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_called “reactants” interact \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ called “products” having \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ characteristic properties.
* To represent a chemical transformation we use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Reactants ) (Product(s))

* 2H2 + O2 → 2H2O

**Four types of chemical reactions:**

* **Synthesis Reaction:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ combine to produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The resulting product has a greater mass than either of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Examples:** 2H2 + O2 ---> 2H2O Hydrogen + Oxygen ---> Water

Cl2 + 2Na ---> 2NaCl Chlorine + Sodium ---> Sodium Chloride (table salt)

* **Decomposition Reaction:** A compound is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ substances.

The resulting products have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (individually) than the initial reactant.

Ex. 2H2O --> 2H2 + O2 Water --> Hydrogen + Oxygen

* **Oxidation Reaction:** occurs when a substance combines with one or more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The resulting substance is an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Oxidation reactions are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that involve oxygen.

Ex: Iron oxide (rusts) 4Fe + 3O2 → Fe2O3

C6H12O6  + 6O2 ---> 6CO2 + 6H2O + Energy

Glucose (sugar) + Oxygen ---> Carbon Dioxide + Water

* **Precipitation Reaction:** occurs when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in solution combine to form a new substance that is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the solution

Insoluble: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of being \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This insoluble substance is called the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Ex: Pb (NO3)2 + 2KI → PbI2 + 2KNO3

**Identifying Substances in the Lab**

- Often we are asked to identify various substances in the lab based on their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

- Specifically, we are able to identify them by testing for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Tests for Identification**

|  |  |  |
| --- | --- | --- |
| Substance | Test | Reaction |
| Electroconductivity | Conductivity Meter | If the substance can conduct electricity, the conductivity meter will light up when the prongs are placed on the substance. |
| Presence of H2O | Cobalt Chloride Paper (CCP) | Will turn from **dark blue to light pink** if water is present in the solution. |
| pH level | Red Litmus Paper (RLP) Blue Litmus Paper (BLP) | An **acid will turn the BLP red** (BRA)  A **base will turn RLP blue**  A neutral substance will not cause either to change colour |
| Presence of Glucose | Glucose Test Paper | If the substance contains carbohydrates (glucose), the glucose test paper will turn from **yellow to green** when placed in the substance |
| Presence of Protein | Protein Test Solution | The solution will begin to turn **violet** around the edges if protein is present |
| Presence of Fat | Alcohol Test | When alcohol is added to the solution, it will turn **cloudy and white** if fat is present |
| Presence of H2 Gas | Lit Split Test | When a lit splint (burning) is placed in the presence of H2 gas, a "**popping"** sound will be heard |
| Presence of O2 Gas | Glowing Splint Test | When a glowing splint (glowing embers) is placed in the presence of O2 gas the splint will re-ignite |
| Presence of CO2 Gas | Lime water Test | When lime water, Ca(OH)2 is added to CO2 gas, the liquid becomes cloudy/milky and a precipitate is formed |