## **Classification of Matter**

Period:\_\_\_\_\_

Much of science involves describing the universe. To do this we must be able to *classify* the things we encounter.

Anything that has mass and takes up space we call *matter*.

Everything you can touch or hold we call matter, but only most of what you can see is matter (lightening is not, it is energy).

A mixture is made up of more than one kind of matter and can be separate physically.

Ways to physically

separate include: sorting; filtering; heating; cooling.

Has mass and matter takes up space Separated Types of non-mixtures Not mixtures substances physically separated Matter physically heterogeneous homogeneous elements compounds Different Same One type of More than one throughout throughout element atom only

Substances cannot be separated physically. Compounds can be separated chemically. Elements can only be separated by nuclear means.

To tell the difference in chemical formulas remember that each element uses on one capital letters—must be a compound

Examples of mixtures

Homogenous: milk; salt water; vanilla ice cream

Heterogeneous: chicken soup; orange juice rocky road ice cream



Heterogenous Mixture: Rocky Road



Homogenous Mixture: Vanilla



Element:



Compound:

Examples of substances:

Elements: Iron (Fe) Oxygen (O<sub>2</sub>)

Compounds: Rust (FeO<sub>2</sub>) Carbon Dioxide (CO<sub>2</sub>)

### **Metric Overview**

Science uses the **Metric System** because it is a decimal system. To convert to larger or smaller units you just have to move the decimal.

Basic Units are: Meters for length

Grams for mass Liters for volume

Basic Prefixes are: kilo means multiply by 1000

centi means divide by 100 milli means divide by 1000

Gram
Kilo- Heca- Deka- Meter Deci- Centi- MilliLiter

1 Meter is just bigger than a yard 1 Liter is just bigger than a quart 1 Gram is about the mass of a dollar bill

### **States of Matter**

States of Matter States of Water

Solid Ice
Liquid Water

Gas

When a substance changes temperature it can change its state of matter, but it will not change chemically.

Other definitions we will learn: (Try to relate these words to water.)

Boiling point—temperature that turns a liquid to a gas.

Steam

Freezing point—temperature that turns a liquid to a solid.

*Melting point*—temperature that turns a solid to a liquid.

Condensation—when a gas turns to a liquid.

Evaporation—when a liquid turns to a gas.

Sublimation—when a solid turns straight to a gas.

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1. Substance or non-mixture a. Made up of two types of matter that can be physically separated.	1. Meter	a. Divide by 1000. This is the smallest standard metric prefix.				
2. Mixture b. Two samples might not be the same.	2. Kilo-	<ul><li>b. The standard metric unit of mass; it is very small.</li><li>c. The standard metric unit of length; equal to 3.3 feet.</li><li>d. The standard metric unit of volume. Used to measure liquids.</li></ul>				
3. Heterogeneous Mixture c. Two samples will have the same makeup.	3. Gram					
d. Has only one kind of atom in the same.						
6. Contains two kinds of atoms that <i>can-not</i> be physically separated.	4. Milli-					
6. Homogeneous Mixture f. Cannot be separated by physical means.	5. Centi-	e. Means divide by 100. Easy to remember by the word <i>cent</i> -ury.				
7. Compound g. A classification of anything that has mass and takes up space.	6. Liter	f. Prefix that means multiply by 1000.				
List heterogeneous and homogenous mixtures for:	Mark these as elements (E) or compounds (C):					
<u>Mixture</u> <u>Heterogenous</u> <u>Homogenous</u>	W. (H.O.)					
Jello	Water (H <sub>2</sub> O) Carbon Dioxide (CO <sub>2</sub> )					
Ice cream	Hydrogen (H) Sodium (Na)					
Soup	Helium (He) Silver (Ag)					

# Lab

#### Lab Station 1. Solid Mixtures

There are a number of mixtures that are solid at room temperature. Brass is a mixture of copper and zinc. Soil (dirt) is also a solid mixture at room temperature. Which is homogenous, brass or soil? What test would you use to determine this?

Our lab examples - Sugar cookies vs. Chocolate Chip cookies Record them as homogenous or heterogeneous. Be sure to record how you determined this (be specific).

Lab Station 2. Liquid Mixtures

Salt water is a \_\_\_\_\_ mixture that is liquid at room temperature.

Orange juice is a \_\_\_\_\_ mixture.

Our lab examples – Tomato soup vs. Vegetable soup Record which is homogenous or heterogeneous. Be sure to record how you determined this.

Lab Station 3. Substances: Elements versus Compounds

In our life we work almost exclusively with compounds, but a few objects are elements, such as iron. The biggest reason for this is that elements tend to combine into compounds. If its name is on the Periodic Chart, it is an element. Our examples: Aluminum (Al) versus Table Salt (sodium chloride: NaCl).

Record which is the element and which is the compound. Be sure to record how you determined this.

Using the Periodic Chart, find 5 elements you recognize. Record their names and their chemical symbol (abbreviation).

Element 1 — \_\_\_\_\_

Element 2— \_\_\_\_\_

Element 3— \_\_\_\_\_

Element 4— \_\_\_\_\_

Element 5— \_\_\_\_\_

LAB WRITE UP—A one page write up about what you did in the lab. You must write it as a descriptive essay, using proper English and punctuation. Due next class.