

Unit 2 : Matter and Changes Worksheet : Chap. 2

1. Are each of these an example of a Scientific Law or Theory?

$F = m a$ (Force is equal to mass times acceleration) Law Theory

Attraction between matter is caused by curved spacetime Law Theory

2. Criticize this statement. " A Scientific Law is a theory that has been proven."

3. Give three examples of each class of elements:

metals metalloids non-metals noble gases

4. Identify the following as **heterogeneous mixtures, homogeneous mixtures, elements** or **compounds**. Give **Specific reasons** for your answers on the lines provided!!

Example: Air: Homogeneous mixture: Air all looks alike, air is mostly 2 gases, (nitrogen and oxygen), and it still is a gas. Air can have different amounts of Carbon dioxide, etc.

a. An opened, fizzing bottle of seltzer _____

b. Sugar dissolved in water _____

c. Brass (an alloy of copper and zinc) _____

d. Potassium permanganate ($KMnO_4$) _____

e. Yttrium _____

f. Dry copper(II) nitrate and zinc mixed together _____

g. A cloudy yellow liquid (darker yellow on the bottom than the top). When filtered, the liquid becomes clear and a yellow solid is left on the filter paper _____

h. A brownish liquid. It can't be broken down chemically, but it combines with sodium to make a white solid _____

i. A clear, colorless liquid. When ignited (burned), nothing happens. When boiled, a white residue is left behind. _____

j. A clear, colorless liquid. When ignited, it produces carbon dioxide and water vapor. When boiled, no residue is left. _____

5. Identify the following as characteristics of **Mixtures** or **Compounds**

Chemically combined

Physically mixed

Has a definite formula

Components can be in any proportion.

Components keep their own properties

Has very different properties than its elements

Can be separated by *physical* means

Must be separated by *Chemical* means

6. Identify the following *changes* as **physical, chemical, or nuclear**.

Give **Specific Reasons** for your answers for letter g through m!!

a. burning coal _____ d. exploding gunpowder _____

b. tarnishing silver _____ e. an atomic bomb explodes _____

c. magnetizing steel _____ f. melting butter _____

Example: A piece of white paper is burned in air. The paper turns into black ashes, heat and light are seen, and CO₂ gas and H₂O vapor are made. Chemical change: There is a color change from white to black, energy is released (heat and light), and gas is made.

g. clear, colorless lead nitrate and sodium iodide solutions combine to form a yellow solid

h. clear, colorless lead nitrate and sodium chloride solutions combine to form another colorless solution _____

i. a piece of gold sinks to the bottom of a test tube of acid _____

j. a sample of potassium metal is sealed in a vacuum (no air). After 1 billion years half the potassium is gone and there is some Argon gas in the container. _____

k. a piece of zinc + acid form bubbles and the test tube gets hot _____

l. pure water is heated on a burner until bubbles form _____

m. purple potassium permanganate and colorless sodium bisulfite are mixed in a basic solution. No precipitate or bubbles form, but the solution turns green. _____

6. Give an example of a *chemical* change that produces the following.

a. a gas _____

b. an energy change _____

c. a color change _____

7. Give an example of a *physical* change that produces the following.

a. a gas _____

b. an energy change _____

Scientific Method, Lab Lesson Application:

1. You are given a clear, colorless liquid and are told to identify it. You think it must be water. So you decide to experiment to find out.

a. You carefully measure 42.0 mL of the liquid. How many sig figs are in this measurement? _____ What measuring tool did you use? _____

b. The mass of this sample of the liquid is 33.22 grams. How many sig figs are in this measurement? _____ What measuring tool did you use? _____

c. Calculate the Density of the liquid. **Show work!**. Don't forget units.

d. How many sig figs should you use to report your density? _____

Next you waft the liquid and detect an odor. You ignite (burn) a sample of the liquid. It produces a gas and some vapor condenses in the test tube. It feels cold when it evaporates from your skin.

e. What is your Statement of the Problem? _____

f. What is your Hypothesis? _____

You tested some properties of the liquid. Are these Properties Physical or Chemical? **Explain why** you think so.

g. Testing the density:

h. Igniting to see if it burns:

i. Evaporating from skin:

j. Do you think the original Hypothesis was correct? Explain.

k. Following the scientific method, what would be your next step? Would you (circle) :
Make a conclusion, Revise your hypothesis, Do another experiment, or Revise your theory?
State a possible good conclusion, hypothesis, experiment, or theory.

2. a. Convert the 33.22 grams mass of the sample to kilograms.

b. Convert the 42.0 mL volume of the sample to μL .

3. How could you separate a mixture of white sand and sugar?

4. How could you separate a mixture of iodine crystals from iron filings?

Page 4

5. Iridium is a silvery colored metal. Chlorine is a greenish gas. Describe the properties of Iridium Chloride (IrCl_2). Explain your answer.

For a and c in each of the following: Classify the indicated materials as

heterogeneous mixtures, homogeneous mixtures, elements or compounds.

For part b in each: Classify the changes as Physical, Chemical or Nuclear.

For **all** parts: Give **Specific reasons** for why you think so!!!

6. Some Bromine liquid (a brownish liquid) is placed in a test tube and heated. A brownish gas is seen in the test tube. When the test tube cools a brownish liquid sticks to the sides of the test tube.

a. Classify the Bromine.

b. Classify the type of change.

c. Classify the brownish gas made.

7. You are given some Aluminum foil. You put it in a container with some Chlorine gas (a greenish gas). A white powdery material forms on surface of the Aluminum.

a. Classify the Aluminum.

b. Classify the type of change.

c. Classify the white powdery material.

8. Some sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) is mixed into some water in your kitchen at home. A clear, colorless liquid is made. When you taste the liquid it tastes sweet.

a. Classify the sugar ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$).

b. Classify the type of change.

c. Classify the liquid made.