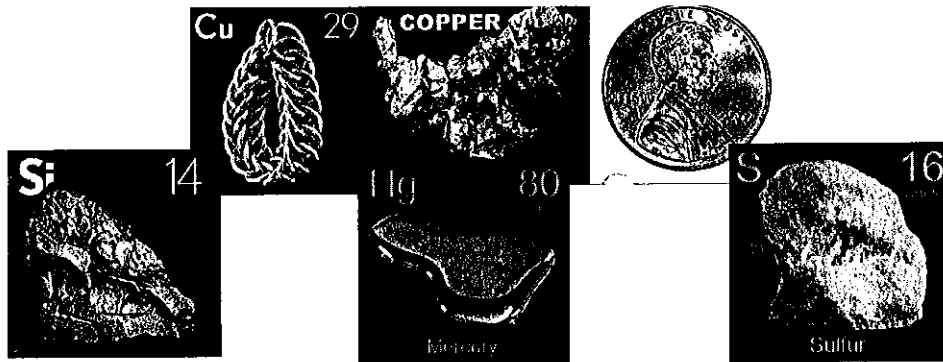


Describing Matter- Elements, Compounds, and Mixtures

Matter is anything that has mass and takes up space. All matter is made up of **atoms**. An atom is the basic particle that makes up an element. An **element** is made up of the **same** atoms. An element is a *pure substance* because it cannot be broken down into any other substance. For example, the element gold is a pure substance because it consists of only gold atoms, and lead is an element that consists of only lead atoms. See other elements below:

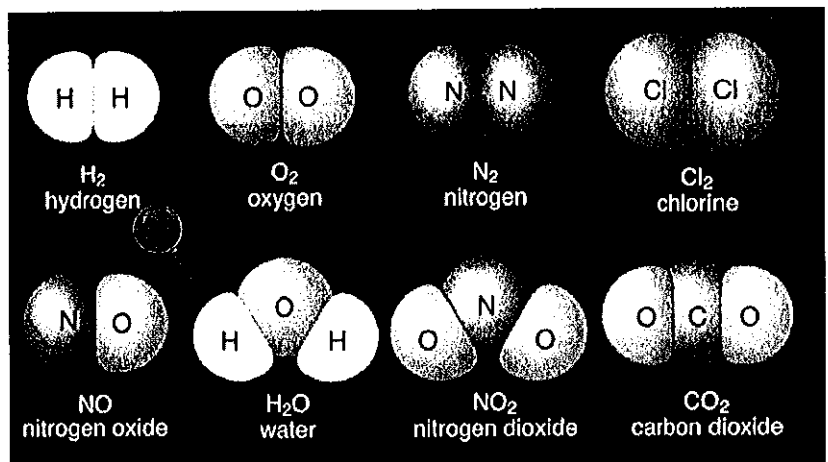


Atoms that do not have a full outer shell of electrons like to combine with other atoms that will help them to be full. (Remember the octet rule?) If they are atoms of the same element, they will form a molecule. A **molecule** is 2 or more atoms that have bonded, or combined *chemically*, (with their valence electrons). A *chemical bond* is the force that holds two atoms together. So, two hydrogen atoms will share their electrons and become H_2 , and two nitrogen atoms will share their electrons and become N_2 .

Molecules that are formed from atoms of **different** elements are called **compounds**. When these different elements combine chemically (valence electrons), the new compound will have properties that are very different from those of the uncombined elements. For

example, both hydrogen and oxygen are highly flammable, but when they combine in a ratio of 2:1, H_2O , or

water, is used to put fire out. Like elements, a compound is a **pure substance** because the elements that make the compound **always** combine with a **set ratio**. If in our water example the ratio was changed to 2:2, meaning 2 hydrogen and 2 oxygen, you would have H_2O_2 or hydrogen peroxide- which won't help you when you're thirsty.



Name _____

Describing Matter
-Elements, Compounds, and Mixtures

1. What is matter? _____
2. All matter is made of _____.
3. A substance made of the same kind of atoms is an _____.
4. Why is an element called a pure substance? _____

5. Why would an atom want to combine with another atom? _____

6. What is the octet rule? (It's not on this worksheet.) _____

7. What is a molecule? _____
8. True or False? A molecule must always be made up of different atoms.
9. What does it mean that atoms are bonded? _____
10. In what area do atoms chemically combine? _____

11. The force that hold two atoms together is called a _____.
12. When you see N_2 , what does it mean? _____
13. What is a compound? _____
14. True or False? When elements form compounds they always retain (keep) their original properties.
15. What is the ratio of atoms in carbon dioxide, or CO_2 ? (use picture on paper) _____
16. Why are compounds considered pure substances? _____

17. What would happen if you added another oxygen atom to water? _____

Describing Matter- Elements, Compounds, and Mixtures

Elements and compounds are pure substances, but most of the materials you see every day are not. Instead, they are *mixtures*. A mixture is made of two or more substances that are together in the same place, but are **not chemically** combined. Mixtures

differ from compounds in two ways. Each substance in a mixture keeps its individual properties. Also, the parts of a mixture are not combined in a set ratio. A good example is salt water. When the compound sodium chloride NaCl is combined with H₂O water, you call it salt water because the compounds never lose their chemical properties. Also, there is **no set ratio** or formula in making saltwater. A teaspoon? A cup? How much water?

Sea Salt

A mixture can be **heterogeneous** or **homogeneous**. Hetero- means *other* and generous means *kind*. So in a heterogeneous mixture, you can see the other or different parts like in a salad, where you can see tomatoes, lettuce, celery, etc. If you use Italian dressing, that too, is a heterogeneous mixture. So is pizza and a mixture of mud and water.

Homo-means *-same* so the substances in a homogeneous mixture are so evenly mixed that you cannot see the different parts as in ice tea. You can't see the different parts. It looks the same throughout.

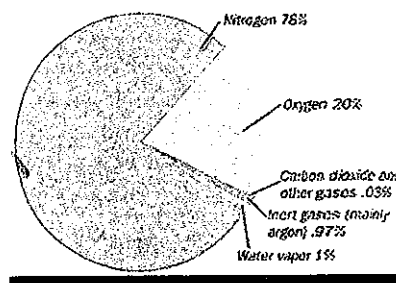
A **solution** is another name for a **homogeneous mixture**. In a solution, there are two parts- the solvent, which is the substance that is doing the dissolving, and the solute(s) which is the substance(s) being dissolved. The solvent is the substance that is most abundant. So the salt in the ocean is the solute and the ocean water is the solvent.

Many people think that a solution is only a solid in a liquid, or a liquid in a liquid. But that is not so. A solution can be gases dissolved in other gases, like the air we breathe.

(See pie chart.)

Your soda is a solution of gas –carbon dioxide in a liquid with solids, like sugar and other liquids (flavors).

If the mixture is made of different metals it is a homogeneous mixture of solids and is called an **alloy**. Steel is an alloy. Even though it is a mixture of iron, carbon, and other metals, you cannot see them separately and it looks the same throughout. But as in all mixtures, you can get the different components back by using different methods, such as sifting, filtering, and evaporating.



Air is a mixture of gases dissolved in nitrogen.

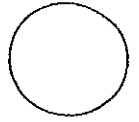
Stainless steel is a mixture of iron, nickel, zinc, and other elements.



Put salt and water in a cup and let it sit for a few days. You will get your salt back.

Name _____ Describing Matter

Date _____

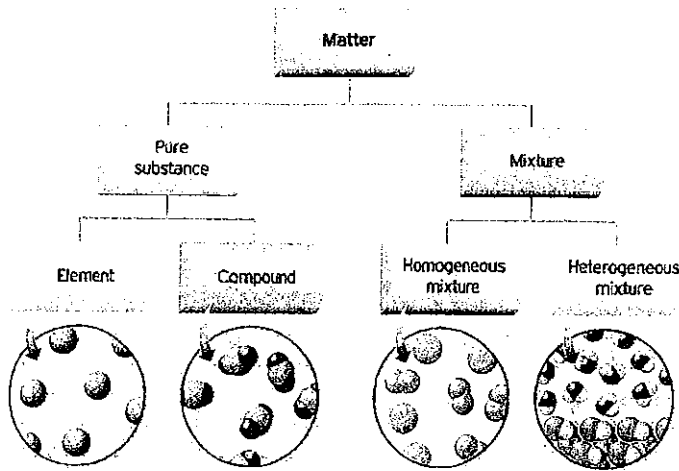
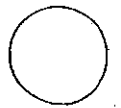


Elements, Compounds and Mixtures

1. Circle: True or False? Most of the materials we see are elements.
2. A(n) _____ is made of two or more substances that are together in the same place **but are not chemically combined.**
3. What are two ways in which mixtures differ from compounds?
 - a. _____
 - b. _____
4. In a _____-mixture, you can see the different parts, but in a _____ mixture you cannot.
5. Circle the letter of each mixture below that is heterogeneous:
a. salad dressing b. sugar water c. stainless steel d. salad
6. Circle: True or false? Another name for a solution is a homogeneous mixture..
7. In a solution, the _____ is doing the dissolving while the _____ is the substance being dissolved.
8. Circle: True or False? Air is a solution of different gases dissolved in nitrogen gas.
9. Give an example of a gas dissolved in a liquid. _____
10. A homogeneous mixture (solution) of metals is called a(n) _____.
11. Circle: True or False? Once a mixture is made there is no getting the original materials back.
12. Look at the picture of the glass beaker. What is all over it? What happened? Was it a mixture or a compound? _____

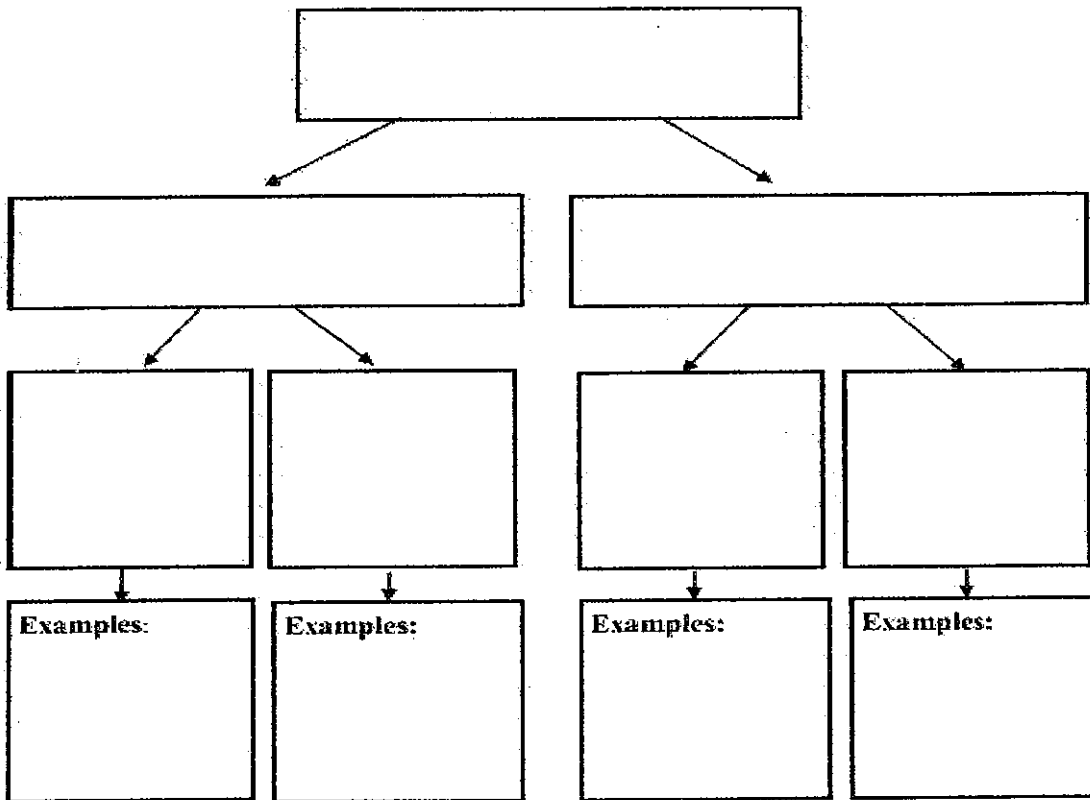
Vocabulary review: Matching

- | | |
|------------------------|---|
| _____ 1. mixture | a. a substance dissolved in another substance |
| _____ 2. solvent | b. a mixture in which you can see the different parts |
| _____ 3. substance | c. two or more substances that are combined together but not chemically |
| _____ 4. solute | d. a particle formed when two or more atoms combine |
| _____ 5. chemical bond | e. a single kind of matter that is pure |
| _____ 6. molecule | f. a kind of homogeneous mixture |
| _____ 7. solution | g. a substance in which another substance is dissolved |
| _____ 8. heterogeneous | h. a mixture in which different parts cannot be seen |
| _____ 9. homogeneous | i. the force of attraction between two atoms |



	Mixture	Compound
Composition	Variable composition – you can vary the amount of each substance in a mixture.	Definite composition – you cannot vary the amount of each element in a compound.
Joined or not	The different substances are not chemically joined together.	The different elements are chemically joined together.
Properties	Each substance in the mixture keeps its own properties.	The compound has properties different from the elements it contains.
Separation	Each substance is easily separated from the mixture.	It can only be separated into its elements using chemical reactions.
Examples	Air, sea water, most rocks.	Water, carbon dioxide, magnesium oxide, sodium chloride.

Matter: all matter can be classified



Word Bank				
Element	Homogeneous	Mixture	Matter	Compound
Pure Substance	Heterogeneous	H ₂ O	O ₂	Lemonade
Snow Globe	Gelatin	CO ₂	Kool-Aid	H ₂

Name _____

Date _____

Period _____

Identify the following as an element, compound, or mixture. Give a reason for each. Bonus: identify each mixture as homogenous or heterogeneous.

Substance	Element/Compound/Mixture?	Reason
Balloon (CO ₂)		
Zinc (Zn)		
Sandy water		
Salt and pepper		
Water (H ₂ O)		
Vinegar (CH ₃ COOH + H ₂ O)		
Beads		
Aluminum (Al)		
Salt water (NaCl + H ₂ O)		
Dish soap		
Tin (Sn)		
Baking soda (NaHCO ₃)		
Colored water		
Granola		
Salt (NaCl)		
Sugar (C ₆ H ₁₂ O ₆)		
coin (91.67% Cu and 8.33% nickel)		
Helium (He)		
Beans		
Potpourri		