PS - Matter Chapter 2-3 - Unit 8 Review

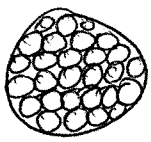
Name Key Period

1. Define the following terms:
   a. Matter
      anything that takes up space + has mass
   b. Atom
      smallest particle that makes up all matter + still retains properties of an element
   c. Pure substance
      matter that always has the same, fixed, uniform composition
   d. Element
      pure substance; cannot be broken down any simpler
   e. Compound
      pure substance made of 2+ atoms that are chemically combined
   f. Mixture
      combination of 2+ substances NOT chemically combines
   g. Homogeneous
      same throughout; difficult to see parts
   h. Heterogeneous
      Not mixed uniformed; parts can be seen easily
   i. Solutions
      homogeneous mixture
   j. Suspensions
      large particles; heterogeneous mixture that separates
   k. Colloids
      intermediate particles that don't separate
   l. Malleable
      ability to be shaped + molded
   m. Brittle
      breaks easily under manipulation
   n. Ductile
      ability to be pulled/stretched into a wire
   o. Conductivity
      ability to allow heat (and typically electric charge) to flow
   p. Melting point
      temperature at which solids phase change to liquids
   q. Boiling point
      temperature at which liquids phase change to gas
   r. Density
      mass to volume ratio; how tightly packed something is
   s. Viscosity
      tendency of a liquid to resist flow
   t. Flammability
      ability of a substance to burn in oxygen
   u. Reactivity
      how easily a substance combines chemically w/other substances
   v. Boyle's Law
      ↑pressure ↓volume
   w. Charles's Law
      ↑temp ↑volume
   x. Immiscible
      inability of liquids to form homogeneous mixture
   y. Temperature
      how fast particles are moving in a material
   z. Pressure
      force applied on a certain area

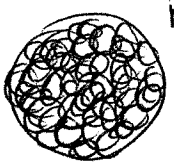
2. List several physical properties.
   density, viscosity, ductility, malleability, brittleness, conductivity, melting/boiling point, color odor, taste

3. How can physical properties be used?
to identify materials, to separate, to select appropriate substances for varying uses
4. List two chemical properties.
- flammability
- reactivity
5. What is the different between a physical change and a chemical change?
Chemical changes involve a change in chemical composition that results in new type of matter and can only be reversed by other chemical changes. Physical changes do NOT involve changes in composition & may be reversed (in many cases)
6. Give 3 examples of a physical change and justify.
- Ice cube melts → still H_2O, no new matter, reversible
- Chopping wood → only size has changed, comp. has not
- Braiding hair → shape + appearance changed, comp. has not
7. Give 3 examples of indications of a chemical change. Then, give 3 examples of different chemical changes.
- Color change
- ~~Forming precipitate~~
- Fizzing + bubbling
- Banana ripening
- Copper Nitrate added to Sodium hydroxide forms a solid
- Vinegar + baking soda forms CO_2
8. What is the Tyndall effect and which mixture does it identify?
light does not pass through a mixture due to scattering + particle size → colloid
9. Give several examples of elements.
hydrogen oxygen
sodium etc etc
10. Give several examples of compound.
H_2O (water)
NaCl (salt)
etc etc
11. How is a homogeneous mixture different from a heterogeneous mixture? Give several examples of both.
can't see different parts
eg: Kool-Aid, salt water
→ can see different parts
eg: pizza, italian dressing, sand,
12. List and describe the three states of matter and SKETCH the particle arrangements.

solid
rigid tight pattern
little movement
low energy



Liquid
close but move easily
mid energy



gas

large spaces
move rapidly
high energy

13. Which state of matter has the highest energy and why?
gas — $KE = \frac{1}{2}mv^2$
↑ highest velocity particles

14. List 5 phase changes and define them.
Melting → solid → liq
Freezing → liq → solid
Evaporating → liq → gas
Condensation → gas → liq
Sublimation → solid → gas

15. Why is a phase change a physical change?
• particle arrangement changes, but the chemical composition is the same. EG: ice is still H_2O

16. Give 2 examples that demonstrate Boyle's Law.
- decrease volume of a piston, increase pressure
- push on marshmellow (↑pressure), smaller (volume ↓)
- open lid of vessel (↑volume), relieves pressure (↓pressure)

17. Give 2 examples that demonstrate Charles's law.
- tires seem flatter in winter
- balloon shrinks in freezer
- hot air balloon volume increases w/ fire

18. Explain why bicycle tires seem more flat in the winter.
In the winter, the temperature drops. Due to Charles's Law, the drop/decrease in temperature will cause a decrease in the gas's volume within the tire, making it seem flat.

19. Explain why a can of soda explodes if left in the sun.
In the sun, temperature rises. The carbon dioxide gas within the soda will expand and the volume will increase. Due to Charles's law, the increase in temperature will cause an increase in the volume.

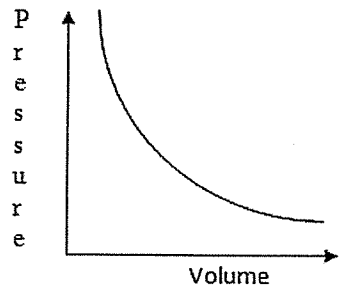
20. Steel has a density of 7.8 g/cm3. What is the mass of the block of steel with a volume of 600cm3? (Hint 1mL = 1cm3)

21. A substance has a mass of 360 g and a volume of 7.5 cm3. What is its density?

22. Identify each of the following as a compound or an element.
a. Cl element
b. CH_4 compound
c. Co element
d. CO_2 compound

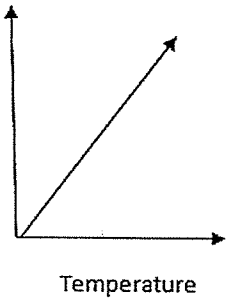
23. State the laws that fit with the following graphs.

a.



Boyle's

b.



Charles's

Name _____ Class _____ Date _____

Skills Worksheet

Reinforcement

A Matter of Density

Complete this worksheet after you finish reading the section "Physical Properties."

Imagine that you work at a chemical plant. This morning, four different liquid chemicals accidentally spilled into the same tank. Luckily, none of the liquids reacted with one another! Also, you know the liquids do not dissolve in one another, so they must have settled in the tank in four separate layers. The sides of the tank are made of steel, so you can see only the surface of what's inside. But you need to remove the red chemical to use in a reaction later this afternoon.

How will you find and remove the red chemical? By finding the chemicals' different densities, of course!

The following liquids were spilled into the tank:

- a green liquid that has a volume of 48 L and a mass of 36 kg
- a blue liquid that has a volume of 144 L and a mass of 129.6 kg
- a red liquid that has a volume of 96 L and a mass of 115.2 kg
- a black liquid that has a volume of 120 L and a mass of 96 kg

$D = \frac{m}{V} = \frac{kg}{L}$

1. Calculate the density of each liquid.

Green liquid: 36/48 = 0.75 kg/L or 0.75 g/mL

Blue liquid: 129.6/144 = 0.90 kg/L or 0.90 g/mL

Red liquid: 115.2/96 = 1.2 kg/L or 1.2 g/mL

Black liquid: 96/120 = 0.80 kg/L or 0.80 g/mL

2. Determine the order in which the liquids have settled in the tank.

First (bottom): Red

Second: Blue

Third: Black

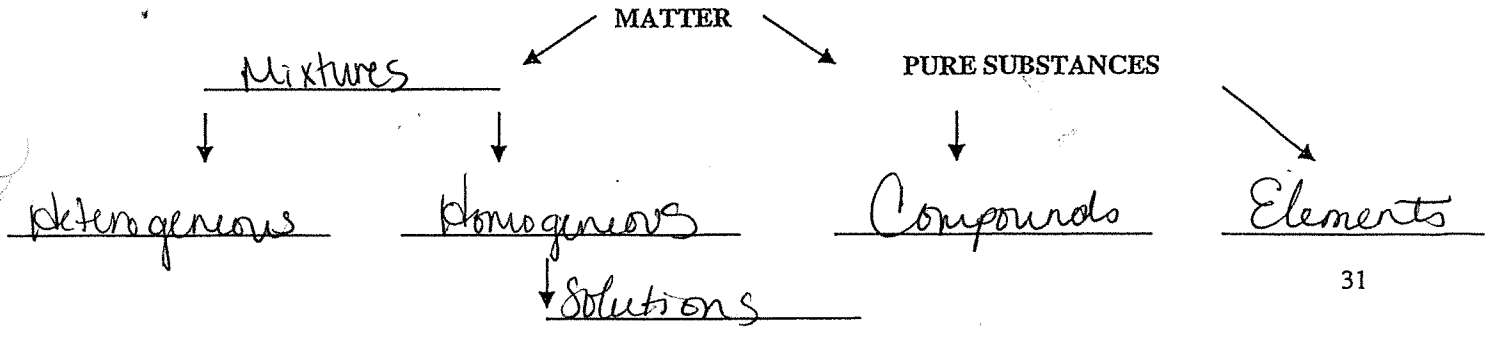
Fourth (top): Green

B **3.** What kind of property did you use to distinguish among these four chemicals?

a. a chemical property
b. a physical property
c. a liquid property
d. a natural property

Elements, Compounds, and Mixtures Video Guide **Name:**_____

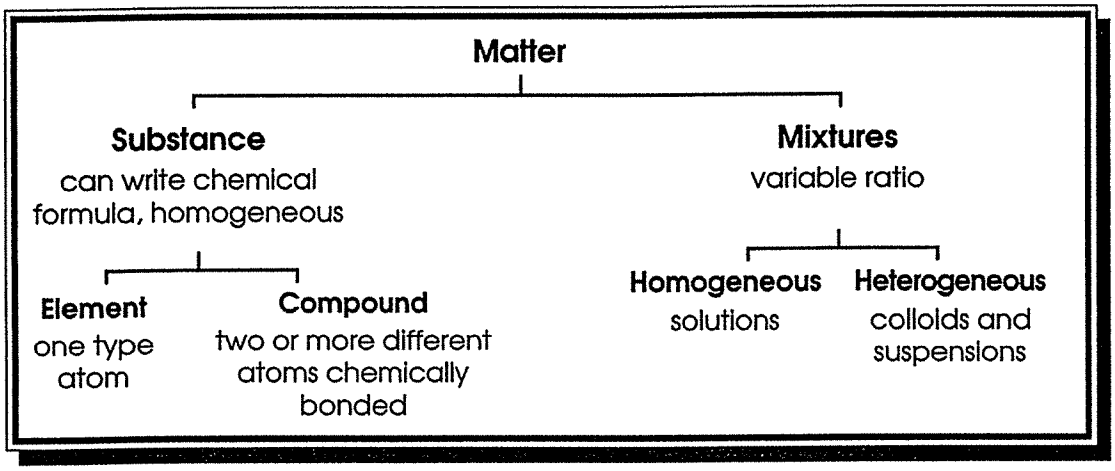
1. Chemistry is the study of substances and the way they combine.
2. Materials with parts that keep their own identities are known as Mixtures. Most of the materials in the world fall into this category.
3. A mixture can vary its composition.
4. A mixture can be further classified according to how evenly mixed its parts are.
   a. A heterogeneous mixture is unevenly mixed. Two examples are:
      i. suspension
      ii. colloid
5. You separate mixtures by making use of their properties:
   a. We can separate salt water into its parts by a process called _____. To do this we first evaporate the water and then _____ it.
   b. _____ uses differences in the boiling points of the various liquids in crude oil to separate it into its parts.
6. To separate a pure substance like H_2O into its parts, you need to use chemical changes and properties. You can decompose water, for example, by passing an electric current through it. This process is called _____.
7. A pure substance with two or more parts than can't be separated physically is known as a compound.
   a. The smallest part of a compound is called a molecule.
   b. The properties, number and arrangement of the atoms in a compound are always the same.
8. Elements are the basic units of pure matter that can't be broken down further using ordinary chemical means.
   a. The smallest part of a(n) element is called a(n) atom.
   b. Symbols of the elements are as individual as finger prints so can be used to identify a particular element.
9. Every element has its own unique composition of protons and electrons with a variable number of neutrons.
   a. Similarities in the arrangement of elements electrons give certain groups of elements similar properties.
   b. Differences in the arrangements of elements electrons give certain groups of elements different properties.



MATTER—SUBSTANCES VS. MIXTURES

Name _____

All matter can be classified as either a substance (element or compound) or a mixture (heterogeneous or homogeneous).



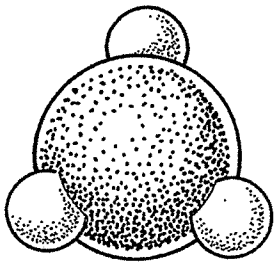
Classify each of the following as to whether it is a substance or a mixture. If it is a substance, write Element or Compound in the substance column. If it is a mixture, write Heterogeneous or Homogeneous in the mixture column.

Type of Matter	Substance	Mixture
1. chlorine	Element	
2. water	Compound	
3. soil		Heterogeneous
4. sugar water		Homogeneous
5. oxygen	Element	
6. carbon dioxide	Compound	
7. rocky road ice cream		Heterogeneous
8. alcohol		
9. pure air		Homogeneous
10. iron	Element	

SUBSTANCES VS. MIXTURES

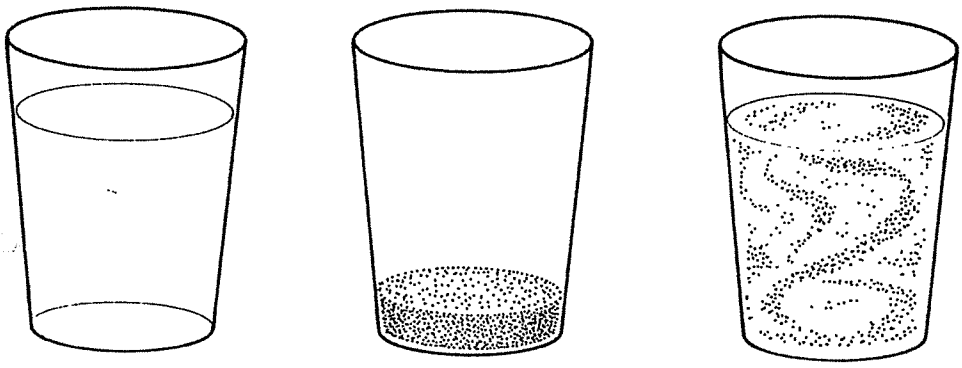
Name _____

A substance is matter for which a chemical formula can be written. Elements and compounds are substances. Mixtures can be in any proportion, and the parts are not chemically bonded.



Classify the following as to whether it is a substance or a mixture by writing S or M in the space provided.

1. sodium S
2. water S
3. soil M
4. coffee M
5. oxygen S
6. alcohol M
7. carbon dioxide S
8. cake batter M
9. air M
10. soup M
11. iron S
12. salt water M
13. ice cream M
14. nitrogen S
15. eggs M
16. blood M
17. table salt S
18. nail polish M
19. milk M
20. cola M



HOMOGENEOUS VS. HETEROGENEOUS MATTER

Name _____

Classify the following substances and mixtures as either homogeneous or heterogeneous. Place a √ in the correct column.

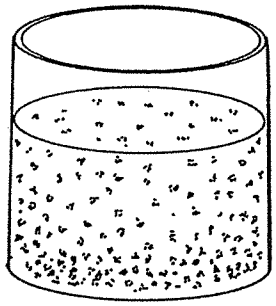
	HOMOGENEOUS	HETEROGENEOUS
1. flat soda pop	✓	
2. cherry vanilla ice cream		✓
3. salad dressing		✓
4. sugar	✓	
5. soil		✓
6. aluminum foil	✓	
7. black coffee	✓	
8. sugar water	✓	
9. city air		✓
10. paint (assume dried)	✓	
11. alcohol	✓	
12. iron	✓	
13. beach sand		✓
14. pure air	✓	
15. spaghetti sauce		✓

SOLUTIONS, COLLOIDS AND SUSPENSIONS

Name _____

Label the following mixtures as a solution, colloid or suspension. Give an example of each.

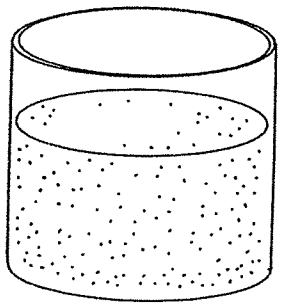
1. large particles,
   settles out on standing



Kind of mixture: Suspension

Example: Italian dressing

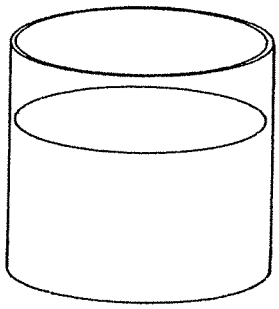
2. medium size particles,
   settles out on standing
   scatters light



Kind of mixture: Colloid

Example: Milk, fog

3. very small particles
   does not settle out on standing



Kind of mixture: Solution

Example: Kool-Aid