

**WKS 1-1: Mixtures, Elements, & Compounds**

1. Label each of the following descriptions as corresponding to an element (E), a compound (C) or a mixture (M). Choose as many labels for each description that apply.

*For help, consult your text book (p. 15-17) or another resource.*

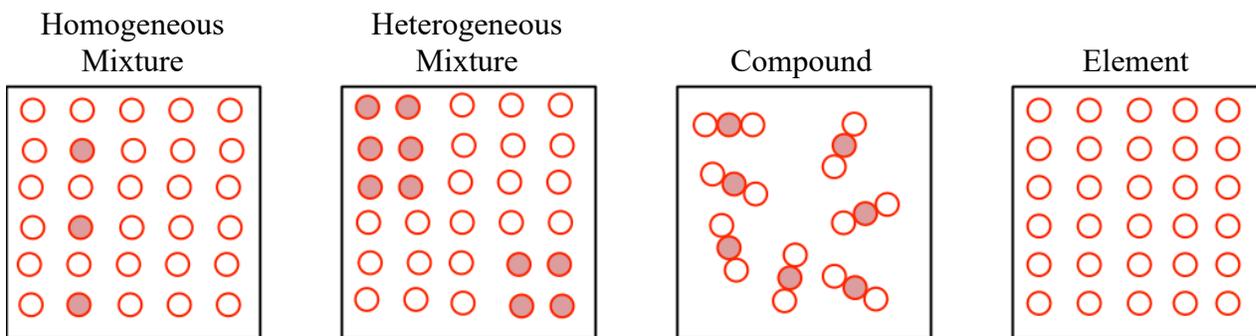
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|---------------------|---|
| <u>    C    </u>    | a) Its components always exist in the same fixed ratio.                             |
| <u>    M    </u>    | b) Its components can exist in various proportions.                                 |
| <u>    M    </u>    | c) It consists of two or more substances.   |
| <u>    E    </u>    | d) It consists of only one type of atom (can be either atoms or molecules).         |
| <u>    E, C    </u> | e) Has a distinct melting point and boiling point (at normal atmospheric pressure). |
| <u>    C    </u>    | f) It can only be separated into its components by chemical means.                  |
| <u>    M    </u>    | g) It can usually be separated into its components by physical means.               |
| <u>    E, C    </u> | h) It is a pure substance.  |

2. Classify each of the following substances as; an element (E), a compound (C), a homogeneous mixture (hom), or a heterogeneous mixture (het).

*For help, consult your text book (p. 15-17) or another resource.*

a) Air	Hom	b) Lithium Carbonate	C
c) Bronze (an alloy)	Hom	d) Mud	Het
e) Carbon Dioxide	C	f) Potassium	E
g) Neon	E	h) Salad Dressing	Het
i) Caesar Salad	Het	j) Oxygen	E
k) Chocolate Chip Cookie	Het	l) Vegetable Soup	Het
m) Citric acid	C	n) Kool Aid	Hom

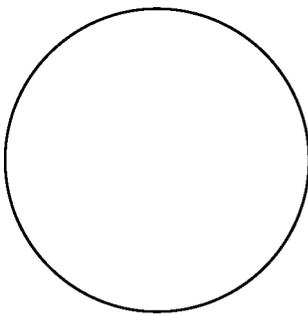
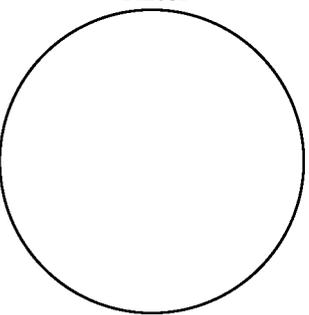
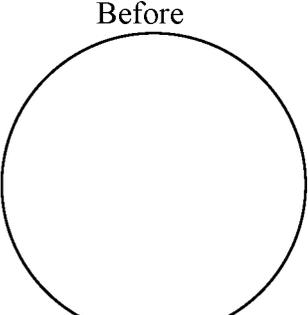
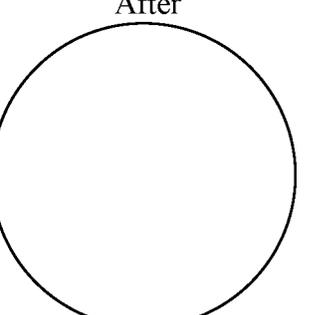
3. Using the *Classification of Matter* POGIL as a guide, draw particle diagrams of the following mixtures and substances



○ Atom A	Using the spheres at left to represent atoms, fill the above boxes with representations of the kind of matter listed above it.
● Atom B	

**WKS 1-2: Physical & Chemical Properties & Changes**

4. For the following two situations, decide whether the change described is physical or chemical. Then, in the space provided, illustrate the change at the particulate level. *Draw circles for each atom. Shade copper atoms blue, carbon atoms black, hydrogen atoms white and oxygen atoms red.*

<p>a) Pure copper can be heated until it melts just below 2000°F. The liquid copper can be poured into molds. <b>Physical or Chemical?</b> _____</p> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>Before</p>  </div> <div style="text-align: center;"> <p>After</p>  </div> </div>	<p>b) Natural gas consists mostly of methane gas, CH<sub>4</sub>. Natural gas is used to heat homes and cook food. The methane is “burned” by reacting with oxygen gas, O<sub>2</sub>. The products of this reaction are carbon dioxide gas, CO<sub>2</sub>, and water vapor, H<sub>2</sub>O. <b>Physical or Chemical?</b> _____</p> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <p>Before</p>  </div> <div style="text-align: center;"> <p>After</p>  </div> </div>
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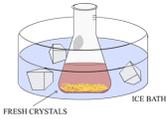
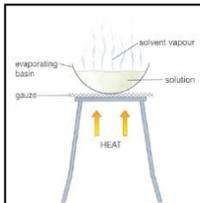
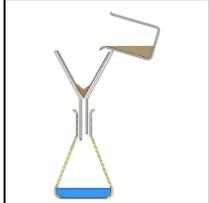
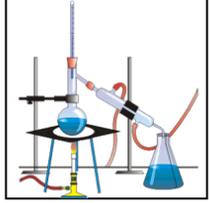
5. The following are some traditional ways of differentiating between physical changes and chemical changes. Which definition below is the most correct and useful definition? \_\_\_\_\_
- A physical change is easily reversed, while a chemical change is not easily reversed.
  - During a chemical change, a new substance is formed. During a physical change, no new substance is formed.
  - No bonds are formed or broken during a physical change. Bonds are formed and broken during a chemical change.
  - A chemical change is associated with a large energy change, whereas a physical change is associated with a small energy change.
6. Classify each of the following as either a physical change or a chemical change.

	a) Burning a log
	b) Melting a piece of solid wax
	c) Food spoiling
	d) Obtaining gasoline by distilling crude oil. (Crude oil is a mixture of hydrocarbons—one of which is gasoline)
	e) Making rock candy by crystallizing solid sugar from a concentrated sugar/water solution.
	f) Production of dry ice (solid CO <sub>2</sub> ) from pressurized CO <sub>2</sub> gas.
	g) Refining copper from copper ore ( <i>2 common copper ores are CuS and Cu<sub>2</sub>O</i> )
	h) Desalination of sea water by boiling the away the water and recollecting it.
	i) Fermentation of the sugars in corn to form ethanol.
	j) Separating sand out of a sand/water mixture by filtration.
	k) Distilling wine (a 12% alcohol/water mixture) to form grain alcohol (an 80% alcohol/water mixture).
	l) Dissolving sugar into tea.
	m) Collecting oxygen from air by pressurizing and cooling air. Liquid oxygen condenses out of the air.

7. Classify each of the following as an *intensive* or an *extensive* property.
- a) Copper has a density of 8.96 g/cm<sup>3</sup>. Intensive
  - b) Nitrogen boils at -196°C. Intensive
  - c) A sample of water has a mass of 35.2 g. Extensive
  - d) Gold has a metallic yellow color. Intensive
  - e) A nail is 5.10 cm long. Extensive

**Word Bank:** *distillation, crystallization, evaporation, extraction, filtration*

8. Fill in the name of each separation technique described below, then fill in any missing information into the chart.

Diagram of technique				
Name of Technique				
What types of substances can be separated by this technique?				
Give a specific example of a mixture that could be separated by this technique.				
Separation is possible due to what physical property being different between substances?				

9. Nail polish remover consists of a solution of acetone dissolved into water. Acetone has a boiling point of 55°C and water has a boiling point of 100°C. What technique could you use to separate the acetone and the water? \_\_\_\_\_ Describe this process.
10. Describe how one could separate a mixture of water, salt and sand. (*Make sure to state what techniques would be used and in what order.*)
11. The main substances of air are listed at the right. Use the specific boiling points given to describe how one could separate the substances of air? What order would the substances separate out?

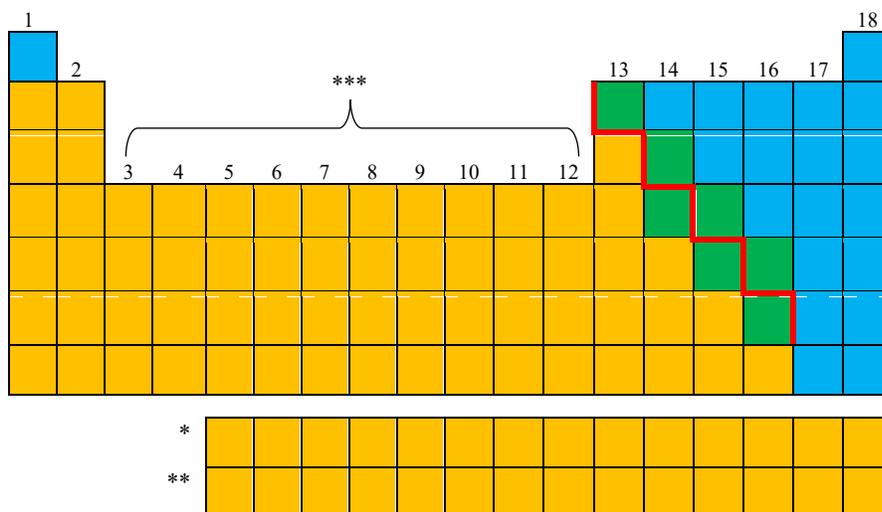
	Oxygen	Argon	Nitrogen
Boiling point (°C)	-183	-186	-196
% Air by volume	20.9	0.9	78.1

**WKS 1-3: Introduction to the Periodic Table** (use your textbook and/or the internet to help you)

12. List some **common properties** for the following types of elements:

METALS	NONMETALS	METALLOIDS/SEMIMETALS
<ul style="list-style-type: none"> <li>• Malleable</li> <li>• Ductile</li> <li>• Shiny</li> <li>• Electrically conductive</li> <li>• Conducts heat</li> </ul>	<ul style="list-style-type: none"> <li>• Dull</li> <li>• Brittle</li> <li>• Electrically insulating</li> <li>• Thermally Insulating</li> </ul>	<ul style="list-style-type: none"> <li>• Shiny</li> <li>• Brittle</li> <li>• Slightly conductive</li> </ul>

13. Draw in the staircase. Using 3 different colors, lightly shade in the general area where the metals, nonmetals, and metalloids are on the blank PT below. (Hint: be careful with Hydrogen!)



14. Indicate the family or block name for the following elements:

- |  |  |
|--|--|
| a) Group 1 (except H): <b>Alkali Metals</b>          | b) Group 2: <b>Alkaline Earth Metals</b> |
| c) Group 17: <b>Halogens</b>                         | d) Group 18: <b>Noble Gases</b>          |
| e) *: <b>Lanthanoids</b>                             | f) **: <b>Actinoids</b>                  |
| g) *** (the whole section): <b>Transition Metals</b> |  |

15. Pick any element on the periodic table that intrigues you and want to learn more about.

**My Element's Name** \_\_\_\_\_ **Symbol** \_\_\_\_\_

a) Research online for 5 min. What are three interesting facts that you learned about?

-  
-  
-

b) My element is classified as a (*metal, nonmetal, metalloid*) (circle one)

c) My element belongs to the \_\_\_\_\_ family.

- d) The normal state of matter of my element at room temperature is (*solid, liquid, gas*).  
A periodic table that has colored symbols distinguishes between the states of matter, typically, black, red, and blue. What state of matter does each color represent at room temp?

Red \_\_\_\_\_ Black \_\_\_\_\_ Blue \_\_\_\_\_

*Bonus: What does an outlined elemental symbol mean?* \_\_\_\_\_

- e) Melting point of my element \_\_\_\_\_ °C \_\_\_\_\_ K

- f) Boiling point of my element \_\_\_\_\_ °C \_\_\_\_\_ °F  
(*Hint: to change the temp from °C to Kelvin add 273. To convert to °F multiply by 9/5 and add 32. Show your calculation below.*)