

Matter Review



WORKSHEET ON CHEMICAL VS PHYSICAL PROPERTIES AND CHANGES

Keep this in your binder as a study guide! You will have a quiz on this next class!

Background: Keeping the difference between physical and chemical properties as well as changes can be a challenge! This worksheet will help you do this. First, use the book to define the following terms.

VOCABULARY WORD	DEFINITION
Physical Property	Property that does not involve chemical reactions
Physical Change	Change in which the identity of the substance does NOT change
Chemical Property	Property involving reactions & interactions with other matter
Chemical Change	Change in which the identity of substance changes

Part One: Physical or Chemical Property? Fill in the chart using the vocabulary words or phrases provided.

Vocabulary words

Boiling point	Ability to rust	Melting point	Brittleness	Reactivity with vinegar
elasticity	Flammability	Density	Transparency	ductility

Each word is used once. Define the word when done!

Chemical Property	Definition
Flammability	• The ability to burn
Ability to rust	• Reacts with oxygen to produce rust
Reactivity with vinegar	• degree of reaction with vinegar

Physical Property	Definition
Transparency	• The property of letting light pass through something
Ductility	• ability to pull into a wire
Brittleness	• shatters when hit with a hammer
Elasticity	• ability to bend
Boiling Point	• temperature when it changes from liquid to gas
Melting Point	• temperature when it changes from solid to liquid
Density	• the packing of the particles

Part Two: Physical or Chemical Change? Indicate with a 'P' or a 'C' which type of change is taking place.

1. <u>PC</u> glass breaking	10. <u>PC</u> mixing salt and water
2. <u>PC</u> hammering wood together	11. <u>PC</u> mixing oil and water
3. <u>CC</u> a rusting bicycle	12. <u>PC</u> water evaporating
4. <u>PC</u> melting butter	13. <u>PC</u> cutting grass
5. <u>PC</u> separate sand from gravel	14. <u>CC</u> burning leaves
6. <u>CC</u> bleaching your hair	15. <u>CC</u> fireworks exploding
7. <u>CC</u> frying an egg	16. <u>PC</u> cutting your hair
8. <u>PC</u> squeeze oranges for juice	17. <u>PC</u> crushing a can
9. <u>PC</u> melting ice	18. <u>PC</u> boiling water

Worksheet #2: Physical/Chemical
Properties/Changes

Name _____

I. Fill in the Blanks

physical properties can be observed without chemically changing matter.
chemical properties describe how a substance interacts with other substances. Solids have definite shapes and definite volumes.
Liquids have indefinite shapes and definite volumes. Gases have indefinite shapes and indefinite volumes.

Phase changes are physical changes. Freezing point is the temperature at which a liquid turns to a solid. It is also equal to the melting point which is the temperature at which a solid turns to a liquid. Boiling point is the temperature at which a liquid turns to a gas, and Condensation point is the temperature at which a gas turns to a liquid. Occasionally, a solid turns directly into a gas without turning into a liquid first. This is called Sublimation.

II. Label these properties as chemical (C) or physical (P). Be certain to know the definition of each of these properties.

combustibility	<u>C</u>	density	<u>P, I</u>
malleability	<u>P, I</u>	tendency to corrode	<u>C</u>
weight	<u>P, E</u>	volume	<u>P, E</u>
failure to react	<u>C</u>	melting point	<u>P, I</u>
ductility	<u>P, I</u>	odor	<u>P, I</u>
texture	<u>P, I</u>	flammability	<u>C</u>

III. Label these changes as chemical (C) or physical (P).

digestion of food	<u>CC</u>	explosions	<u>CC</u>
getting a haircut	<u>PC</u>	lighting a candle	<u>CC</u>
evaporation	<u>PC</u>	tarnishing silver	<u>CC</u>
ice cube melting	<u>PC</u>	formation of acid rain	<u>CC</u>
crushing rocks	<u>PC</u>	dissolving salt in water	<u>PC</u>

Worksheet: Physical and Chemical Changes

[Return to tutorial on physical & chemical changes](#)

[Go to the worksheet answers](#)

1. Label each process as a physical or chemical change:

- a. perfume evaporating on your skin P
- b. butter melting P
- c. wood rotting C
- d. charcoal heating a grill C
- e. autumn leaves changing color C
- f. a hot glass cracking when placed in cold water P
- g. melting copper metal P
- h. burning sugar C
- i. mixing sugar in water P
- j. digesting food C

2. Which of the following would NOT be a physical change?

- a. freezing water to make ice cubes
- b. melting gold to make jewelry
- c. burning gasoline in a lawnmower
- d. boiling water for soup
- e. tearing a piece of aluminum foil

3. Which of the following is NOT a physical change?

- a. grating cheese
- b. melting cheese
- c. fermenting of cheese
- d. mixing two cheeses in a bowl

4. Which are physical and which are chemical changes?

- a. boil PC
- b. burn (combustion) CC
- c. condense PC
- d. corrode CC
- e. crumple PC
- f. ferment CC
- g. melt PC
- h. rust CC
- i. crush PC
- j. freeze PC
- k. oxidize CC
- l. tarnish CC
- m. explode CC

- n. grind PC
- o. rot CC
- p. vaporize PC
- q. photosynthesis CC
- r. sublimation PC

5. If a certain mixture is homogeneous, you would properly conclude that the physical properties and the composition:

- a. are different from one part of the sample to another
- b. vary smoothly from top to bottom of the sample
- c. are the same in every small volume element from the sample
- d. none of these

6. Label each process as a physical or chemical change:

- a. Moth balls gradually vaporize in a closet PC
- b. hydrofluoric acid attacks glass (used to etch glassware) CC
- c. A chef making a sauce with brandy is able to burn off the alcohol from the brandy, leaving just the brandy flavoring PC
- d. Chlorine gas liquefies at -35°C under normal pressure PC
- e. hydrogen burns in chlorine gas CC

7. Label each process as a physical or chemical change:

- a. fogging a mirror with your breath PC
- b. breaking a bone PC
- c. mending a broken bone PC
- d. burning paper CC
- e. slicing potatoes for fries PC
- f. mixing sugar with coffee PC
- g. frying chicken CC
- h. a nail rusting CC
- i. paper ripping PC
- j. wood burning CC
- k. mixing water and food coloring PC
- l. food molding (rotting) CC
- m. writing on paper PC
- n. dyeing fabric PC

8. Is concrete a heterogeneous mixture? *yes, you can see the parts*

[Go to the worksheet answers](#)

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I. Fill in the Blanks

A(n) element is a pure substance that is made of only one kind of atom. The symbol for a(n) element is always one or two letters. When the symbol contains two letters, the first letter is always capital, and the second letter is always lower case.

A(n) compound is a pure substance containing two or more elements that are chemically combined. A(n) element is represented by a chemical symbol. The elements in a(n) compound always combine in definite proportions.

A(n) mixture is made of two or more substances that are physically combined. A(n) mixture that is uniformly mixed is called homogeneous. A special name for this is a(n) solution. A(n) mixture that is not uniformly mixed is called heterogeneous. A special type of mixture that is a solid _____ of two or more metals is called a(n) _____.

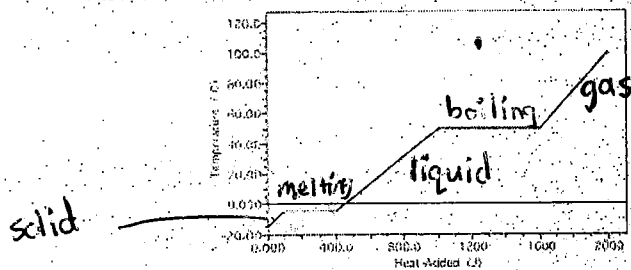
II. Classify each of the following as an element (E), compound (C), homogeneous mixture/solution (S), or heterogeneous mixture (HE).

- | | |
|-----------------------|-----------------|
| chocolate chip cookie | <u>M / HE</u> |
| oxygen gas | <u>PS / E</u> |
| salt water | <u>M / HO</u> |
| taco | <u>M / HE</u> |
| gold | <u>PS / E</u> |
| carbon dioxide | <u>PS / C</u> |
| water | <u>PS / C</u> |
| kool aid | <u>M / HO</u> |
| table salt | <u>PS / C</u> |
| muddy water | <u>M / HE</u> |
| potassium | <u>PS / E</u> |
| brass | <u>M / HO</u> |
| graphite | <u>PS / E</u> |
| glass | <u>PS / C ?</u> |
| air | <u>M / HO</u> |

Date:

Heating and Cooling Curves

Consider the phase diagram shown below



a. Label the different phases in this diagram

b. Label the melting and boiling areas on this curve

c. What is the

- 1) melting point of the substance? -5°C
- 2) boiling point of the substance? 50°C

d. How much heat has been added to

- 1) solid phase: 100 J
- 2) liquid phase: 600 J
- 3) melt the substance: 300 J
- 4) boil the substance: 600 J

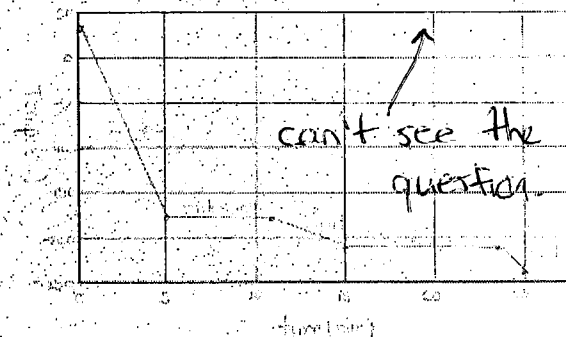
e. Describe what is happening to the molecules during each region of the graph?

Region	Name	Molecular Description
1	solid warm	particles move faster
2	melting	particles being separated
3	liquid warm	particles move faster
4	boiling	particles move further apart
5	gas being warmed	gas particles moving faster

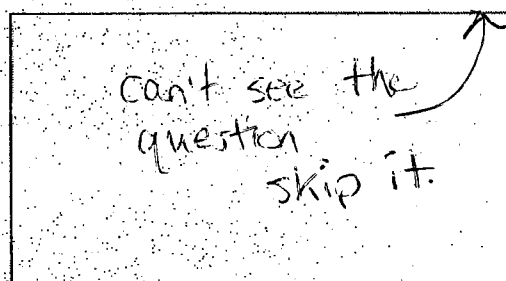
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Heating and Cooling Curves

★ On the graph below make a sketch of the temperature vs time for oxygen as it is cooled at temperature (25°C) to temperature of -200°C. The process takes 25 minutes and oxygen is pure gas, 4 minutes as a pure liquid, and 2 minutes as a solid. The freezing point of oxygen is 182°C and the boiling point is -183°C



★ On the graph below, make a sketch of the temperature vs time for aluminum as it is heated (temperature 15°C to 3000°C). The process takes 30 minutes and aluminum starts in the pure phase and 5 minutes boiling. The melting point of aluminum is 933°C and the boiling



Explain why temperature does not change during a phase change

- before phase change, all energy added goes into making the particles move faster. This is a kinetic energy change.
- during a phase change, all added energy goes into separating particles from one another. This is potential energy changing.
- temperature is a measure of kinetic energy
- since kinetic energy does not change during a phase change, neither does temperature.

What are the similarities between science and technology?

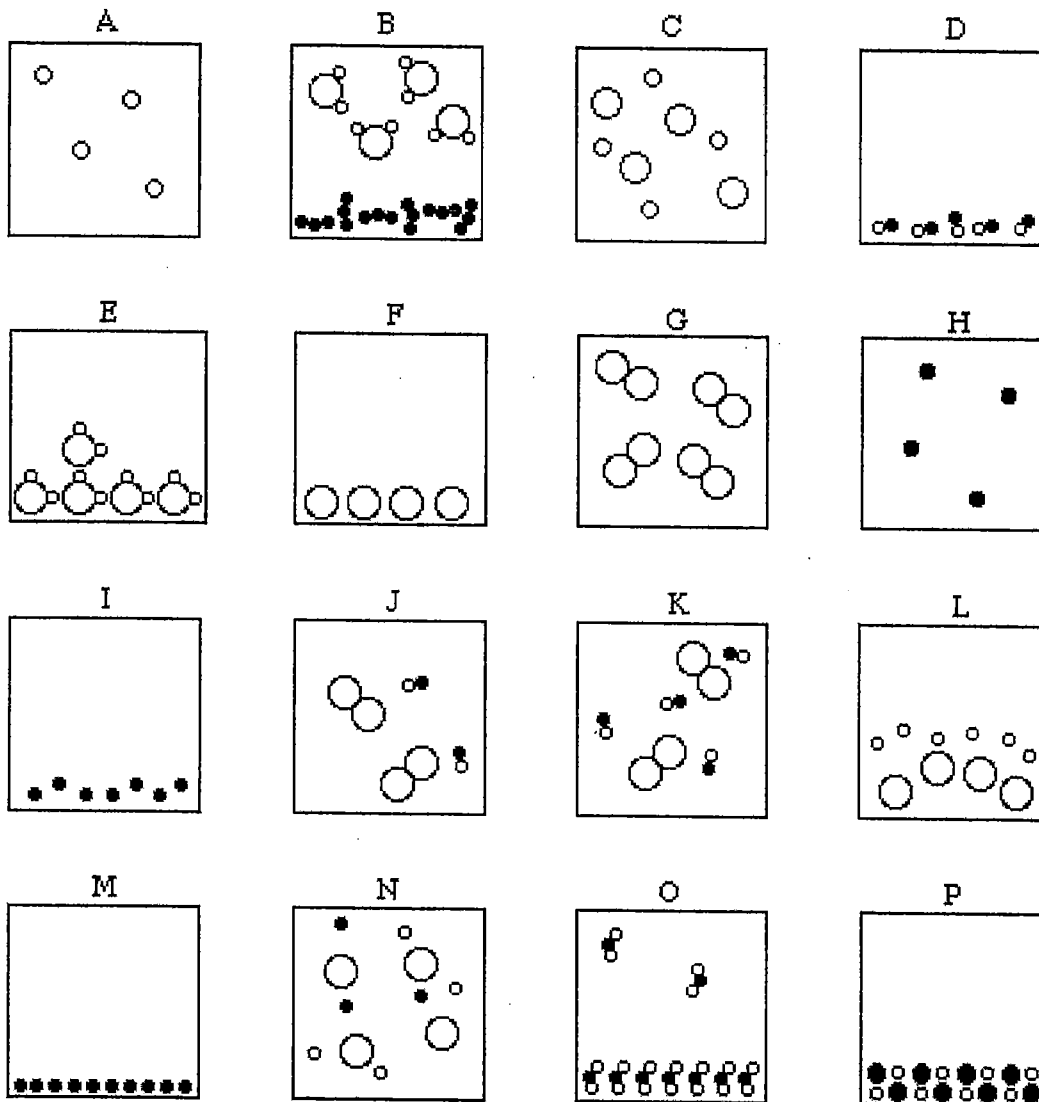
Similar

- asks questions about world around us.
- body of knowledge.
- produces knowledge.

different

- science asks why? technology: asks what can this be used for
- science: serves curiosity technology: serves the marketplace
- science after knowledge technology makes our lives better.

As an example consider diagram A. Category I: pure substance; Category II: element; Category III: gas phase. It is a pure substance since there is a single type of matter in the container. It is an element since it exists as a monoatomic substance. Finally it is in the gas phase due to the totally random distribution of particles.



Identify whether each is a solid (S), liquid (L), or gas (G) AND whether it represents an element (E), compound/molecule (C/M), homogeneous mixture (HOM), or heterogeneous mixture (HEM).

- A. gas; element B. (l); HEM C. (l), HOM D. (s); compound.
 E. (s); compound F. (s); element G. (l); compound H. (g); element
 I. (s); element J. (g); HEM K. (l); HOM L. (l) HEM.
 M. (s); HEM N. (s); element O. (g); HEM P. solid; HOM
 (s); element (l) HEM (s) & (g) compound

