CP Chemistry
Mrs. Post

Chapter 1:
Matter and Change

Name: _____

Mods: _____

Chapter 1: Matter & Change
Reading Guide

1.1 – Chemistry is a Physical Science *(pgs. 3-5)*

1) Define **chemistry**-

2) Branches of Chemistry - describe each of the *six* major divisions in chemistry:

- **Organic chemistry**-
- **Inorganic chemistry**-
- **Physical chemistry**-
- **Analytical chemistry**-
- **Biochemistry**-
- **Theoretical chemistry**-

3) Define **chemical**-

4) Types of Research - copy the first sentence from each of the *three* sections below.

- **Basic Research**-
- **Applied Research**-
- **Technological Development**-

1.2 – Mater and Its Properties *(pgs. 6-14)*

5) Define **mass**-

6) Define **matter**-

7) The Building Blocks of Matter – define each of the words below

- **Atom-**
- **Element-**
- **Compound-**
- **Molecule-**

8) Characteristic Properties of a Substance – define and give examples for the *two* types of properties that a substance may have

- **Extensive properties-**
  - ► Examples:
- **Intensive properties-**
  - ► Examples:

9) When its Physical – define the *two* terms below and give examples for each

- **Physical property-**
  - ► Examples:
- **Physical change-**
  - ► Examples:

10) States of Matter – define the *five* terms below

- **Change of state-**
- **Solid-**
- **Liquid-**

- **Gas-**

- **Plasma-**

11) When its Chemical – define the *two* terms below and give examples for each

- **Chemical property-**

  ▶ Examples:

- **Chemical change/reaction-**

  ▶ Examples:

12) Substances Involved in a Chemical Reaction – define the *two* terms below

- **Reactants-**

- **Products-**

13) Define **law of conservation of energy-**

14) Classifications of Matter- define the *three* terms below and give examples when needed

- **Mixture-**

  ▶ **Homogeneous-** (also called _____)

  - Example:

  ▶ **Heterogeneous-**

  - Example:

  ▶ Name *five* ways to *separate* a mixture:

- **Pure substance-**
  - ► Rule #1:
  - ► Rule #2:
  - ► Pure substances are either _____ or _____
  - ► Name *two* ways to *decompose* a compound:

15) Why is it important for chemists to be aware of the kinds of **impurities** in a reagent?

1.3 – Elements *(pgs. 16-20)*

16) Organization of the Periodic Table – define the terms below and answer questions that are asked

- How is the *periodic table* organized?
- **Groups/families-**
- **Periods-**

17) Types of Elements – define the *three* different categories of elements within the periodic table

- **Metal-**
  - ► What are 3 other properties that *most* metals possess?
- **Nonmetal-**
- **Metalloid-**

*Elements & Symbols to Memorize**

GROUP ONE

#	Element	Symbol
1	Hydrogen	H
2	Helium	He
3	Lithium	Li
4	Beryllium	Be
5	Boron	B
6	Carbon	C
7	Nitrogen	N
8	Oxygen	O
9	Fluorine	F
10	Neon	Ne
11	Sodium	Na
12	Magnesium	Mg
13	Aluminum	Al
14	Silicon	Si
15	Phosphorus	P
16	Sulfur	S
17	Chlorine	Cl
18	Argon	Ar
19	Potassium	K
20	Calcium	Ca
21	Scandium	Sc
22	Titanium	Ti
23	Vanadium	V
24	Chromium	Cr
25	Manganese	Mn
26	Iron	Fe
27	Cobalt	Co

GROUP TWO

#	Element	Symbol
28	Nickel	Ni
29	Copper	Cu
30	Zinc	Zn
31	Gallium	Ga
32	Germanium	Ge
33	Arsenic	As
34	Selenium	Se
35	Bromine	Br
36	Krypton	Kr
38	Strontium	Sr
47	Silver	Ag
48	Cadmium	Cd
50	Tin	Sn
51	Antimony	Sb
53	Iodine	I
54	Xenon	Xe
55	Cesium	Cs
56	Barium	Ba
74	Tungsten	W
78	Platinum	Pt
79	Gold	Au
80	Mercury	Hg
82	Lead	Pb
83	Bismuth	Bi
86	Radon	Rn
87	Francium	Fr
88	Radium	Ra

* When studying, you only need to memorize the element name and symbol (you do NOT need to memorize the number)*

States of Matter - Important Properties

Property	***Solid***	***Liquid***	***Gas (vapor)***
Shape			
Volume			
Expansion Upon Heating			
Compressibility			
Appearance of Particles			

Element Practice: Names to Symbols

Directions: Write the correct SYMBOL for the following elements.
Try doing this from memory first, then go back with your notes for the elements you didn't remember.

Element	Symbol
Hydrogen	
Nitrogen	
Fluorine	
Aluminum	
Sulfur	
Barium	
Tungsten	
Iron	
Radium	
Cesium	
Argon	
Radon	

Element	Symbol
Beryllium	
Oxygen	
Sodium	
Silicon	
Chlorine	
Cadmium	
Gold	
Lead	
Zinc	
Iodine	
Krypton	
Francium	

Element Practice: Symbols to Names

Directions: Write the correct NAME for the following elements symbols.
Try doing this from memory first, then go back with your notes for the elements you didn't remember.

Symbol	Element
Mn	
Sr	
C	
P	
Ca	
Ni	
Sb	
Sn	
K	
He	
Ne	
Bi	
Sc	

Symbol	Element
Ag	
B	
Co	
Pb	
Hg	
Cr	
Ra	
Li	
Cu	
Mg	
Xe	
Ti	
Rn	

Physical vs. Chemical Properties

A **physical property** is observed with the senses and can be determined without destroying the object. For example, color, shape, mass, length, and odor are all examples of physical properties.

A **chemical property** indicates how a substance reacts with something else. The original substance is fundamentally changed into a new substance by observing a chemical property. For example, the rusting of iron is a chemical change. The iron has reacted with oxygen, and the original iron metal is changed. It now exists as iron oxide, a different substance.

Directions: Classify the following properties as either chemical or physical by putting a check in the appropriate column.

		Physical Property	**Chemical Property**
1	blue color		
2	density		
3	flammability		
4	solubility		
5	reacts with acid to form H_2		
6	supports combustion		
7	sour taste		
8	melting point		
9	reacts with water to form a gas		
10	floral smell		
11	hardness		
12	boiling point		
13	luster		
14	reacts with a base to form water		

Physical vs. Chemical Changes

In a **physical change**, the original substance still exists, it has only changed form.

In a **chemical change**, a new substance is produced and it is not possible to get the original substance by an ordinary means. Energy changes always accompany chemical changes.

Directions: Classify the following as being a physical (P) or chemical (C) change:

1. _____ Sodium hydroxide dissolves in water.
2. _____ An acid reacts with potassium hydroxide to produce a salt, water, and heat.
3. _____ A chunk of sodium is sliced in two
4. _____ Water is heated and changed to steam
5. _____ Potassium chlorate decomposes to potassium chloride and oxygen gas
6. _____ Iron rusts
7. _____ When placed in H_2O, a chunk of sodium catches on fire as hydrogen gas is released and sodium hydroxide forms.
8. _____ Evaporation
9. _____ Ice melting
10. _____ Milk sours
11. _____ Sugar dissolves in water
12. _____ Wood rotting
13. _____ Pancakes cooking on a griddle
14. _____ Grass growing in a lawn
15. _____ Food is digested in the stomach
16. _____ Water is absorbed by a paper towel

Distinguishing Between Physical and Chemical Changes

Directions: Identify each of the following as a **physical change (P)** or **chemical change (C)**.

1. _____ A piece of wood burns to form ash
2. _____ Ethanol vaporizes
3. _____ A piece of cork is cut in half
4. _____ A bicycle chain rusts
5. _____ Your body begins to build up lactic acid as oxygen is depleted during exercise
6. _____ Water decomposes into hydrogen gas and oxygen gas
7. _____ Hydrochloric acid reacts with zinc
8. _____ A piece of an apple rots on the ground
9. _____ A tire is inflated with air
10. _____ A plant turns sunlight, CO_2, and water into sugar and oxygen
11. _____ Salt dissolves in water
12. _____ Eggs turn into an omelet
13. _____ Cheese turns moldy in the refrigerator
14. _____ A popsicle melts
15. _____ Cooking brownie mix in the oven

Directions: Choose two of the above examples and explain why you believe them to be chemical or physical changes. Please **choose one of each type of change** and **justify your choice (in complete sentences)** using the information you have learned in class.

16. Physical Change explanation: _____

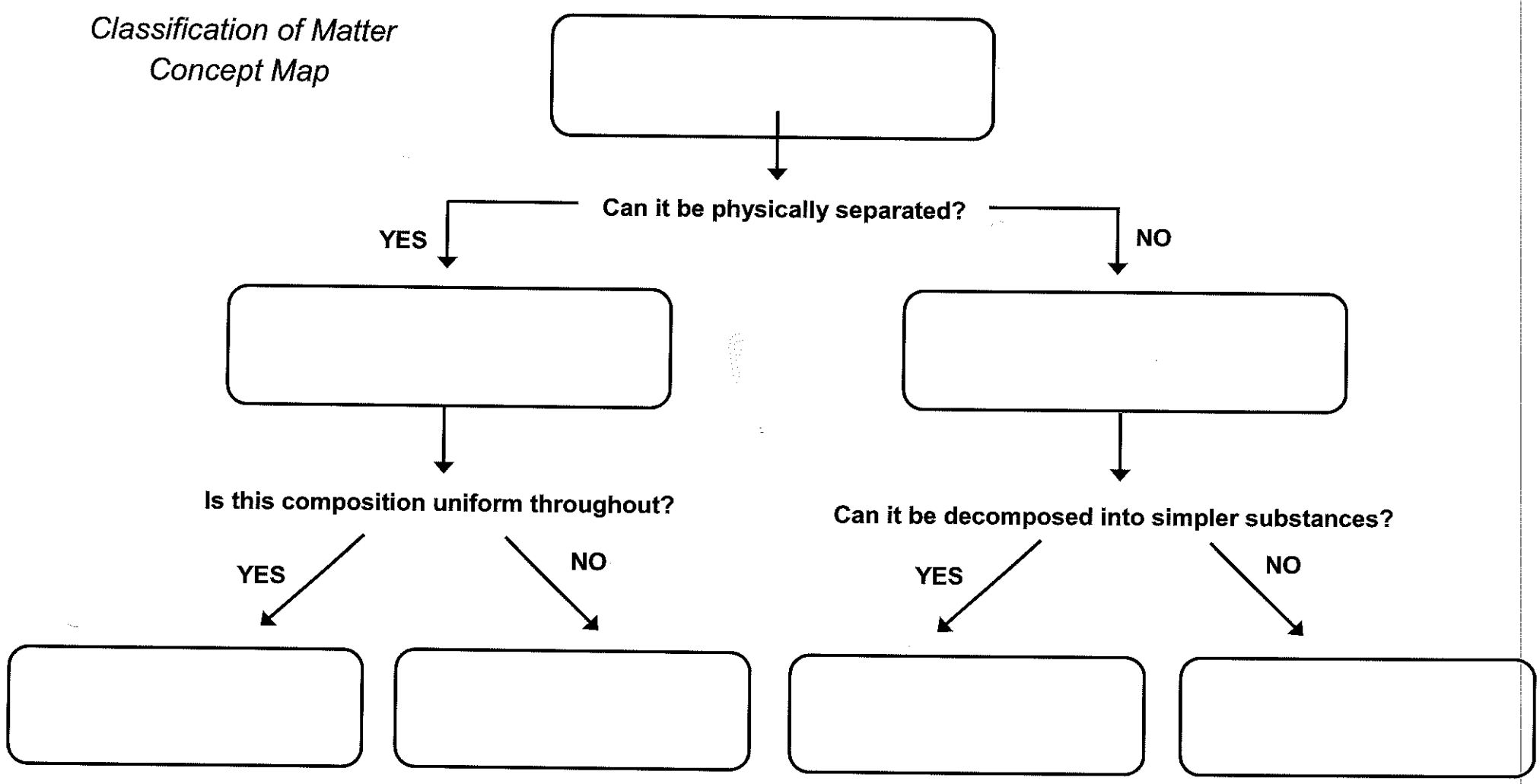
17. Chemical Change explanation: _____

Chemical Symbols & Substances WS

Directions: The following chemical substances are made up of some of the elements you will be studying during this course. For each substance, using an appropriate reference source, indicate the names and symbols of the elements present. The exact formula is not required.

	Substance	**Element(s) Present**	**Chemical Symbol(s)**
Example	***Water***	***Hydrogen Oxygen***	***H O***
1	Ammonia		
2	Sucrose (sugar)		
3	Baking Soda		
4	Table Salt		
5	Vinegar		
6	Bleach		
7	Bronze		
8	Hydrogen peroxide		

Classification of Matter
Concept Map



Examples:

a)

b)

c)

d)

Examples:

a)

b)

c)

d)

Examples:

a)

b)

c)

d)

Examples:

a)

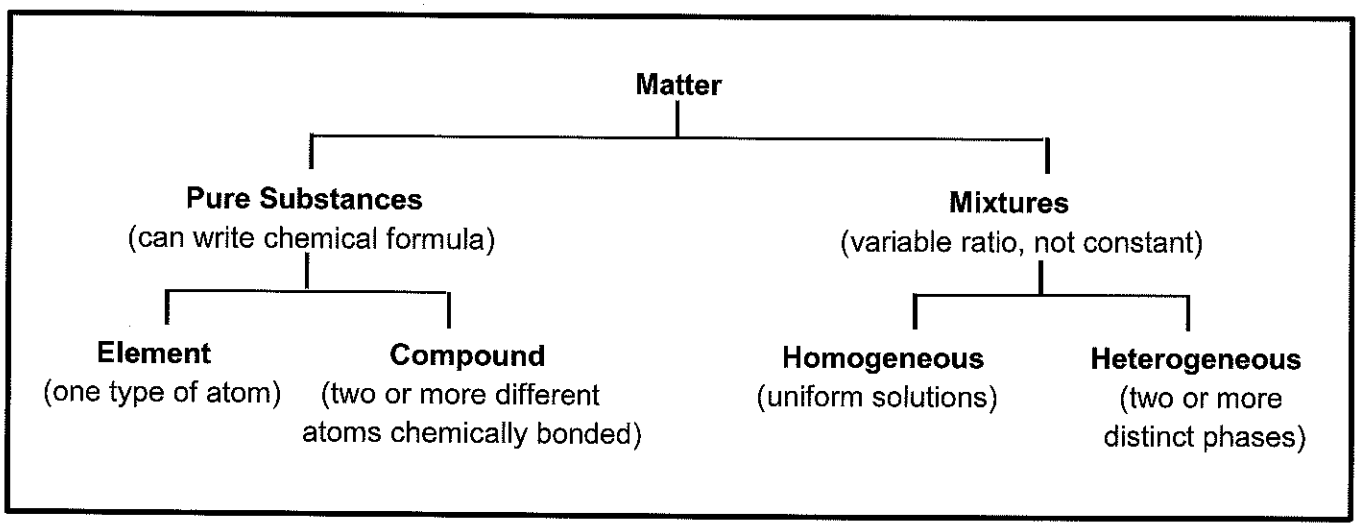
b)

c)

d)

Pure Substances vs. Mixtures

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



Directions: Classify each of the following as either a pure substance or a mixture. If it is a pure substance, write either *element* or *compound* in the "pure substance" column. If it is a mixture, write either *heterogeneous* or *homogeneous* in the "mixture" column.

		Pure Substance	Mixture
1	chlorine		
2	water		
3	soil		
4	sugar water		
5	oxygen		
6	carbon dioxide		
7	rocky road ice cream		
8	rubbing alcohol		
9	air		
10	iron		

Chemistry: Classifying Matter

Directions: Classify each of the materials below. In the center column, state whether the material is a *pure substance* or a *mixture*. If the material is a pure substance, further classify it as either an *element* or *compound* in the right hand column. Similarly, if the material is a mixture, further classify it as *homogeneous* or *heterogeneous* in the right hand column.

	Material →	**Pure Substance or Mixture** →	**Element, Compound, Homogeneous, or Heterogeneous**
1	concrete		
2	sugar water		
3	iron filings		
4	limestone ($CaCO_3$)		
5	orange juice (w/pulp)		
6	Pacific Ocean		
7	air inside a party balloon		
8	Aluminum		
9	Magnesium		
10	acetylene (C_2H_2)		
11	bag of colored M&M's		
12	Soil		
13	pure water		
14	Chromium		
15	chex mix		
16	Kool-aid drink		
17	benzene (C_6H_6)		
18	muddy water		
19	brass (Cu mixed with Zn)		
20	baking soda ($NaHCO_3$)		

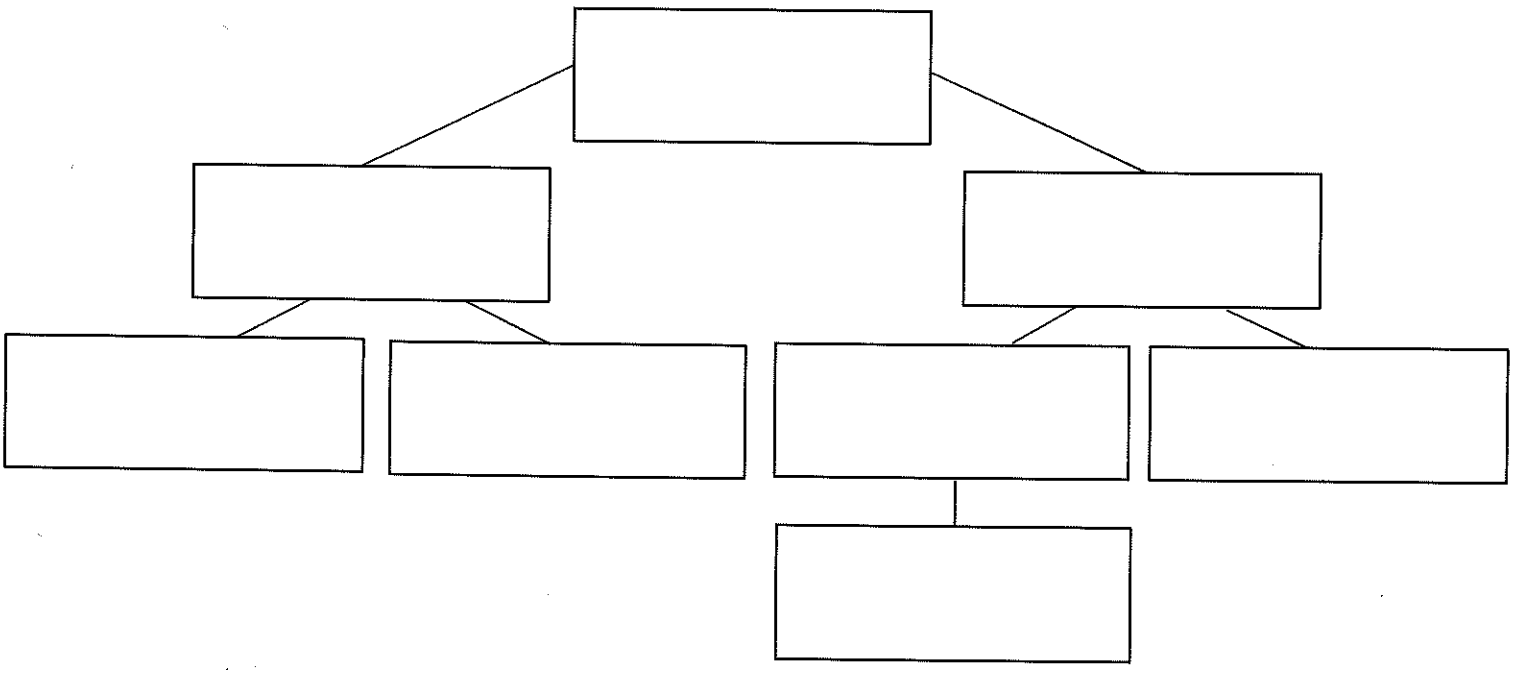
Chapter 1 Review - Matter & Change

SHORT ANSWER: Answer the following questions in the space provided.

1. Consider the burning of gasoline and the evaporation of gasoline. Which process represents a chemical change and which represents a physical change? Explain your answer.

2. Describe the difference between a heterogeneous mixture and a homogeneous mixture, and give an example of each.

3. Appropriately fill in the matter concept map below with the following terms: *atom, compound, mixture, pure substance, matter, homogeneous, element,* and *heterogeneous.*



4. For each substance below, place a check in the box to classify the substance appropriately:

		Homo-geneous mixture	Hetero-geneous mixture	Element	Compound
a	granola bar				
b	Salt				
c	Granite				
d	Copper				
e	energy drink				
f	lucky charms cereal				
g	oil & vinegar dressing				
h	bleach (NaClO)				
i	oatmeal raisin cookie				
j	Air				
k	nitrogen				
l	sucrose ($C_{12}H_{22}O_{11}$)				
m	fruit salad				

5. Classify each of the following as either a *physical* (P) or *chemical* (C) change.

a. _____ ice melting

b. _____ paper burning

c. _____ metal rusting

d. _____ gas pressure increasing

e. _____ liquid evaporating

f. _____ food digesting

6. **Compare and contrast each of the following terms:**

a. *mass* and *matter*

_____

_____

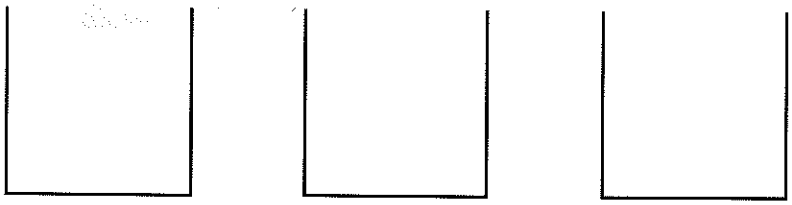
_____

b. *atom* and *compound*

c. *physical property* and *chemical property*

d. *homogeneous mixture* and *heterogeneous mixture*

7. Using circles to represent particles, draw a diagram that depicts the arrangement of particles in the solid, liquid, and gas states.



Solid Liquid Gas

8. How is energy involved in chemical and physical changes?