

**CHAPTER 1 REVIEW***Matter and Change***SECTION 1****SHORT ANSWER** Answer the following questions in the space provided.1.   a   Technological development of a chemical product often

- (a) lags behind basic research on the same substance.
- (b) does not involve chance discoveries.
- (c) is driven by curiosity.
- (d) is done for the sake of learning something new.

2.   d   The primary motivation behind basic research is to

- (a) develop new products.
- (b) make money.
- (c) understand an environmental problem.
- (d) gain knowledge.

3.   a   Applied research is designed to

- (a) solve a particular problem.
- (b) satisfy curiosity.
- (c) gain knowledge.
- (d) learn for the sake of learning.

4.   b   Chemistry is usually classified as

- (a) a biological science.
- (b) a physical science.
- (c) a social science.
- (d) a computer science.

5. Define the six major branches of chemistry.

organic chemistry—the study of carbon-containing compoundsinorganic chemistry—the study of non-organic substancesphysical chemistry—the study of properties of matter, changes that occur in matter, and the relationships between matter and energyanalytical chemistry—the identification of the composition of materialsbiochemistry—the study of the chemistry of living thingstheoretical chemistry—the use of mathematics and computers to design and predict the properties of new compounds

**SECTION 1** continued

6. For each of the following types of chemical investigations, determine whether the investigation is *basic research*, *applied research*, or *technological development*. More than one choice may apply.

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| <b>basic research</b>                              | a. A laboratory in a major university surveys all the reactions involving bromine.                         |
| <b>applied research/<br/>technical development</b> | b. A pharmaceutical company explores a disease in order to produce a better medicine.                      |
| <b>applied research</b>                            | c. A scientist investigates the cause of the ozone hole to find a way to stop the loss of the ozone layer. |
| <b>applied research/<br/>technical development</b> | d. A pharmaceutical company discovers a more efficient method of producing a drug.                         |
| <b>applied research/<br/>technical development</b> | e. A chemical company develops a new biodegradable plastic.  |
| <b>applied research</b>                            | f. A laboratory explores the use of ozone to inactivate bacteria in a drinking-water system.               |

7. Give examples of two different instruments routinely used in chemistry.

**Answers may include any type of balance and any type of microscope.**

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8. What are microstructures?

**things too small to be seen with the unaided eye**

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9. What is a chemical?

**a substance with a definite composition**

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10. What is chemistry?

**the study of the composition, properties, and interactions of matter**

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**CHAPTER 1 REVIEW***Matter and Change***SECTION 2****SHORT ANSWER** Answer the following questions in the space provided.**1.** Classify each of the following as a *homogeneous* or *heterogeneous* substance.

- heterogeneous a. iron ore
- homogeneous b. quartz
- heterogeneous c. granite
- homogeneous d. energy drink
- heterogeneous e. oil-and-vinegar salad dressing
- homogeneous f. salt
- homogeneous g. rainwater
- homogeneous h. nitrogen

**2.** Classify each of the following as a *physical* or *chemical* change.

- physical a. ice melting
- chemical b. paper burning
- chemical c. metal rusting
- physical d. gas pressure increasing
- physical e. liquid evaporating
- chemical f. food digesting

**3.** Compare a physical change with a chemical change.

A chemical change involves a rearrangement of the atoms of different elements in a substance and the formation substances with different physical properties. A physical change can occur in properties such as the state or shape of a substance, but it will not affect the composition of that substance.

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**SECTION 2** continued

4. Compare and contrast each of the following terms:

a. *mass* and *matter*

**Mass is a measure of the amount of matter. Matter is anything that has mass and takes up space.**

b. *atom* and *compound*

**All matter is composed of atoms, which are the smallest units of an element that retain the properties of that element. Atoms can come together to form compounds.**

c. *physical property* and *chemical property*

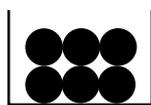
**Physical properties are characteristics such as color, density, melting point, and boiling point that can be measured without changing the identity of the substance.**

**Chemical properties relate to how a substance interacts with another substance to form a different substance.**

d. *homogeneous mixture* and *heterogeneous mixture*

**A homogeneous mixture has a uniform composition. A heterogeneous mixture is not uniform.**

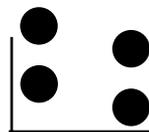
5. Using circles to represent particles, draw a diagram that compares the arrangement of particles in the solid, liquid, and gas states.



Solid



Liquid



Gas

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

**Energy is either absorbed or given off in all chemical and physical changes, but it is neither created nor destroyed. It simply assumes a different form, or it is moved from one place to another.**

**CHAPTER 1 REVIEW***Matter and Change***SECTION 3**

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

1. A horizontal row of elements in the periodic table is called a(n) period.
2. The symbol for the element in Period 2, Group 13, is B.
3. Elements that are good conductors of heat and electricity are metals.
4. Elements that are poor conductors of heat and electricity are nonmetals.
5. A vertical column of elements in the periodic table is called a(n) group, or family.
6. The ability of a substance to be hammered or rolled into thin sheets is called malleability.
7. Is an element that is soft and easy to cut cleanly with a knife likely to be a metal or a nonmetal? metal
8. The elements in Group 18, which are generally unreactive, are called noble gases.
9. At room temperature, most metals are solids.
10. Name three characteristics of most nonmetals.  
They are brittle, are poor conductors of heat and electricity, and have low boiling points.
11. Name three characteristics of metals.  
They are malleable, ductile, and good conductors of heat and electricity, and they have a metallic (shiny) luster.
12. Name three characteristics of most metalloids.  
They are semiconductors of electricity, solid at room temperature, and less malleable than metals.
13. Name two characteristics of noble gases.  
They are in the gas state at room temperature and are generally unreactive.

**SECTION 3** continued

- 14.** What do elements of the same group in the periodic table have in common?

**Elements of the same group share similar chemical properties.**

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- 15.** Within the same period of the periodic table, how do the properties of elements close to each other compare with the properties of elements far from each other?

**The properties of elements that are close to each other in the same period tend to be more similar than the properties of elements that are far apart. Physical and chemical properties change somewhat regularly across a period.**

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- 16.** You are trying to manufacture a new material, but you would like to replace one of the elements in your new substance with another element that has similar chemical properties. How would you use the periodic table to choose a likely substitute?

**You would consider an element of the same vertical column, or group, because elements in the same group have similar chemical properties.**

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- 17.** What is the difference between a family of elements and elements in the same period?

**Family is another name for *group*, or elements in the same vertical column.**

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**Elements in the same period are in the same horizontal row.**

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- 18.** Complete the table below by filling in the spaces with correct names or symbols.

<b>Name of element</b>	<b>Symbol of element</b>
Aluminum	Al
<b>Calcium</b>	Ca
<b>Manganese</b>	Mn
Nickel	<b>Ni</b>
Potassium	<b>K</b>
Cobalt	<b>Co</b>
<b>Silver</b>	Ag
<b>Hydrogen</b>	H

**CHAPTER 1 REVIEW***Matter and Change***MIXED REVIEW****SHORT ANSWER** Answer the following questions in the space provided.

1. Classify each of the following as a
- homogeneous*
- or
- heterogeneous*
- substance.

<u>homogeneous</u>	a. sugar	<u>homogeneous</u>	d. plastic wrap
<u>homogeneous</u>	b. iron filings	<u>heterogeneous</u>	e. cement sidewalk
<u>heterogeneous</u>	c. granola bar		

2. For each type of investigation, select the most appropriate branch of chemistry from the following choices:
- organic chemistry*
- ,
- analytical chemistry*
- ,
- biochemistry*
- ,
- theoretical chemistry*
- . More than one branch may be appropriate.

<u>analytical chemistry</u>	a. A forensic scientist uses chemistry to find information at the scene of a crime.
<u>theoretical chemistry/ biochemistry</u>	b. A scientist uses a computer model to see how an enzyme will function.
<u>biochemistry</u>	c. A professor explores the reactions that take place in a human liver.
<u>organic chemistry</u>	d. An oil company scientist tries to design a better gasoline.
<u>analytical chemistry</u>	e. An anthropologist tries to find out the nature of a substance in a mummy's wrap.
<u>biochemistry/ analytical chemistry</u>	f. A pharmaceutical company examines the protein on the coating of a virus.

3. For each of the following types of chemical investigations, determine whether the investigation is
- basic research*
- ,
- applied research*
- , or
- technological development*
- . More than one choice may apply.

<u>basic research</u>	a. A university plans to map all the genes on human chromosomes.
<u>applied research</u>	b. A research team intends to find out why a lake remains polluted to try to find a way to clean it up.
<u>applied research/ technological development</u>	c. A science teacher looks for a solvent that will allow graffiti to be removed easily.
<u>basic research/ applied research</u>	d. A cancer research institute explores the chemistry of the cell.
<u>basic research</u>	e. A professor explores the toxic compounds in marine animals.

**MIXED REVIEW** continued

4. Use the periodic table to identify the name, group number, and period number of the following elements:

<u>chlorine, Group 17, Period 3</u>	a. Cl
<u>magnesium, Group 2, Period 3</u>	b. Mg
<u>tungsten, Group 6, Period 6</u>	c. W
<u>iron, Group 8, Period 4</u>	d. Fe
<u>tin, Group 14, Period 5</u>	e. Sn

5. What is the difference between extensive and intensive properties?

Extensive properties depend on the amount of matter present; intensive properties do not.

6. 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.

The burning of gasoline represents a chemical change because the gasoline is being changed into substances with different identities. Evaporation involves a physical change; the identity of gasoline remains unchanged.

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

A heterogeneous mixture, such as blood, is made of components with different physical properties. A homogeneous mixture, such as stainless steel, has a single set of physical properties.

8. Construct a concept map that includes the following terms: *atom*, *element*, *compound*, *pure substance*, *mixture*, *homogeneous*, and *heterogeneous*.

