

CHAPTER RESOURCES

Chapter 7 The Periodic Table and Physical Properties

Includes:

LEVELED ASSESSMENT

Chapter Review


Chapter Tests

Test A (Below Level) **BL**

Test B (On Level) **OL**

Test C (Advanced Learner) **AL**

LABS

For leveled labs, use the  CD-ROM.

Lab worksheets from Student Edition Labs

MiniLab

Lab: Version A (Below Level) **BL**

Lab: Version B (On Level) **OL**
(Advanced Learner) **AL**

UNIVERSAL ACCESS/LEVELED RESOURCES

Target Your Reading

Chapter Content Mastery English
(Below Level) **BL**

Chapter Content Mastery Spanish
(Below Level) **BL**

Reinforcement (On Level) **OL**

Enrichment (Advanced Learner) **AL**

READING SUPPORT

Content Vocabulary

Chapter Outline

TEACHER SUPPORT AND PLANNING

Chapter Outline for Teaching

Teacher Guide and Answers



Glencoe Science

Photo Credits

Cover: Roger Ressmeyer/CORBIS



The McGraw-Hill Companies

Copyright © by The McGraw-Hill Companies, Inc. All rights reserved.
Permission is granted to reproduce the material contained herein on the condition that such material be reproduced only for classroom use; be provided to students, teachers, and families without charge; and be used solely in conjunction with the *Glencoe Science* program. Any other reproduction, for use or sale, is prohibited without prior written permission of the publisher.

Send all inquiries to:
Glencoe/McGraw-Hill
8787 Orion Place
Columbus, OH 43240-4027

ISBN-13: 978-0-07-875463-0
ISBN-10: 0-07-875463-1

Printed in the United States of America.

2 3 4 5 6 7 8 9 10 009 11 10 09 08 07 06

Table of Contents

To the Teacher	iv
----------------------	----

Reproducible Student Pages

Hands-On Activities

MiniLab: <i>Can you guess the element?</i>	2
MiniLab: <i>Which parachute will drop first?</i>	3
Lab Version A: <i>Investigating Physical Changes</i>	4
Lab Version B: <i>Investigating Physical Changes</i>	7

Meeting Individual Needs

Below, On, Advanced

Target Your Reading	10
Chapter Content Mastery	11
Spanish Chapter Content Mastery	14
Reinforcement	17
Enrichment	20
Content Vocabulary	23
Chapter Outline Worksheets	36

Assessment

Chapter Review	25
Chapter Test A	27
Chapter Test B	30
Chapter Test C	33

Teacher Support and Planning

Chapter Outline for Teaching	T2
Teacher Guide and Answers	T6



Additional Assessment Resources available with Glencoe Science:

- ExamView® Assessment Suite
- Assessment Transparencies
- Performance Assessment in the Science Classroom
- Standardized Test Practice Booklet
- MindJogger Videoquizzes
- Vocabulary PuzzleMaker at science.glencoe.com
- Interactive Classroom
- The Glencoe Science Web site at science.glencoe.com
- An interactive version of this textbook along with assessment resources are available online at mhln.com.

Teacher Approval Initials

Date of Approval

Student Lab/Activity Safety Form

Student Name: _____

Date: _____

Lab/Activity Title: _____

In order to show your teacher that you understand the safety concerns of this lab/activity, the following questions must be answered after the teacher explains the information to you. You must have your teacher initial this form before you can proceed with the activity/lab.

1. How would you describe what you will be doing during this lab/activity?

2. What are the safety concerns associated with this lab/activity (as explained by your teacher)?

- _____
- _____
- _____
- _____
- _____

3. What additional safety concerns or questions do you have?

MiniLab

Can you guess the element?

Elements are organized in the periodic table according to their atomic numbers. An element can be a solid, a liquid, or a gas; a metal, a semimetal, or a nonmetal. How well do you think you know some of the elements?

Procedure

1. Organize the **element cards** from the Launch Lab into groups. Identify some of the physical properties of the groups.
2. Group some of the metals according to a specific property, such as luster or malleability.
3. Choose other groupings that you will remember easily. Group these with the properties that are most important.
4. Identify other elements with additional physical or chemical properties.
5. Your teacher will hold up an element card without showing its face and give one clue to the identity of the element.
6. Someone might say, "I can guess that element with just five clues!" Someone else might challenge and say, "I can guess that element with only four clues."
7. Your teacher will give the number of clues that ended the challenge. The student who won the challenge will name the element.

Analysis

1. **Identify** which properties you found easiest to become familiar with when you were organizing your notes.

2. **Give an example** of groups you found difficult to learn about.

3. **Explain** how the challenge helped you understand the organization of the periodic table.

MiniLab

Which parachute will drop first?

One physical property of metals is that they conduct heat. The ability of a material to transfer heat is thermal conductivity. Some metals conduct heat faster than others do. Which metals do you think conduct heat more rapidly than other metals?

Procedure

1. Read and complete a lab safety form.
2. Choose **three foil cupcake forms** and **three toy people**.
3. Use **three short pieces of thread** to attach a person to a foil form so the form becomes a parachute.
4. Choose **three rods** about 10 cm long, each made of a different metal.
5. Light a **candle** and carefully allow wax to drip on the center of the outside of a cupcake form. While the wax is melted, attach a rod horizontally to the parachute. Allow the wax to harden.
6. Repeat step 5 for the other two rods.
7. Loosely secure the **ring** on a **ring stand** to be positioned later.
8. Place the ends of the three rods as close together as possible on the ring. Use **metal clamps** to keep them secure.
9. Place a candle in a **holder** under the ring. Secure the rod ends and ring directly above the candle.
10. Light the candle and observe.

Analysis

1. **Identify** the parachute that dropped first.

2. **Explain** what property of metals caused the parachutes to drop at different times.

3. **Hypothesize** the results if three different metals had been used in this experiment.

Lab

Investigating Physical Changes

CHAPTER 7

VERSION A

Problem Matter makes up all the substances you find in your world. Matter can go through changes in size, shape or color, or even changes of state, but it still is the same matter. Matter accomplishes tasks, such as moving heat or electricity or cooling your drinks, but it still is the same matter. It is made up of the same matter. It is made up of the same atoms and has the same properties.

The changes in matter mentioned above are physical changes. How can you show that physical changes do not actually change matter?

Form a Hypothesis Think about the elements you organized into a periodic table in the Launch Lab. If you change these elements in some way, or use them, can you show that they are still the same matter? Write a hypothesis for an experiment that explains why the composition of matter remains the same even though it undergoes a physical change.

Materials

substances that are made up of some of the elements used in the Launch Lab or other elements or compounds:

carbon
iron fillings
sand
copper penny

copper wire
salt
ice cube
balloon
a mineral sample
milk

Safety Precautions 

Procedure

Directions: Check the boxes below as you complete each step of the procedure.

- | | |
|--|---|
| <p><input type="checkbox"/> 1. Read and complete a lab safety form.</p> <p><input type="checkbox"/> 2. Choose five items or substances that can be put through a physical change.</p> <p>Hint: Think about changes in texture, shape, size, color, odor, volume, mass, weight, and density.</p> <p><input type="checkbox"/> 3. Make a table that lists the substances and at least one element in the substance, or fill in the table on the next page.</p> | <p><input type="checkbox"/> Make a physical change to each substance and observe.</p> <p><input type="checkbox"/> 4. In your data table, record the physical change.</p> <p><input type="checkbox"/> Give a brief explanation of how the substance can be changed back.</p> |
|--|---|

Lab: Version A CONTINUED**Data Table**

Substance	Element in Substance	Physical Change to Substance	How to Change Substance Back

Analyze and Conclude

1. **Explain** why you chose certain substances for your investigation.

2. **Explain** why you chose the physical changes you made.

3. **Evaluate** how difficult it was to recover the original substance following some physical changes.

4. **Apply** Are there some physical changes that would be very difficult to reverse? Explain.

5. **Infer** You may have seen tanks marked “Liquid Nitrogen.” Has the gas form of nitrogen undergone a physical change? Does the nitrogen in the tank have the same properties as the nitrogen in the air you breathe?

Lab: Version A CONTINUED

6. Draw Conclusions Matter can go through changes that make it look different and feel different, but it is still the same matter. Why is this so? Give some examples.

Error Analysis

Did you make any changes in which the original substance could not be observed or returned to its original state? For example, did you cook an egg or bake a cupcake? Check to be certain all the changes you made were physical. How can you be sure?

Communicate

Write a Paragraph Explain how you can determine that a change in matter is a physical change. Use your observations in this experiment to provide examples.

Lab

Investigating Physical Changes

CHAPTER 7
LESSON B

Problem Matter makes up all the substances you find in your world. Matter can go through changes in size, shape or color, or even changes of state, but it still is the same matter. Matter accomplishes tasks, such as moving heat or electricity or cooling your drinks, but it still is the same matter. It is made up of the same matter. It is made up of the same atoms and has the same properties.

The changes in matter mentioned above are physical changes. How can you show that physical changes do not actually change matter?

Form a Hypothesis Think about the elements you organized into a periodic table in the Launch Lab. If you change these elements in some way, or use them, can you show that they are still the same matter? Write a hypothesis for an experiment that explains why the composition of matter remains the same even though it undergoes a physical change.

Materials

substances that are made up of some of the elements used in the Launch Lab or other elements or compounds:

carbon
iron filings
sand
copper penny

copper wire
salt
ice cube
balloon
a mineral sample
milk

Safety Precautions

Procedure

Directions: Check the boxes below as you complete each step of the procedure.

- | | |
|---|--|
| <input type="checkbox"/> 1. Read and complete a lab safety form. | <input type="checkbox"/> 4. In your data table, record the physical change. Give a brief explanation of how the substance can be changed back. |
| <input type="checkbox"/> 2. Choose five items or substances that can be put through a physical change. | |
| <input type="checkbox"/> 3. Make a table that lists the substances and at least one element in the substance or fill in the table on the next page. Make a physical change to each substance and observe. | |

Lab: Version B CONTINUED**Data Table**

Substance	Element in Substance	Physical Change to Substance	How to Change Substance Back

Analyze and Conclude

1. **Explain** why you chose certain substances for your investigation.

2. **Explain** why you chose the physical changes you made.

3. **Evaluate** how difficult it was to recover the original substance following some physical changes.

4. **Apply** Are there some physical changes that would be very difficult to reverse? Explain.

5. **Infer** You may have seen tanks marked “Liquid Nitrogen.” Has the gas form of nitrogen undergone a physical change? Does the nitrogen in the tank have the same properties as the nitrogen in the air you breathe?

Lab: Version B CONTINUED

6. Draw Conclusions Matter can go through changes that make it look different and feel different, but it is still the same matter. Why is this so? Give some examples.

Error Analysis

Did you make any changes in which the original substance could not be observed or returned to its original state? For example, did you cook an egg or bake a cupcake? Check to be certain all the changes you made were physical. How can you be sure?

Going Further

Challenge

7. Develop a list of questions that could be used to help classify a change as a physical change.

8. A teacher mixes salt into a glass of water. One student says this is a physical change because it can be reversed. Another student disagrees. **Suggest** how the first student could reverse the change and prove his assertion.

9. Tyler wanted to illustrate all the physical changes he could make to paper. He did the following: painted the paper, cut the paper, placed the paper in water, burned the paper, shredded the paper, and folded the paper. His teacher said that not all of these were physical changes. **Classify** each of the changes as physical or not physical.

Extension

Plan the preparation and cooking of a meal at home. Identify all of the physical changes and chemical changes that occur during food preparation.

Communicate

Write a Paragraph Explain how you can determine that a change in matter is a physical change. Use your observations in this experiment to provide examples.

Target Your Reading

The Periodic Table and Physical Properties

CHAPTER 7

Use this to focus on the main ideas as you read the chapter.

- Before you read** the chapter, respond to the statements below on your worksheet or on a numbered sheet of paper.
 - Write an **A** if you **agree** with the statement.
 - Write a **D** if you **disagree** with the statement.
- After you read** the chapter, look back to this page to see if you've changed your mind about any of the statements.
 - If any of your answers changed, explain why.
 - Change any false statements into true statements.
 - Use your revised statements as a study guide.

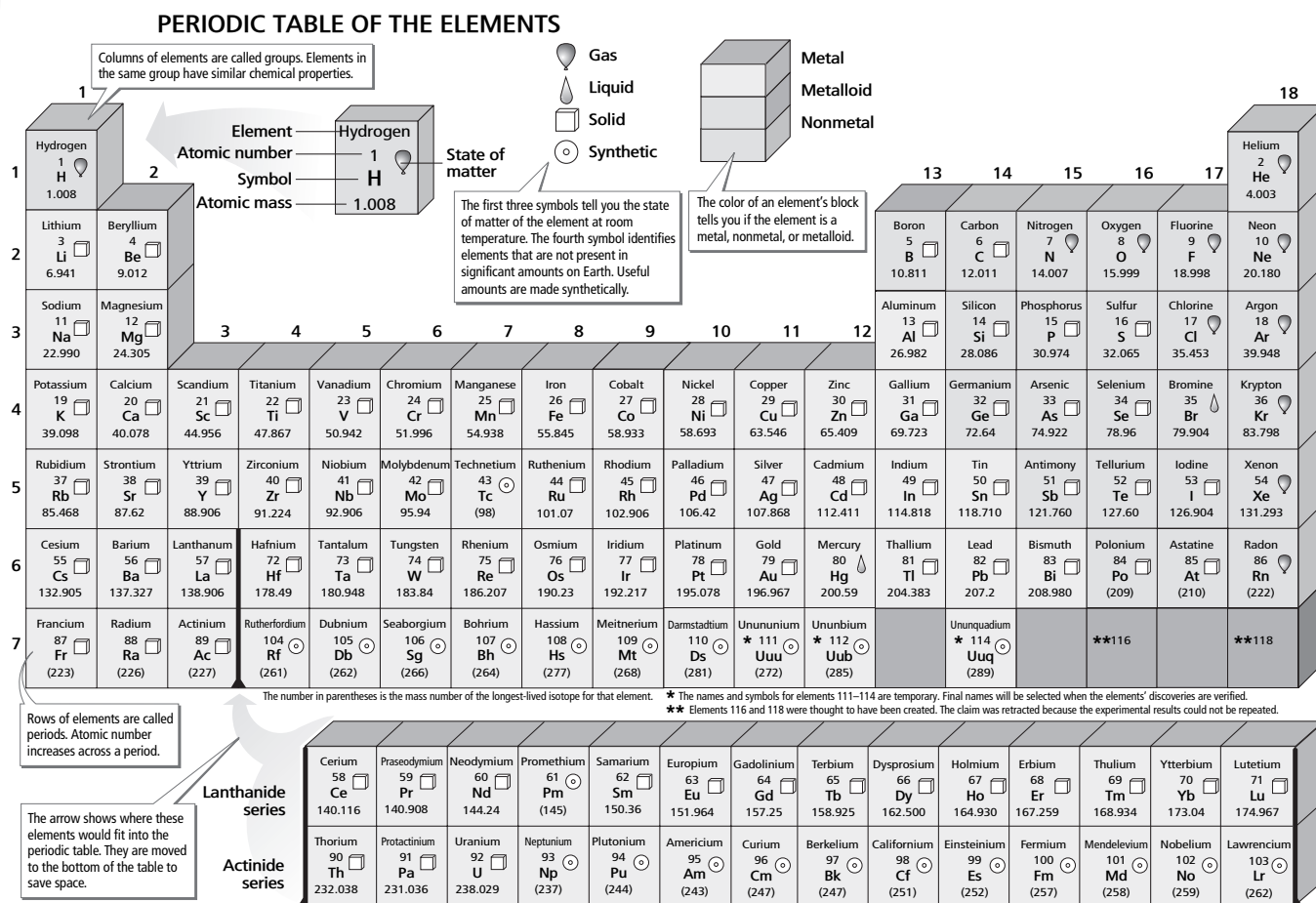
Before You Read A or D	Statement	After You Read A or D
	1. The elements are arranged on the periodic table according to their atomic numbers and mass numbers.	
	2. The elements in a group have similar properties.	
	3. Metals are located on the right side of the periodic table.	
	4. Not all isotopes are radioactive.	
	5. Radioactive elements have unstable nuclei.	
	6. An element's mass number is the number of neutrons in its nucleus.	
	7. <i>Transmutation</i> is another word for <i>half-life</i> .	
	8. Melting and boiling points change with pressure.	
	9. Thermal conductivity occurs because particles collide with one another.	
	10. Density is a physical property that depends on the size of a sample.	

Chapter Content Mastery

Organization of the Periodic Table

CHAPTER 7 LESSON 1

Directions: Use the illustration of the periodic table to complete the tasks below.



- Circle the noble gases family of elements. It contains helium. What is the group number?

- Draw an X through the element with the lowest atomic number. Name the element. What is the atomic number?

- Draw a box around the period that contains radioactive elements. This period includes uranium. What is the special name for elements in this period?

- Underline all of the elements in the oxygen group.
- Draw a line through the symbols of all elements in Period 3. List them on a separate sheet of paper.

Chapter Content Mastery

Isotopes and Radioactivity

CHAPTER 7
LESSON 2

Directions: Write the term that matches each description below in the spaces provided. The letters in the darker boxes will spell the answer to question 9.

1.					

1. the time it takes for a radioactive isotope to decay to half its original mass
2. a radioactive element made by scientists or created during nuclear reactions
3. occurs when an unstable atomic nucleus changes into other nuclei by emitting particles and energy
4. an atom of one element is changed into an atom of another element
5. a term to describe a nucleus that is unstable and undergoes radioactive decay
6. a giant machine that is capable of making particles move very fast
7. an element that has only radioactive isotopes
8. An alpha particle is made up of two neutrons and two _____.
9. Atoms of the same element that have different numbers of neutrons are called _____.

Directions: Calculate the number of protons and neutrons in each isotope listed below.

10. carbon-12: _____ protons, _____ neutrons
11. carbon-14: _____ protons, _____ neutrons
12. uranium-235: _____ protons, _____ neutrons

Chapter Content Mastery

Physical Properties and Changes

CHAPTER 7
LESSON 3

Directions: Match the terms in Column II with the definitions in Column I. Write the letter of the correct term in the blank at the left.

Column I	Column II
_____ 1. a characteristic of a substance	A. mass
_____ 2. a physical property that shows how strongly the particles of a substance are held together	B. melting point
_____ 3. measurement of how much matter an object contains	C. hardness
_____ 4. solid, liquid, gas	D. property
_____ 5. temperature at which a solid becomes a liquid	E. states of matter

Directions: For each of the objects, list as many physical properties as possible.

6. brick

7. banana

8. pencil

9. horseshoe magnet

10. sheet of paper

11. can of soda

12. your science book

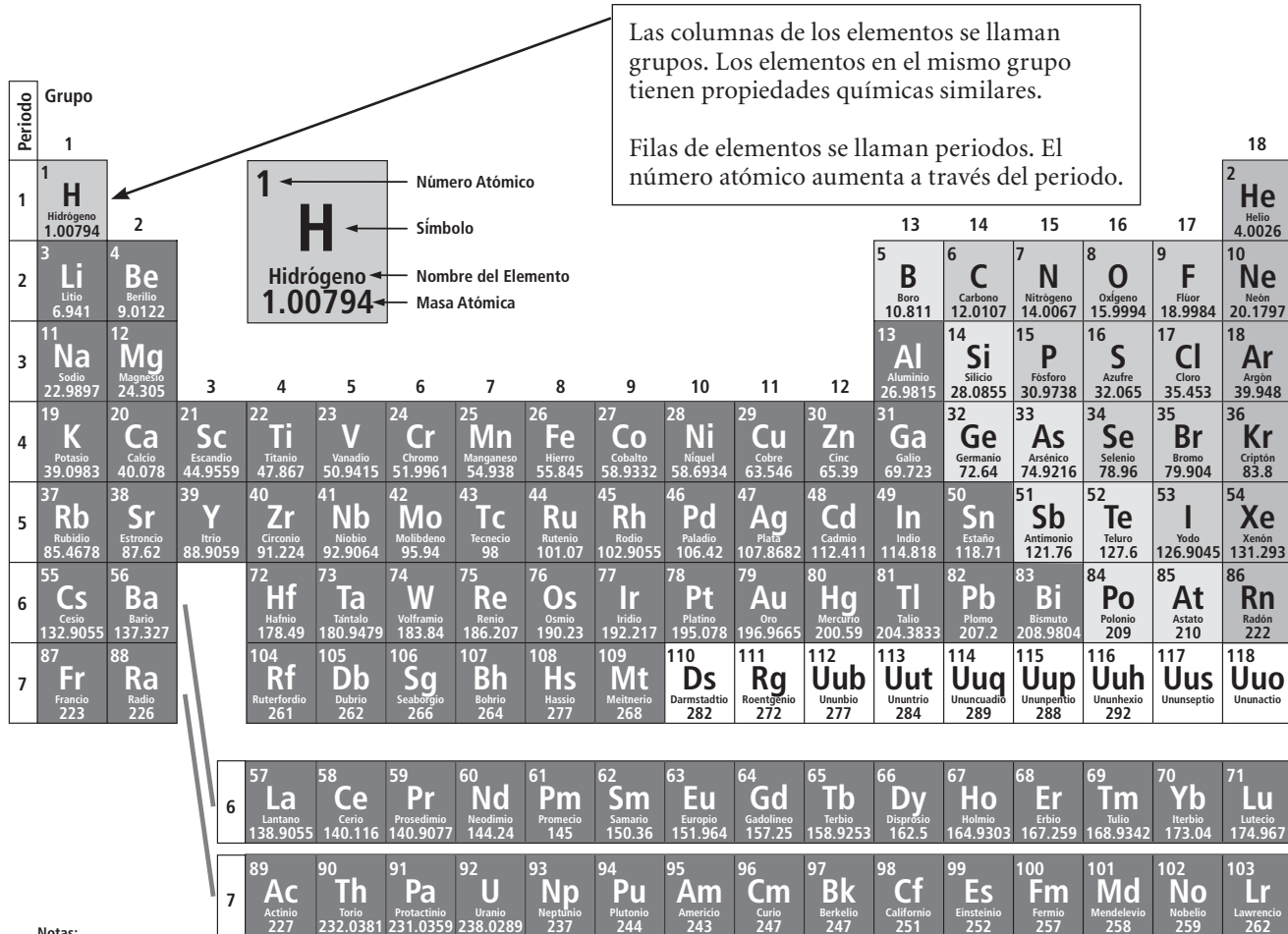
13. your index finger

Dominio del contenido

La organización de la tabla periódica

CAPÍTULO 7 LECCIÓN 1

Instrucciones: Usa la ilustración de la tabla periódica para completar la siguiente tarea.



Notas:

■ Metales ■ Metaloides ■ No Metales ■ Gases nobles

1. Circula la familia de elementos de los gases nobles. Contiene el helio. ¿Cuál es el número del grupo?

2. Traza una X en el elemento con el número atómico más bajo. Nombra el elemento. ¿Cuál es el número atómico?

3. Pon en una casilla el periodo que contiene los elementos radioactivos. Este periodo incluye el uranio. ¿Cuál es el nombre especial para los elementos en este periodo?

4. Subraya todos los elementos en el grupo de oxígeno.
5. Traza una línea en los símbolos de todos los elementos en el periodo 3. Escribe sus nombres.

Dominio del contenido

Los isótopos y la radioactividad

CAPÍTULO 7
LECCIÓN 2

Instrucciones: Escribe el término en los espacios que coincide con cada descripción. Las letras en las cajas más oscuras forman la palabra que contesta la pregunta 9.

1.																			
2.																			
3.																			
4.																			
5.																			
6.																			
7.																			
8.																			

1. el tiempo que se toma para que un isótopo radioactivo se desintegre a la mitad de su masa original
2. los elementos radioactivos que están hechos por los científicos o creados durante las reacciones nucleares
3. ocurre cuando un núcleo atómico inestable se cambia a otros núcleos emitiendo partículas y energía
4. un átomo de un elemento se cambia a un átomo de otro elemento
5. un término para describir un núcleo que es inestable y sufre desintegración radioactiva
6. una maquina muy grande que es capaz de hacer que las partículas se muevan muy rápidamente
7. un elemento que tiene solamente isótopos radioactivos
8. Una partícula alfa está hecha de dos neutrones y dos _____.
9. Los átomos del mismo elemento que tienen diferentes números de neutrones se llaman _____.

Instrucciones: Calcula el número de protones y de neutrones en cada isótopo en la lista de abajo.

10. carbono-12: _____ protones, _____ neutrones
11. carbono-14: _____ protones, _____ neutrones
12. uranio -235: _____ protones, _____ neutrones

Dominio del contenido

Las propiedades físicas y los cambios

**CAPÍTULO 7
LECCIÓN 3**

Instrucciones: *Coincide los términos en la Columna I con las definiciones en la Columna II. Escribe la letra del término correcto al lado izquierdo.*

Columna I	Columna II
_____ 1. una característica de una sustancia	A. masa
_____ 2. una propiedad física que muestra que tan fuertemente las partículas de una sustancia están unidas	B. punto de fusión
_____ 3. una medida de la cantidad de materia que un objeto contiene	C. dureza
_____ 4. sólido, líquido, gas	D. propiedad
_____ 5. la temperatura en la cual un sólido se convierte en un gas	E. estados de materia

Instrucciones: *Para cada uno de los objetos, haz una lista de tantas propiedades físicas como sea posible.*

6. ladrillo

7. plátano

8. lápiz

9. imán de herradura

10. hoja de papel

11. lata de soda

12. tu libro de ciencias

13. tu dedo índice

Reinforcement

Organization of the Periodic Table

CHAPTER 7
LESSON 1

Directions: Label the following element's key using the terms listed below.

atomic mass atomic number element name element symbol

1. _____

2. _____

3. _____

4. _____

Directions: Use the data on the left to complete the two element keys below.

5. element name: aluminum
 element symbol: Al
 atomic number: 13
 atomic mass: 26.982

6. element name: gold
 element symbol: Au
 atomic number: 79
 atomic mass: 196.967

Directions: In the blank at the left, write true if the statement is true. If the statement is false, change the word in italics to make it true.

- _____ 7. Some of the most chemically reactive elements are the metals located in *Groups 3-12*.
- _____ 8. *Nonmetals* are good conductors of heat and electricity.
- _____ 9. The elements in the periodic table are organized by their atomic *number*.
- _____ 10. There are seven *groups*, or rows, in the periodic table.

Reinforcement Isotopes and Radioactivity

Directions: Write the word or phrase that correctly completes each statement in the space provided.

1. _____ occurs when an atom of one element is changed into an atom of another element.
2. The process that occurs when an unstable atomic nucleus changes into another nucleus by emitting one or more particles and energy is called _____.
3. An alpha particle is made up of two _____ and two _____.
4. A(n) _____ is a giant machine that is capable of making particles move fast.
5. A nucleus that is unstable and undergoes radioactive decay is called _____.
6. Atoms of the same _____ that have different numbers of neutrons are called isotopes.
7. _____ are radioactive elements made by scientists or created during nuclear reactions.
8. An element that has only radioactive isotopes is said to be a(n) _____.
9. An isotope's _____ is the time it takes it to decay to half its original mass.
10. An electron that is ejected from a radioactive nucleus is called a(n) _____.

Directions: Given the information below, calculate how long it would take before only 1 g of each isotope remains. Show your calculations, and circle your answer.

11. uranium-235; half-life = 713 million years, starting mass = 4 g
12. carbon-16; half-life = 0.747 s; starting mass = 32 g
13. carbon-14; half-life = 5,730 years, starting mass = 16 g

Reinforcement**Physical Properties and Changes****CHAPTER 7
LESSON 3**

Directions: Explain how the two terms in each question are related.

1. mixing, melting _____
2. color, size _____
3. density, melting point _____
4. rusting, transmutation _____
5. boiling point, melting point _____
6. isotope, number of electrons _____
7. mixture, solution _____
8. thermal conductor, electrical conductor _____

Directions: Circle the term that correctly completes each sentence.

9. (Thermal/Electrical) conductivity is the ability of a material to transfer electric charge through a material.
10. (Hardness/Density) is a physical property that shows how strongly the particles of a substance are held together.
11. The temperature at which a solid changes to a liquid is its (melting/boiling) point.
12. The higher the air pressure around a substance, the (lower/higher) its boiling point.
13. A (chemical/physical) property is any characteristic of a material that can be observed without changing the identity of the material itself.
14. Density is a physical property of a substance that is equal to the (volume/mass) per unit (volume/mass) of the substance.
15. (Nonmetals/Metals) have high thermal and electrical conductivities.

Enrichment

Tiny Matter

The modern periodic table is based on the work of Dmitri Mendeleev, a nineteenth-century Russian chemist and professor. In the 1860s, while writing a chemistry textbook, he came up with a way to organize the elements by their atomic weights. He arranged the elements into groups with similar properties. What you see below is the table he had developed by 1871.

Notice the spots that Mendeleev left blank in the table below (marked with a dash). According to his system, any spot on the table could only be filled by an element with a particular atomic weight and specific properties. None of the elements known at the time had the appropriate properties to fit the blank spots. Therefore, Mendeleev inferred that some elements existed but had not yet been discovered.

I	II	III	IV	V	VI	VII	VIII
H							
Li	Be	B	C	N	O	F	
Na	Mg	Al	Si	P	S	Cl	
K	Ca	–	Ti	V	Cr	Mn	Fe, Co, Ni
Cu	Zn	–	–	As	Se	Br	Ru, Rh, Pd
Ag	Cd	In	Sn	Sb	Te	I	
Cs	Ba						

Directions: Respond to each statement below in the space provided.

1. **Contrast** this table and the modern periodic table.

2. **Describe** your theory about why some elements are missing from the table.

3. Mendeleev predicted that one of the blanks in his table would someday be filled by an element similar to silicon (Si). **Deduce** which spot this was and explain your reasoning.

Enrichment

The Actinide Group

CHAPTER 7 LESSON 2

The actinide group is a series of radioactive elements. There are 15 elements in the actinide group, but only three of them are found in any appreciable amount in nature: thorium, protactinium, and uranium. All of the elements that have been artificially produced are referred

to as the transuranium elements. It is easy to remember the transuranium elements as the ones that have an atomic mass greater than or equal to 93. Many of the transuranium elements have been named in honor of important scientists or important scientific institutions.

Directions: *Research each of the transuranium elements listed below. Determine how they are formed, when they were discovered, and, if applicable, their melting points, their boiling points, if and how many isotopes exist, any important uses for them, and for whom or what they were named.*

1. americium

2. curium

3. berkelium

4. einsteinium

Enrichment Properties of Carbon

Carbon is one of the most common elements in the world. It forms the tissue of every living thing, from an elephant to a spinach leaf. It makes up the products we use to fuel our cars and heat our homes. In one form, it is so soft that it easily rubs off on paper. In another form, it is the hardest natural material known. For years, scientists have explored how the same element can make such different substances.

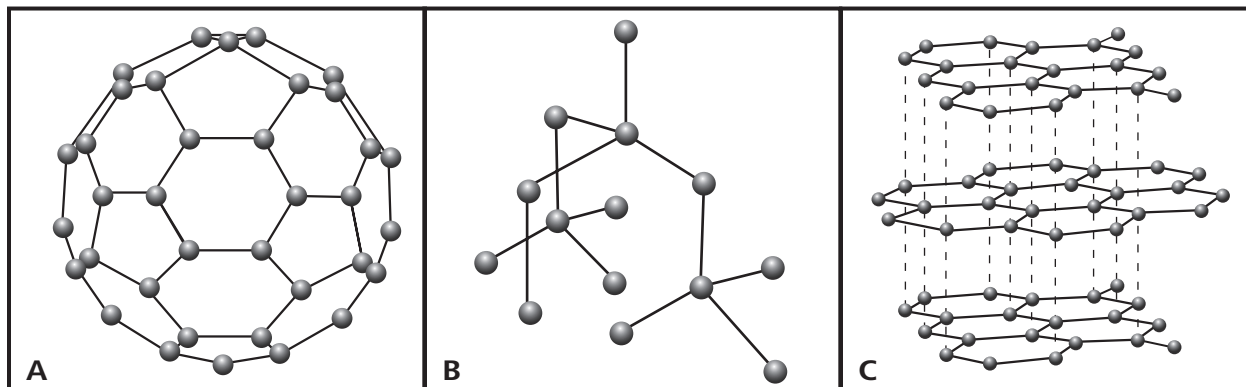
Because the outer shells of most atoms can hold eight electrons, carbon atoms easily form bonds with many other atoms—including other carbon atoms. However, carbon atoms can bond in several different ways. The drawings below show three different forms of carbon. The circles represent atoms and the lines represent chemical bonds holding the atoms together.

Which properties do you think go with each form of carbon?

Carbon Bonding

One answer is that each carbon atom has four electrons in its outer shell (or orbit).

Directions: *On the line to the left of each form's name, write the letter of its sketch. Then on the lines after each form's name, write the letters of the descriptive phrases from the list below that fit each form. Each descriptive phrase will be used only once.*



1. _____ Diamond- _____, _____, _____
2. _____ Graphite- _____, _____, _____
3. _____ Fullerene- _____, _____, _____

- a. the hardest natural structure
- b. a recently discovered type of carbon, also known as “buckyballs”
- c. a soft type of carbon that rubs off easily on paper
- d. clear crystal
- e. used in pencil lead
- f. can also form hollow tubes with the same carbon structure
- g. scientists use it as a “cage” to hold other atoms
- h. used to cut glass and steel
- i. added to lubricants

Content Vocabulary

The Periodic Table and Physical Properties

CHAPTER 7

Directions: Print T or F on the line in front of each definition. If the definition is false, write the word that correctly matches the definition on the blank line after the statement.

- | | | | |
|-----------------|--------------------|----------------------|-------------------------|
| boiling point | conductivity | density | electrical conductivity |
| group | half-life | halogens | melting point |
| metallic | mixing | particle accelerator | period |
| physical change | synthetic elements | transmutation | |

- _____ 1. A(n) **physical property** is a characteristic of a material that can be observed without changing the identity of the material. _____
- _____ 2. A vertical column of elements on the periodic table is called a **series**.

- _____ 3. **Radioactive elements** have only radioactive isotopes. _____
- _____ 4. **Thermal conductivity** is the ability of a material to transfer heat by collisions between its particles. _____
- _____ 5. The time it takes for a sample of a radioactive isotope to decay to half of its original mass is known as its **frequency**. _____
- _____ 6. The temperature at which a liquid changes state to become a gas is the substance's **melting point**. _____
- _____ 7. **Transformation** is a process in which an atom of one element is changed into an atom of another element. _____
- _____ 8. The ability of a material to transfer electricity or thermal energy is **conductivity**.

- _____ 9. **Radioactive decay** occurs when an unstable atomic nucleus changes into another nucleus by emitting one or more particles and energy. _____

Content **Vocabulary** CONTINUED

_____ 10. A(n) **chemical change** is any change in size, shape, or state of matter in which the substance's identity is unchanged. _____

_____ 11. The very stable elements in Group 18 of the periodic table are called **noble gases**.

_____ 12. Common metals have the property of being **ductile**. _____

_____ 13. A machine capable of making particles move very fast is a **cathode ray gun**.

_____ 14. **Thermal conductivity** is the ability of a material to transfer electric charge through a material. _____

_____ 15. The temperature at which a solid changes state to become a liquid is its **freezing point**. _____

_____ 16. **Luster** is shine displayed by most metals. _____

_____ 17. A horizontal row of elements in the periodic table is called a **group**.

Chapter Review

The Periodic Table and Physical Properties

CHAPTER 7

Part A. Vocabulary Review

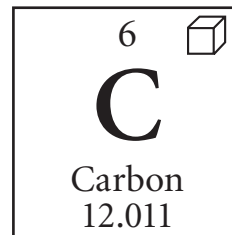
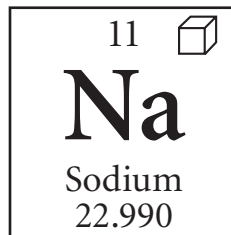
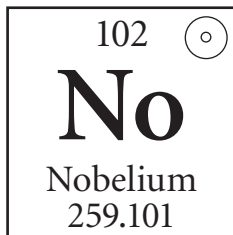
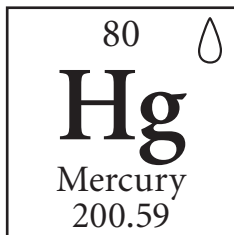
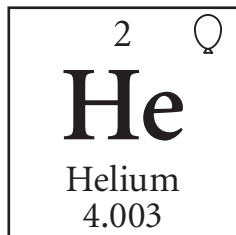
Directions: *In the space provided, write the letter of the item in Column II that matches the description in Column I.*

Column I	Column II
_____ 1. any change in size, shape, or state of matter in which the substance's identity is unchanged	A. boiling point
_____ 2. occurs when an unstable atomic nucleus changes into another nucleus by emitting one or more particles and energy	B. conductivity
_____ 3. the temperature at which a liquid changes state to become a gas	C. group
_____ 4. a word which describes the collective properties of common metals	D. half-life
_____ 5. the ability of a material to transfer electricity or thermal energy	E. luster
_____ 6. the shine displayed by most metals	F. melting point
_____ 7. radioactive elements made by scientists or created during nuclear reactions	G. metallic
_____ 8. very stable elements that are in Group 18 of the periodic table	H. noble gases
_____ 9. the temperature at which a solid changes state to become a liquid	I. period
_____ 10. the ability of a material to transfer heat by collisions between its particles	J. physical change
_____ 11. the time it takes for a sample of a radioactive isotope to decay to half of its original mass	K. radioactive decay
_____ 12. a horizontal row of elements in the periodic table	L. synthetic element
_____ 13. a process in which an atom of one element is changed into an atom of another element	M. thermal conductivity
_____ 14. a vertical column of elements on the periodic table	N. transmutation

Chapter Review CONTINUED

Part B. Concept Review

Directions: Choose the element that fits each of the descriptions written below. In the blank to the left of the description, write the name of the element.



- _____ 1. liquid at room temperature
- _____ 2. atomic nucleus has the fewest protons
- _____ 3. does not occur naturally on Earth
- _____ 4. has an average atomic mass of about 12
- _____ 5. atomic nucleus contains 11 protons

Directions: Circle the term in parentheses that correctly completes each sentence.

6. The symbol for the element mercury is (Mg/Hg/Ga).
7. The element (neon/sodium/bromine) is a gas at room temperature.
8. Most of the (actinides/alkali metals/halogens) are synthetic elements.
9. (Sulfur/Magnesium/Copper) is a good conductor of electricity and heat.
10. (Aluminum/Iron/Copper) has magnetic properties.
11. Silicon is an example of a(n) (semiconductor/transition element/alloy).
12. (Alpha/Beta/Gamma) particles consist of two protons and two neutrons.
13. Most nonmetals are (good conductors/brittle/gases).
14. Elements that can be pounded into thin sheets are (metalloids/ductile/malleable).
15. The (boiling point/melting point/freezing point) is the temperature at which a substance changes from a solid to a liquid.
16. All of the (transition elements/lanthanides/actinides) are radioactive elements.

Chapter Outline

The Periodic Table and Physical Properties

CHAPTER 7

Lesson 1: Organization of the Periodic Table

A. How are the elements arranged?

1. Each element is arranged in the periodic table according to its _____.
2. There are seven horizontal rows of elements, called _____.
3. There are 18 vertical columns of elements on the periodic table, called _____.
4. Each member of a group in the periodic table tends to have _____ and _____ properties similar to those of the other members of the group.

B. What are the regions of the periodic table?

1. There are _____ regions on the periodic table within which elements are clustered that share some chemical and physical properties.
2. The elements that are _____ are on the left side and in the middle of the periodic table.
 - a. _____ properties are the collective properties of common metals. If an element has these properties, it is classified as a metal.
 - b. The shine of a metal such as gold, silver, or stainless steel is called _____.
 - c. Metals can be shaped into sheets or pulled into wires, meaning that metals are both _____ and _____.
 - d. The ability of a material to transfer electricity or thermal energy (heat) is called _____. Metals are good conductors of both heat and electricity.
 - e. The most reactive metals, found in Groups _____ and _____ of the periodic table, combine with other materials easily and are never found in nature by themselves.
3. Nonmetals are found on the _____ of the periodic table and have properties that are the opposite of metals.

Chapter **Outline** CONTINUED

- a. Nonmetals do not have luster, cannot be easily shaped, and are _____ conductors of heat or electricity.
 - b. _____, a nonmetal, is important in the compounds that make up the living world.
 - c. Most of the _____ found in living things are nonmetals.
 - d. The most reactive nonmetals, called _____, are found in Group 17 on the periodic table and do not exist in nature by themselves.
 - e. Halogens react with _____ from Groups 1 and 2 to form ionic salts, which are brittle, crystalline substances with high melting points.
4. The _____, or metalloids, are located between the metals and nonmetals on the periodic table in a stair-like pattern starting with boron and moving down and to the right.
- a. Semimetals have properties of both _____ and _____.
 - b. A(n) _____ is an element, like silicon, that does not conduct electricity as well as a(n) _____ but does conduct electricity better than a(n) _____.
5. Elements in Group 18 on the periodic table are known as the _____. They are extremely stable and exist in nature only as single atoms.

C. Are there other periodic tables?

1. Depending on the information they need to get from a periodic table, different scientists use _____ periodic tables.

Lesson 2: Isotopes and Radioactivity

A. Isotopes—Different Numbers of Neutrons

1. A(n) _____ is one of two or more atoms of an element with the same number of protons, but a different number of neutrons, in their nuclei.
2. The number of neutrons in an isotope is equal to the mass number of the isotope (total number of neutrons and protons) minus the _____ (number of protons).

Chapter **Outline** CONTINUED

3. Because they have the same number of _____ in their outer energy levels, different isotopes form compounds with nearly identical chemical properties.

B. What is radioactive decay?

1. Many atomic nuclei are stable when they have the same number of _____ and _____ and are unstable when they have more neutrons than protons.
2. _____, or radioactivity, occurs when an unstable atomic nucleus changes into another nucleus by emitting one or more particles and energy.
3. A nucleus that is unstable and undergoes radioactive decay is called _____.
4. An alpha particle has _____ protons and _____ neutrons. When a radioactive isotope releases an alpha particle, its _____ changes and it becomes a different element.
5. An electron released from the nucleus of an atom is called a(n) _____ particle.
6. _____ occurs when an atom of one element is changed into an atom of another element.
7. Elements with no stable isotopes are called _____.
8. Nuclei with large numbers of protons and neutrons tend to be _____.
9. The _____ of a radioactive isotope is the time it takes for a sample of that isotope to decay to half of its original mass.

C. How are elements discovered and named?

1. _____ are radioactive elements that are made by scientists in laboratories or created during nuclear reactions.
2. Synthetic elements are created in laboratories by artificial _____.
3. Artificial transmutation is done by causing _____ to collide with each other at high speeds; particles are given high speeds using a tool called a _____.

Chapter **Outline** CONTINUED

4. The name of a new _____ is selected by the team of scientists that discovers it, but only after their work has been reviewed and the name has been approved by a panel of experts.

Lesson 3: Physical Properties and Changes

A. What is a physical property?

1. A(n) _____ is any characteristic of a material that can be observed without changing the identity of the material itself.
2. Some physical properties, such as _____ and _____, depend on the amount of matter; other physical properties do not depend on the amount of matter.
3. The temperature at which a solid changes to a liquid is its _____. This physical property does not depend on the amount of matter.
4. The temperature at which a liquid changes to a gas is its _____. This physical property does not depend on the amount of matter.
5. Different substances have different _____ and _____ points.
 - a. Substances whose molecules have stronger attractions to each other tend to have _____ melting and boiling points.
 - b. The _____ the air pressure around a substance, the higher its melting and boiling points.
6. Density is a physical property of a substance that _____ depend on the amount of matter.
 - a. Density is the _____ -per-unit volume of a substance.
 - b. A substance's density is _____ when its particles are packed more tightly together.
7. _____ is a physical property that shows how strongly the particles of a substance are held together.
8. _____ is the ability of a material to transfer heat by collisions.
9. _____ is the ability of a material to transfer electric charge.

Chapter **Outline** CONTINUED

B. What is a physical change?

1. A(n) _____ is any change in size, shape, or state of matter in which the identity of the substance is unchanged.
2. _____ is a physical change in which one substance is mixed into another substance to form a solution.
3. _____ is a physical change that takes place when two substances are combined and neither substance dissolves.
4. Changes in the state of matter of a substance are physical changes and are _____.