

Periodic Table: Reactions and Relationships

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ANSWER KEYS



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Congratulations!

You have chosen a learning program that will actively motivate your students AND provide you with easily accessible and easily manageable instructional guidelines designed to make your teaching role efficient and rewarding.

The AIMS Teaching Module provides you with a video program keyed to your classroom curriculum, instructions and guidelines for use, plus a comprehensive teaching program containing a wide range of activities and ideas for interaction between all content areas. Our authors, educators, and consultants have written and reviewed the AIMS Teaching Modules to align with the Educate America Act: Goals 2000.

This ATM, with its clear definition of manageability, both in the classroom and beyond, allows you to tailor specific activities to meet all of your classroom needs.

RATIONALE

In today's classrooms, educational pedagogy is often founded on Benjamin S. Bloom's "Six Levels of Cognitive Complexity." The practical application of Bloom's Taxonomy is to evaluate students' thinking skills on these levels, from the simple to the complex: Knowledge (rote memory skills), Comprehension (the ability to relate or retell), Application (the ability to apply knowledge outside its origin), Analysis (relating and differentiating parts of a whole), Synthesis (relating parts to a whole), and Evaluation (making a judgment or formulating an opinion).

The AIMS Teaching Module is designed to facilitate these intellectual capabilities, AND to integrate classroom experiences and assimilation of learning with the students' life experiences, realities, and expectations. AIMS' learner verification studies prove that our AIMS Teaching Modules help students to absorb, retain, and to demonstrate ability to use new knowledge in their world. Our educational materials are written and designed for today's classroom, which incorporates a wide range of intellectual, cultural, physical, and emotional diversities.

ORGANIZATION AND MANAGEMENT

To facilitate ease in classroom manageability, the AIMS Teaching Module is organized in four sections. You are reading Section 1, Introduction to the Aims Teaching Module (ATM).

SECTION 2,

INTRODUCING THIS ATM

will give you the specific information you need to integrate the program into your classroom curriculum.

SECTION 3,

PREPARATION FOR VIEWING

provides suggestions and strategies for motivation, language preparedness, readiness, and focus prior to viewing the program with your students.

SECTION 4,

AFTER VIEWING THE PROGRAM

provides suggestions for additional activities plus an assortment of consumable assessment and extended activities, designed to broaden comprehension of the topic and to make connections to other curriculum content areas.

FEATURES

INTRODUCING EACH ATM

SECTION 2

Your AIMS Teaching Module is designed to accompany a video program written and produced by some of the world's most credible and creative writers and producers of educational programming. To facilitate diversity and flexibility in your classroom, your AIMS Teaching Module features these components:

Themes

The Major Theme tells how this AIMS Teaching Module is keyed into the curriculum. Related Themes offer suggestions for interaction with other curriculum content areas, enabling teachers to use the teaching module to incorporate the topic into a variety of learning areas.

Overview

The Overview provides a synopsis of content covered in the video program. Its purpose is to give you a summary of the subject matter and to enhance your introductory preparation.

Objectives

The ATM learning objectives provide guidelines for teachers to assess what learners can be expected to gain from each program. After completion of the AIMS Teaching Module, your students will be able to demonstrate dynamic and applied comprehension of the topic.

PREPARATION FOR VIEWING

SECTION 3

In preparation for viewing the video program, the AIMS Teaching Module offers activity and/or discussion ideas that you may use in any order or combination.

Introduction To The Program

Introduction to the Program is designed to enable students to recall or relate prior knowledge about the topic and to prepare them for what they are about to learn.

Introduction To Vocabulary

Introduction to Vocabulary is a review of language used in the program: words, phrases, usage. This vocabulary introduction is designed to ensure that all learners, including limited English proficiency learners, will have full understanding of the language usage in the content of the program.

Discussion Ideas

Discussion Ideas are designed to help you assess students' prior knowledge about the topic and to give students a preview of what they will learn. Active discussion stimulates interest in a subject and can motivate even the most reluctant learner. Listening, as well as speaking, is active participation. Encourage your students to participate at the rate they feel comfortable. Model sharing personal experiences when applicable, and model listening to students' ideas and opinions.

Focus

Help learners set a purpose for watching the program with Focus, designed to give students a focal point for comprehension continuity.

Jump Right In

Jump Right In provides abbreviated instructions for quick management of the program.

AFTER VIEWING THE PROGRAM

SECTION 4

After your students have viewed the program, you may introduce any or all of these activities to interact with other curriculum content areas, provide reinforcement, assess comprehension skills, or provide hands-on and in-depth extended study of the topic.

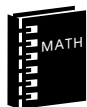
SUGGESTED ACTIVITIES

The Suggested Activities offer ideas for activities you can direct in the classroom or have your students complete independently, in pairs, or in small work groups after they have viewed the program. To accommodate your range of classroom needs, the activities are organized into skills categories. Their labels will tell you how to identify each activity and help you correlate it into your classroom curriculum. To help you schedule your classroom lesson time, the AIMS hourglass gives you an estimate of the time each activity should require. Some of the activities fall into these categories:



Meeting Individual Needs

These activities are designed to aid in classroom continuity. Reluctant learners and learners acquiring English will benefit from these activities geared to enhance comprehension of language in order to fully grasp content meaning.



Curriculum Connections

Many of the suggested activities are intended to integrate the content of the ATM program into other content areas of the classroom curriculum. These cross-connections turn the classroom teaching experience into a whole learning experience.



Critical Thinking

Critical Thinking activities are designed to stimulate learners' own opinions and ideas. These activities require students to use the thinking process to discern fact from opinion, consider their own problems and formulate possible solutions, draw conclusions, discuss cause and effect, or combine what they already know with what they have learned to make inferences.



Cultural Diversity

Each AIMS Teaching Module has an activity called Cultural Awareness, Cultural Diversity, or Cultural Exchange that encourages students to share their backgrounds, cultures, heritage, or knowledge of other countries, customs, and language.



Hands On

These are experimental or tactile activities that relate directly to the material taught in the program. Your students will have opportunities to make discoveries and formulate ideas on their own, based on what they learn in this unit.



Writing

Every AIMS Teaching Module will contain an activity designed for students to use the writing process to express their ideas about what they have learned. The writing activity may also help them to make the connection between what they are learning in this unit and how it applies to other content areas.



In The Newsroom

Each AIMS Teaching Module contains a newsroom activity designed to help students make the relationship between what they learn in the classroom and how it applies in their world. The purpose of In The Newsroom is to actively involve each class member in a whole learning experience. Each student will have an opportunity to perform all of the tasks involved in production: writing, researching, producing, directing, and interviewing as they create their own classroom news program.



Extended Activities

These activities provide opportunities for students to work separately or together to conduct further research, explore answers to their own questions, or apply what they have learned to other media or content areas.



Link to the World

These activities offer ideas for connecting learners' classroom activities to their community and the rest of the world.



Culminating Activity

To wrap up the unit, AIMS Teaching Modules offer suggestions for ways to reinforce what students have learned and how they can use their new knowledge to enhance their world view.

VOCABULARY

Every ATM contains an activity that reinforces the meaning and usage of the vocabulary words introduced in the program content. Students will either read or find the definition of each vocabulary word, then use the word in a written sentence.

CHECKING COMPREHENSION

Checking Comprehension is designed to help you evaluate how well your students understand, retain, and recall the information presented in the AIMS Teaching Module. Depending on your students' needs, you may direct this activity to the whole group yourself, or you may want to have students work on the activity page independently, in pairs, or in small groups. Students can verify their written answers through discussion or by viewing the video a second time. If you choose, you can reproduce the answers from your Answer Key or write the answer choices in a Word Bank for students to use. Students can use this completed activity as a study guide to prepare for the test.

CONSUMABLE ACTIVITIES

The AIMS Teaching Module provides a selection of consumable activities, designed to specifically reinforce the content of this learning unit. Whenever applicable, they are arranged in order from low to high difficulty level, to allow a seamless facilitation of the learning process. You may choose to have students take these activities home or to work on them in the classroom independently, in pairs or in small groups.

CHECKING VOCABULARY

The Checking Vocabulary activity provides the opportunity for students to assess their knowledge of new vocabulary with this word game or puzzle. The format of this vocabulary activity allows students to use the related words and phrases in a different context.

TEST

The AIMS Teaching Module Test permits you to assess students' understanding of what they have learned. The test is formatted in one of several standard test formats to give your students a range of experiences in test-taking techniques. Be sure to read, or remind students to read, the directions carefully and to read each answer choice before making a selection. Use the Answer Key to check their answers.

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

After you have completed this AIMS Teaching Module you may be interested in more of the programs that AIMS offers. This list includes several related AIMS programs.

ADDITIONAL READING SUGGESTIONS

AIMS offers a carefully researched list of other resources that you and your students may find rewarding.

ANSWER KEY

Reproduces tests and work pages with answers marked.

Periodic Table: Reactions and Relationships

THEMES

Periodic Table: Reactions and Relationships explores the various groups of elements and their common properties. The program discusses electron configuration and octets as they relate to relative reactivity. In addition, students will discover the basic aspects of metals, metaloids, non-metals, gases and alkaline metals. Important groups of the periodic table will also be examined, including the oxygen and nitrogen groups.

OVERVIEW

Atoms are the building blocks of the universe. Scientists have identified 90 different types of atoms, each of which produces a different type of element. Scientists in atomic laboratories have produced 19 other types of atoms. In order to more effectively study the properties of these elements, scientists developed a classification system known as the periodic table. A chart is divided into 109 squares, with each square representing one of the elements. Squares are divided into 4 groups, each represented by a different color. The members of each group share common properties, such as their ability to react with other substances.

OBJECTIVES

- ▶ To learn more about the characteristics of the basic groups found on the periodic table.
- ▶ To discuss the various aspects of metals, metaloids, non-metals, gases and alkaline metals.
- ▶ To examine the importance of electron configuration and octets.
- ▶ To explore important groups found on the periodic table, including the oxygen and nitrogen groups.

Use this page for your individual notes about planning and/or effective ways to manage this
AIMS Teaching Module in your classroom.

Our AIMS Multimedia Educational Department welcomes your observations and comments.
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INTRODUCTION TO THE PROGRAM

The study of various elements has led to many of humankind's greatest discoveries. By understanding different substances and how those substances act and change, scientists have developed energy sources, life-saving drugs and fuels for space travel. The periodic table helps scientists to better understand the similarities and differences between various elements. This makes research easier and more effective.

INTRODUCTION TO VOCABULARY

Write the word "element" on the board. What does this word mean to students? How many elements can students name? (An element is the simplest form of a substance. It cannot be separated or broken down into a simpler form. Examples of elements include carbon, nitrogen, aluminum, sodium and calcium.)

FOCUS

Tell students to think about the world around them. What elements comprise this world? What is the importance of studying the nature of these elements? What benefits can we gain from better understanding the building blocks of the universe? Ask the class to keep these questions in mind as they begin the program.

DISCUSSION IDEAS

Ask students to take a look at a periodic table. What do the symbols for most elements come from? Why do some elements, such as iron, have unusual symbols? Can students spot the element named for a famous physicist? How about the element named for a California city? (Most symbols come from the first letter of an element's name. If the first letter of an element's name has already been used, a second letter is added to the symbol. Sometimes, an element gets a symbol unrelated to its common name. The symbol for iron, Pb, comes from the word *plumbum*, which is Latin for iron. Einsteinium was named after the physicist Albert Einstein. Berkelium was named after the city Berkeley, California.)

JUMP RIGHT IN

HOW TO USE THE PERIODIC TABLE: REACTIONS AND RELATIONSHIPS AIMS TEACHING MODULE

Preparation

- ▶ Read *Periodic Table: Reactions and Relationships Themes, Overview, and Objectives* to become familiar with program content and expectations.
- ▶ Use **Preparation for Viewing** suggestions to introduce the topic to students.

Viewing PERIODIC TABLE: REACTIONS AND RELATIONSHIPS

- ▶ Set up viewing monitor so that all students have a clear view.
- ▶ Depending on your classroom size and learning range, you may choose to have students view *Periodic Table: Reactions and Relationships* together or in small groups.
- ▶ Some students may benefit from viewing the video more than one time.

After Viewing PERIODIC TABLE: REACTIONS AND RELATIONSHIPS

- ▶ Select **Suggested Activities** that integrate into your classroom curriculum. If applicable, gather materials or resources.
- ▶ Choose the best way for students to work on each activity. Some activities work best for the whole group. Other activities are designed for students to work independently, in pairs, or in small groups. Whenever possible, encourage students to share their work with the rest of the group.
- ▶ Duplicate the appropriate number of **Vocabulary, Checking Comprehension**, and consumable activity pages for your students.
- ▶ You may choose to have students take consumable activities home, or complete them in the classroom, independently, or in groups.
- ▶ Administer the Test to assess students' comprehension of what they have learned, and to provide them with practice in test-taking procedures.
- ▶ Use the **Culminating Activity** as a forum for students to display, summarize, extend, or share what they have learned with each other, the rest of the school, or a local community organization.

SUGGESTED ACTIVITIES

Writing

Ask students to choose one of the elements listed below. Have them write everything they can about their chosen element using information found on the periodic table. Ask them to present the information in paragraph form. What is the atomic weight and atomic number of the element? To which group does the element belong? What are the properties of the element's group? In what substances might the element be found? What else does the periodic table tell us about the element?

carbon	copper
sodium	tin
calcium	tungsten
neon	plutonium



30 Minutes

Meeting Individual Needs

Ask students to make sentences using the following terms. Encourage them to use a dictionary if they are uncertain of the meanings. Make sure that their sentences display an understanding of the words as they relate to the program.



20 Minutes

- element - the simplest form of a substance
- proton - particle found in the nucleus of an atom; determines an element's atomic number
- periodic table - chart used to organize the elements based on their properties
- molecule - smallest piece of a substance that can exist without losing its original properties

Link to the World

Ask students to find elements on the periodic table that are needed by the human body. In what kinds of foods might we find these elements? (The body needs trace amounts of magnesium, potassium, sodium, calcium, iron, zinc and iodine. These elements can be found in fruits and vegetables, eggs, nuts, fish and milk. In addition, table salt is usually supplemented with iodine.)



20 Minutes

Next, ask each student to list at least three elements on the periodic table, along with a common function for each element. (Helium is used to give balloons their loft. Copper is used to make coins. Aluminum is used to make soda cans. Iodine is used as a disinfectant. Platinum, gold and silver are used to make jewelry, coins, utensils and other valuables. Neon is used to illuminate signs. Tungsten is used in light bulb filaments. Liquid hydrogen and plutonium are used as energy sources for space travel.)

Critical Thinking

Not all periodic tables include atomic weights as whole numbers. Some list atomic weights as mixed numerals, usually in decimal form. Find a periodic table that lists atomic weights in this way. Ask students to suggest some theories to explain the use of mixed numerals. Remind them that atomic weights are determined by using samples of the elements as they exist in nature.

(For many elements, a pure sample will contain some isotopes. Isotopes have a different number of neutrons than other atoms of the same element, and therefore, they weight a bit more. When all of the atoms in a given sample of an element are averaged, the isotopes make the average slightly higher. This is the reason for the decimal numbers present in highly accurate atomic weights.)



15 Minutes

Hands On

Scientists often use chromatography to separate and identify compounds. Since different compounds have different molecular weights, they usually move across a surface at different rates. As the compounds separate, they can often be seen as two different colors. The word chromatography actually means, “to write with color.”

This simple experiment will help students understand how chromatography works. Students will need a water-soluble black felt-tip pen, tape, a jar of water and a coffee filter. Have them cut the coffee filter into a strip, 6 inches long and 2 inches wide. Ask them to place a dark blob of ink near the bottom of the strip. The thicker the blob of ink, the better. Next, have them tape the strip to the side of the water jar. The end of the strip should be in the water, but the blob of ink should be just above the water line. After two hours, what happens to the ink on the paper? What could be the reason?

(The ink samples will usually separate into two or more distinct colors. This is because black ink is usually a mixture of basic dye colors. Each dye color will move across the paper at a different rate. This is the same principle used to identify compounds in chromatography experiments.)



60 Minutes

Connection to Art

Ask students to create a 3-D sculpture using as many elements from the periodic table as they can find. Coins, aluminum foil, copper wire and iron nails are a few examples of items that can be used in the sculptures. Encourage students to be as creative as possible.

Display the finished sculptures beneath a banner labeled, “Elemental Art.”



60 Minutes

Connection to History

Dmitri Mendeleyev was a Russian chemist who organized the study of chemistry by devising the periodic table. He made a set of cards, one for each element, with each card listing the element's chemical properties. When Mendeleyev put the cards in order of atomic weights, a pattern emerged. What was this pattern? What name did Mendeleyev give to this pattern? (When Mendeleyev put the cards in order, similar properties were repeated periodically. He named this phenomenon the Periodic Law.)



20 Minutes

The pattern mentioned above allowed Mendeleyev to arrange his periodic table in such a way that it is still used today. What did he do to insure that the table would continue to be useful? (In places where the Periodic Law did not seem to fit, Mendeleyev left gaps in the periodic table. He correctly predicted that these gaps would be filled as new elements were discovered.)

In the Newsroom

Ask students to look through current newspapers and news magazines to find articles that mention one of the elements of the periodic table. Remind them to be on the lookout for stories dealing with environmental issues, industry, health care and geology. Have each student present an article to the class. Make sure students discuss the element or elements mentioned in the article, as well as any references to the properties of the element.



60 Minutes

Collect the articles in a scrapbook and allow the class to see the final results of this collaborative "Element Newspaper."

Extended Activity

Scientists used a number of experiments to discover the first basic elements. Students can perform a similar test to distinguish between substances that look alike, such as salt and sugar. To test the freezing points of the substances, ask students to perform the following simple experiment at home. Dissolve a teaspoon of salt in a small plastic container of water labeled salt, and a teaspoon of sugar in a small plastic container of water labeled sugar. Place both containers in the freezer. After two hours, check the containers to see which solution has frozen. What do the results say about the relative freezing points of the two solutions?



30 Minutes

(The sugar solution will freeze after two hours. The salt solution will not. Saltwater has a lower freezing point than sugar water.)

Culminating Activity

Using what they have learned in the unit, ask each student to write a question related to the program. Collect the questions and use them to write a review quiz. After giving the quiz, ask students if they enjoyed designing the test. How would they feel about designing more tests in the future?



60 Minutes

VOCABULARY

The following terms are from *Periodic Table: Reactions and Relationships*. Fill in the number of each term next to its closest definition.

- | | |
|------------------|-------------|
| 1. alloy | 7. families |
| 2. atom | 8. halogens |
| 3. atomic mass | 9. isotope |
| 4. atomic number | 10. neutron |
| 5. electron | 11. periods |
| 6. element | 12. proton |

- ___ positively charged particle found in the nucleus of an atom
- ___ stable, orbiting particle of an atom with a negative charge
- ___ substance that is a mixture of two or more metals
- ___ columns of the periodic table; also known as groups
- ___ number of protons carried by the nucleus of an atom
- ___ element with an imbalance in the number of neutrons and protons
- ___ uncharged particle found in the nucleus of an atom
- ___ physical weight of an atom
- ___ horizontal rows of elements on the periodic table having consecutive atomic numbers
- ___ smallest particle containing all the properties of a particular element
- ___ substance that cannot be separated into different substances except by nuclear disintegration
- ___ five nonmetal chemical elements that are so active they do not occur in an uncombined state in nature

CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

___1___ are the building blocks of the universe. Scientists have identified 90 different types of atoms, each of which produces a different type of ___2___. Scientists in atomic laboratories have produced ___3___ other types of atoms. In order to more effectively study the properties of these elements, scientists developed a classification system known as ___4___. A chart is divided into 109 squares, with each square representing one of the ___5___. Squares are divided into 4 groups, each with a different ___6___. Blue squares indicate elements that are ___7___ in their natural state. Yellow squares indicate elements that are ___8___ in their natural state. Orange squares represent elements that are ___9___ in their natural state. ___10___ squares represent the 19 elements that are man-made.

1. A. Protons
B. Electrons
C. Atoms
D. Isotopes

6. A. number
B. color
C. letter
D. symbol

2. A. metal
B. alkaloid
C. group
D. element

7. A. liquids
B. metals
C. gases
D. solids

3. A. 27
B. 19
C. 6
D. 12

8. A. solids
B. isotopes
C. halogens
D. liquids

4. A. the element families
B. the grouping method
C. the period table
D. the square system

9. A. alkaloids
B. solids
C. gases
D. liquids

5. A. elements
B. metals
C. alkaloids
D. metalloids

10. A. purple
B. green
C. red
D. brown

MATTER MATCH-UP

Match each term on the left with the best group of words on the right.

- | | |
|--------------------------|--|
| 1. alkaline earth metals | elements containing properties of both metals and non-metals |
| 2. coinage metals | stable isotope of hydrogen and an essential part of the hydrogen bomb |
| 3. deuterium | highly inactive gases that are usually found in isolation in nature |
| 4. galvanization | sodium, lithium and potassium are some examples of these |
| 5. iron | process whereby zinc is used to coat steel in an effort to prevent corrosion |
| 6. mercury | elements which start in period 4 and have electron configurations unlike any elements in the first 3 periods |
| 7. metalloids | element that is a liquid in its natural state |
| 8. noble gases | hard, heavy metallic chemical element that has a high melting point and is often used as a light filament |
| 9. transition elements | metals that are resistant to corrosion and are excellent conductors of electricity |
| 10. tungsten | silvery-white metal that all living creatures need in their bodies |

TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. ____ In an electrically neutral atom, the number of electrons and neutrons is equal.
2. ____ Each vertical column of the periodic table is referred to as a period.
3. ____ A highly active element has the ability to form bonds easily with other atoms.
4. ____ Many properties of an element are determined by the configuration of protons in the element's atoms.
5. ____ Elements that are just one or two electrons short of an octet tend to be very reactive.
6. ____ All metals have the ability to conduct heat and electricity.
7. ____ Alkaline metals are never found in nature outside of compounds.
8. ____ Sodium, lithium and potassium are always found in a metallic state in nature.
9. ____ Tungsten has a low melting point and is very lightweight.
10. ____ Members of the halogen group often occur in an uncombined state in nature.

THE PERIODIC TABLE

Use a periodic table to answer the questions below.

1. What is the atomic weight of magnesium?
2. What is the symbol for tin?
3. What is the atomic number of mercury?
4. Which element on the table doesn't belong in a group with any others?
5. How many noble gases are there? What are their names?
6. Where is the Actinide series located on the periodic table?
7. What group does radium belong to?
8. How many electrons are in the outer shells of lithium?
9. What period is sodium located in?
10. Which element's atomic number is the same as its atomic weight?

ELEMENT GROUPS

Each clue below points to one of the following groups. Write the correct group name next to each clue.

Alkaline Earth Metals

Alkaline Metals

Coinage Metals

Halogens

Nitrogen Family

Noble Gases

Oxygen Family

Transition Metals

1. _____ The main element in this group combines with almost all of the other elements and is critical to life on Earth.
2. _____ This group contains the least reactive of all elements.
3. _____ This group contains some of the hardest metals known to man, including tungsten and chromium.
4. _____ Highly resistant to corrosion, the members of this group include copper, silver and gold.
5. _____ Phosphorus is a member of this group, whose main element comprises 80% of the Earth's atmosphere.
6. _____ Sodium and potassium are members of this group, the most reactive of all groups on the periodic table.
7. _____ Members of this group, including chlorine and iodine, do not occur in an uncombined state in nature.
8. _____ Magnesium and calcium are members of this highly reactive group.

WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

alloy
atom
electron
element
family
halogens
isotope
neutron
periods
proton

A	L	T	K	B	D	V	N	D	K	Y	O
H	S	P	A	V	H	Q	E	S	X	N	W
E	L	E	C	T	R	O	N	H	C	E	M
L	S	L	E	Q	O	S	T	A	A	U	Z
E	G	B	R	F	A	M	I	L	Y	T	G
M	T	L	M	C	G	L	D	O	E	R	W
E	P	E	R	I	O	D	S	G	J	O	B
N	O	E	N	R	J	M	A	E	P	N	H
T	A	B	P	R	O	T	O	N	G	D	O
X	C	J	N	B	R	V	K	S	H	R	P
J	T	P	C	J	I	S	O	T	O	P	E
Y	O	L	L	A	N	W	X	K	M	O	Y

TEST

Circle the phrase which best answers each question.

1. The atomic number of an element is determined by its number of:
 - protons.
 - electrons.
 - neutrons.
 - periods.
2. The number below an element's symbol is its:
 - atomic number.
 - atomic mass.
 - neutron count.
 - electron count.
3. Elements with an imbalance of protons and neutrons are:
 - transition elements.
 - alkaline metals.
 - coinage metals.
 - isotopes.
4. The short periods contain some of the most common elements found in:
 - Earth's crust, oceans and atmosphere.
 - living things.
 - the sun's core.
 - comet debris.
5. Alkaline metals are _____ found outside of compounds.
 - always.
 - often.
 - usually.
 - never.

TEST (CONTINUED)

6. Magnesium and calcium are examples of:
- halogens.
 - alkaline earth metals.
 - coinage metals.
 - metalloids.
7. Group 12 elements are:
- the most reactive.
 - highly corrosion resistant.
 - highly unstable.
 - able to be magnetized.
8. Helium is an example of the:
- noble gases.
 - unstable metals.
 - oxygen family.
 - self-oxidizing metals.
9. Chromium, one of the hardest metals known, is a:
- coinage metal.
 - member of the nitrogen group.
 - transition metal.
 - halogen.
10. The lanthanide series of elements is composed of:
- the most stable elements.
 - the best conductors of electricity.
 - the rarest earth elements.
 - highly corrosive elements.

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

You and your students might also enjoy these other AIMS Multimedia programs:

Chemistry Essentials Series

Matter: Form and Substance in the Universe

Compounds: Electromagnetic Attraction in Molecules

Atomic Structure: Mapping an Invisible World

Reactions: The Chemistry of Change

Mixtures: Together But Separate

ANSWER KEY for page 18

VOCABULARY

The following terms are from *Periodic Table: Reactions and Relationships*. Fill in the number of each term next to its closest definition.

- | | |
|------------------|-------------|
| 1. alloy | 7. families |
| 2. atom | 8. halogens |
| 3. atomic mass | 9. isotope |
| 4. atomic number | 10. neutron |
| 5. electron | 11. periods |
| 6. element | 12. proton |

- 12 positively charged particle found in the nucleus of an atom
- 5 stable, orbiting particle of an atom with a negative charge
- 1 substance that is a mixture of two or more metals
- 7 columns of the periodic table; also known as groups
- 4 number of protons carried by the nucleus of an atom
- 9 element with an imbalance in the number of neutrons and protons
- 10 uncharged particle found in the nucleus of an atom
- 3 physical weight of an atom
- 11 horizontal rows of elements on the periodic table having consecutive atomic numbers
- 2 smallest particle containing all the properties of a particular element
- 6 substance that cannot be separated into different substances except by nuclear disintegration
- 8 five nonmetal chemical elements that are so active they do not occur in an uncombined state in nature

ANSWER KEY for page 19

CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

___1___ are the building blocks of the universe. Scientists have identified 90 different types of atoms, each of which produces a different type of ___2___. Scientists in atomic laboratories have produced ___3___ other types of atoms. In order to more effectively study the properties of these elements, scientists developed a classification system known as ___4___. A chart is divided into 109 squares, with each square representing one of the ___5___. Squares are divided into 4 groups, each with a different ___6___. Blue squares indicate elements that are ___7___ in their natural state. Yellow squares indicate elements that are ___8___ in their natural state. Orange squares represent elements that are ___9___ in their natural state. ___10___ squares represent the 19 elements that are man-made.

- | | |
|--|---|
| 1. A. Protons
B. Electrons
☒ C. Atoms
D. Isotopes | 6. A. number
☒ B. color
C. letter
D. symbol |
| 2. A. metal
B. alkaloid
C. group
☒ D. element | 7. A. liquids
B. metals
☒ C. gases
D. solids |
| 3. A. 27
☒ B. 19
C. 6
D. 12 | 8. ☒ A. solids
B. isotopes
C. halogens
D. liquids |
| 4. A. the element families
B. the grouping method
☒ C. the period table
D. the square system | 9. A. alkaloids
B. solids
C. gases
☒ D. liquids |
| 5. ☒ A. elements
B. metals
C. alkaloids
D. metalloids | 10. A. purple
☒ B. green
C. red
D. brown |

ANSWER KEY for page 20

MATTER MATCH-UP

Match each term on the left with the best group of words on the right.

-
- | | |
|--------------------------|--|
| 1. alkaline earth metals | elements containing properties of both metals and non-metals |
| 2. coinage metals | stable isotope of hydrogen and an essential part of the hydrogen bomb |
| 3. deuterium | highly inactive gases that are usually found in isolation in nature |
| 4. galvanization | sodium, lithium and potassium are some examples of these |
| 5. iron | process whereby zinc is used to coat steel in an effort to prevent corrosion |
| 6. mercury | elements which start in period 4 and have electron configurations unlike any elements in the first 3 periods |
| 7. metalloids | element that is a liquid in its natural state |
| 8. noble gases | hard, heavy metallic chemical element that has a high melting point and is often used as a light filament |
| 9. transition elements | metals that are resistant to corrosion and are excellent conductors of electricity |
| 10. tungsten | silvery-white metal that all living creatures need in their bodies |

ANSWER KEY for page 21

TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. T In an electrically neutral atom, the number of electrons and neutrons is equal.
2. F Each vertical column of the periodic table is referred to as a period.
3. T A highly active element has the ability to form bonds easily with other atoms.
4. F Many properties of an element are determined by the configuration of protons in the element's atoms.
5. T Elements that are just one or two electrons short of an octet tend to be very reactive.
6. T All metals have the ability to conduct heat and electricity.
7. T Alkaline metals are never found in nature outside of compounds.
8. F Sodium, lithium and potassium are always found in a metallic state in nature.
9. F Tungsten has a low melting point and is very lightweight.
10. F Members of the halogen group often occur in an uncombined state in nature.

ANSWER KEY for page 22

THE PERIODIC TABLE

Use a periodic table to answer the questions below.

1. What is the atomic weight of magnesium? **(24)**
2. What is the symbol for tin? **(Sn)**
3. What is the atomic number of mercury? **(80)**
4. Which element on the table doesn't belong in a group with any others? **(hydrogen)**
5. How many noble gases are there? What are their names? **(6; helium, neon, argon, krypton, xenon, radon)**
6. Where is the Actinide series located on the periodic table? **(on the last row)**
7. What group does radium belong to? **(the Earth Alkaline Metals)**
8. How many electrons are in the outer shells of lithium? **(3)**
9. What period is sodium located in? **(3)**
10. Which element's atomic number is the same as its atomic weight? **(hydrogen)**

ANSWER KEY for page 23

ELEMENT GROUPS

Each clue below points to one of the following groups. Write the correct group name next to each clue.

Alkaline Earth Metals

Alkaline Metals

Coinage Metals

Halogens

Nitrogen Family

Noble Gases

Oxygen Family

Transition Metals

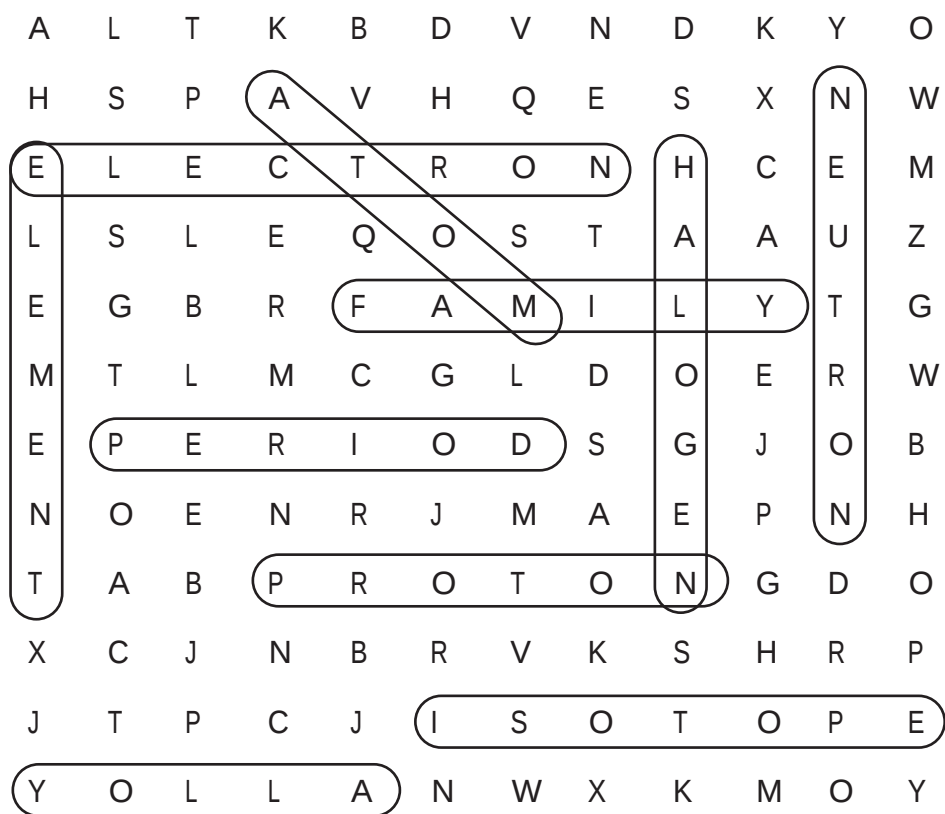
1. **Oxygen Family** The main element in this group combines with almost all of the other elements and is critical to life on Earth.
2. **Nobles Gases** This group contains the least reactive of all elements.
3. **Transitional Metals** This group contains some of the hardest metals known to man, including tungsten and chromium.
4. **Coinage Metals** Highly resistant to corrosion, the members of this group include copper, silver and gold.
5. **Nitrogen Family** Phosphorus is a member of this group, whose main element comprises 80% of the Earth's atmosphere.
6. **Alkaline Metals** Sodium and potassium are members of this group, the most reactive of all groups on the periodic table.
7. **Halogens** Members of this group, including chlorine and iodine, do not occur in an uncombined state in nature.
8. **Alkaline Earth Metals** Magnesium and calcium are members of this highly reactive group.

ANSWER KEY for page 24

WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

alloy
atom
electron
element
family
halogens
isotope
neutron
periods
proton



ANSWER KEY for page 25

TEST

Circle the phrase which best answers each question.

1. The atomic number of an element is determined by its number of:

- protons.
- electrons.
- neutrons.
- periods.

2. The number below an element's symbol is its:

- atomic number.
- atomic mass.
- neutron count.
- electron count.

3. Elements with an imbalance of protons and neutrons are:

- transition elements.
- alkaline metals.
- coinage metals.
- isotopes.

4. The short periods contain some of the most common elements found in:

- Earth's crust, oceans and atmosphere.
- living things.
- the sun's core.
- comet debris.

5. Alkaline metals are _____ found outside of compounds.

- always.
- often.
- usually.
- never.

ANSWER KEY for page 26

TEST (CONTINUED)

6. Magnesium and calcium are examples of:

- halogens.
- alkaline earth metals.
- coinage metals.
- metalloids.

7. Group 12 elements are:

- the most reactive.
- highly corrosion resistant.
- highly unstable.
- able to be magnetized.

8. Helium is an example of the:

- noble gases.
- unstable metals.
- oxygen family.
- self-oxidizing metals.

9. Chromium, one of the hardest metals known, is a:

- coinage metal.
- member of the nitrogen group.
- transition metal.
- halogen.

10. The lanthanide series of elements is composed of:

- the most stable elements.
- the best conductors of electricity.
- the rarest earth elements.
- highly corrosive elements.