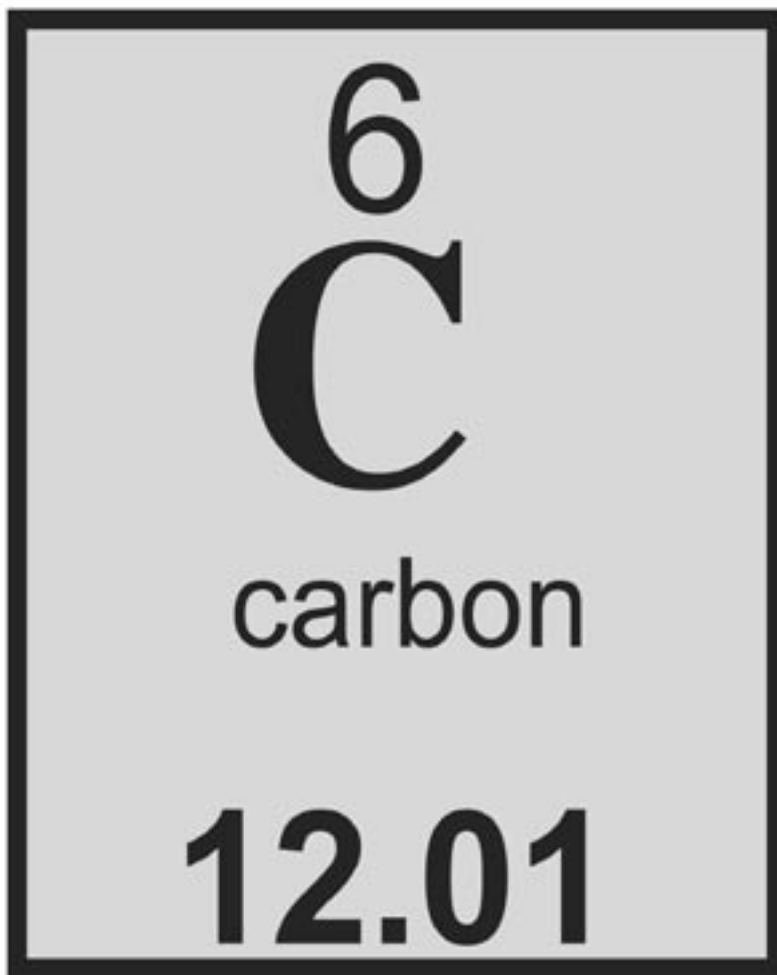


The Periodic Table

Teacher's Guide Middle School



Editors:

Brian A. Jerome, Ph.D.
Stephanie Zak Jerome

Assistant Editor:

Heather Fjeld

Graphics:

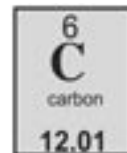
Dean Ladago
Fred Thodal

Visual Learning Company

www.visuallearningco.com

1-800-453-8481

25 Union Street
Brandon, Vermont



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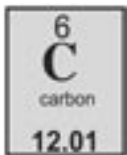
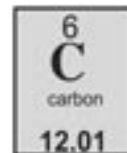


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Viewing Clearances

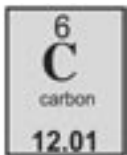
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A Message from our Company...

Dear Educator:

Thank you for your interest in the educational videos produced by the Visual Learning Company. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

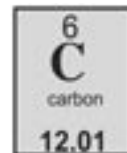
We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and led Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards, while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



National Standards Correlations

National Science Education Standards

(Content standards: 5-8, National Academy of Sciences, c. 1996)

Physical Science, Content Standard B:

Properties and Changes of Properties in Matter

As a result of activities in grades 5-8, students should develop an understanding that:

- Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances we encounter.

Science and Technology, Content Standard E:

Understandings about Science and Technology

As a result of activities in grades 5-8, students should develop an understanding that:

- Many different people in different cultures have made and continue to make contributions to science and technology.

Benchmarks for Science Literacy

(Project 2061 – AAAS, c. 1993)

The Nature of Science

1A The Scientific World View

By the end of 8th grade, students should know that:

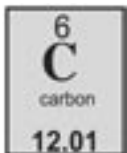
- Scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.
- Some scientific knowledge is very old and yet is still applicable today.

The Physical Setting

4D Structure of Matter

By the end of 8th grade, students should know that:

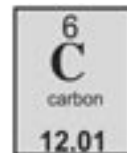
- All matter is made up of atoms, which are far too small to see directly through a microscope. The atoms of any element are alike but are different from atoms of other elements. Atoms may stick together in well-defined molecules or may be packed together in large arrays. Different arrangements of atoms into groups compose all substances.
- There are groups of elements that have similar properties, including highly reactive metals, highly reactive nonmetals (such as chlorine, fluorine, and oxygen), and some almost completely nonreactive gases (such as helium and neon). An especially important kind of reaction between substances involves the combination of oxygen with something else - as in burning or rusting. Some elements don't fit into any of the categories; among them are carbon and hydrogen, essential elements of living matter.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students will be able to do the following:

- Understand that matter is made up of different kinds of particles called elements.
- Describe an element as the simplest form of a pure substance, and know that elements cannot be changed into simpler substances.
- Create a simple sketch of an atom labeling protons, neutrons, and electrons.
- State that the atomic number refers to the number of protons in the nucleus of an atom.
- Explain that no two elements have the same atomic number.
- Identify the atomic number of a given element using the periodic table.
- Describe the meaning of atomic mass unit (AMU).
- Define the term mass number as the number of protons and neutrons of an atom added together.
- Describe how the atomic mass of a given element is the average of all the isotopes of that element.
- Explain that the Modern Periodic Table is based on the periodic law which states that the elements are organized based on periodic functions of their atomic numbers.
- Identify several examples of elements on the periodic table based on their chemical symbol.
- Differentiate between periods and families in the periodic table.



Assessment

Preliminary Assessment:

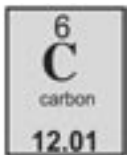
The Preliminary Assessment, provided in the Student Masters section, is an assessment tool designed to gain an understanding of students' pre-existing knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post Assessment:

The Post Assessment, provided in the Student Masters section, can be utilized as an assessment tool following completion of the video and student activities. The results of the Post Assessment can be compared against the results of the Preliminary Assessment to evaluate student progress.



Introducing the Video

Before showing the video, place the following items on a table in front of students: copper wire, aluminum flashing, sulfur powder, a piece of coal, and some gold or silver jewelry. Ask students if they can name the principle elements found in each of the objects. Write the name of each element on the black board. You may also want to review the definition of an element.

Next, ask students how one might go about organizing these elements in some kind of systematic way based on what they know about their characteristics. This may be a difficult task for the students. Then tell them that there are over one hundred different kinds of elements that need to be organized. Explain that scientists have struggled with this task for thousands of years.

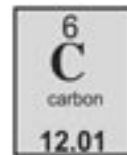
Tell students to pay close attention to the video to learn how scientists eventually devised a way to organize elements based on their characteristics.

Video Viewing Suggestions

The student Master “Video Review” is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

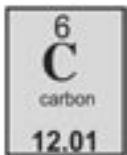
The program is approximately 20-minutes in length and includes a ten question video quiz. Answers are not provided to the Video Quiz on the video, but are included in this teacher’s guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



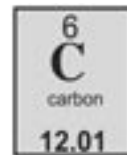
Video Script: The Periodic Table

1. Everything we eat, . . .
2. Everything we touch, . . .
3. . . . and everything we see is made up of matter.
4. Our bodies are made up of matter.
5. All living things are made up of matter.
6. And all nonliving things here on Earth are also made of matter.
7. Just what is matter? Matter is a substance that has mass and takes up space.
8. Matter is made up of tiny particles.
9. What do these particles look like?
10. How do these particles behave?
11. What are some of the characteristics of particles found in common objects?
12. And, how are these particles classified and organized?
13. During the next few minutes, we are going to explore these questions and others. .
14. . . . as we investigate some of the characteristics of matter, . . .
15. . . . and discuss how different types of matter are organized and classified.
- 16. Graphic Transition – Particles in Matter**
17. The trees in this forest are made up of tiny particles you can not see with the naked eye.
18. The water in this lake is made up of tiny particles.
19. And the rocks found on the slope of this mountain are also made up of particles.
20. As you can imagine, there is a wide variety of particles. Different types of particles behave in a variety of ways.
21. Matter is made up of different kinds of particles called elements.
22. This copper wire, for example, is made up mostly of the element copper.
23. And, this substance is made up of the element mercury.
24. An element is the simplest type of a pure substance. . .
25. . . . which cannot be chemically changed into a simpler substance.
26. Let us take a closer look at elements.
- 27. Graphic Transition – Elements and Atoms**
28. This is a piece of aluminum flashing. It is made up mostly of the element aluminum.
29. Aluminum flashing is commonly used on roofs to help rain and snow slide off easily.
30. Let us cut this piece of aluminum in half.
31. And then in half again.
- 32. You Decide!** What is the smallest piece of aluminum that is obtainable?
33. The smallest piece of aluminum we could obtain is an atom.
34. An atom is the smallest possible part of an element.
35. We cannot see the atoms in this piece of aluminum with the naked eye, . . .



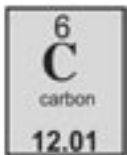
Script (cont.)

36. . . . but, we know that all matter is made up of atoms.
37. While an atom, such as this copper atom, is very small, it still has all the properties of the element copper.
38. Different types of atoms from different elements have different characteristics.
39. In nature, it is very common for atoms to combine to form molecules.
40. The water in this stream, for example, is made up of molecules of water.
41. A molecule of water, for instance, consists of the combination of one oxygen atom and two hydrogen atoms.
- 42. Graphic Transition – Inside the Atom**
43. For thousands of years people have tried to understand what makes up matter.
44. During the past several hundred years, many men and women have contributed to our understanding of atoms – the building blocks of matter.
45. While there are many things about atoms we do not understand, we do have a good understanding of the general characteristics of atoms.
46. Even though atoms are extremely small, in fact millions of atoms make up the head of this pin, they are made up of even smaller particles called subatomic particles.
47. There are three main types of subatomic particles: protons, neutrons, and electrons.
48. Protons and neutrons are found in the inner core or nucleus of the atom.
49. Combined, they make up 99.9% of the mass of an atom.
50. Protons have a positive charge, while neutrons have a neutral charge.
51. Whizzing around the nucleus are negatively charged subatomic particles called electrons.
52. The space they occupy is referred to as the electron cloud.
53. The electron cloud takes up the majority of the space of an atom.
54. If we let this marble represent the nucleus of an atom, it would take up this much space in the football stadium with the electrons orbiting at the far ends of the stadium.
55. Electrons are very light and fast moving.
56. In fact, it is extremely difficult for scientists to pinpoint their exact location.
57. The properties of different atoms are determined not only by the number of protons and neutrons, but by the arrangement of orbiting electrons.
- 58. Graphic Transition – Atomic Number**
59. This car has a license plate number,...
60. . . . that is different from the license plate number of this car.
61. No two cars have the same license plate number.



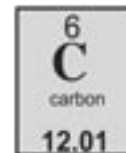
Script (cont.)

62. Similarly, no two elements have the same atomic number.
63. Atomic number refers to the number of protons in the nucleus of an atom.
64. The sooty remains of burned logs are made up of a great deal of carbon.
65. The element carbon has six protons and, therefore, has an atomic number of six.
66. Nitrogen, a gas that makes up about 70% of our air, . . .
67. . . . has an atomic number of seven.
68. In a couple of minutes we will see how atomic numbers play an important role in categorizing elements.
- 69. Graphic Transition – Mass Number and Atomic Mass**
70. Our bodies have mass, as do all living things.
71. Atoms, too, have mass. But, the mass of an atom is very small.
72. As we discussed, atoms are made up of subatomic particles.
73. Because the masses of subatomic particles are so small, scientists assign a special unit called an atomic mass unit to measure their mass.
74. The mass of a single proton is one atomic mass unit, or one AMU.
75. Even though neutrons are slightly more massive than protons, they too have a mass of one atomic mass unit.
76. To obtain the mass of an atom the number of protons and neutrons are added together to get the mass number.
77. Carbon, for example, has six protons and six neutrons.
- 78. You Compute!** What is the mass number of carbon?
79. The mass number of carbon is 12 AMUs and is computed by adding six protons and six neutrons.
80. Surprisingly, not all carbon atoms have the same mass.
81. All of the atoms of the same kind of element also do not have the same mass. This is because some elements exist as isotopes.
82. Isotopes are atoms of the same element that have differing numbers of neutrons. For example, carbon may have six neutrons or eight neutrons.
83. As a result, the atomic mass of a given element is the average of all the isotopes of that element.
84. Since the atomic mass is a weighted average, it is not usually an even number, but instead an element with a decimal.
85. The atomic mass for carbon, for example, is 12.011 AMUs.
- 86. Graphic Transition – Classifying Elements**
87. Imagine how hard it would be to cook dinner without knowing where the pots and pans are stored?



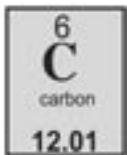
Script (cont.)

88. . . . or where food is kept.
89. . . . or where certain spices are located?
90. As you can imagine, this would be a very frustrating experience.
91. Scientists, until the mid 1800's, were faced with a similar frustration.
92. This frustration was due to the lack of a systematic way of classifying the 60 some-odd elements known at the time.
93. Many scientists tried to make some order of this chaos.
94. The Russian chemist, Dmitri Mendeleev, was one such scientist. He attempted to organize elements in a systematic way.
95. By considering the wide variety of characteristics of known elements, Mendeleev created a meaningful arrangement or table of the elements.
96. He found that the elements could be arranged in order of increasing atomic mass. While this method was not entirely correct, it was the predecessor of the table we use today.
97. Through the work of Henry Moseley, the atomic number, or number of protons, was determined for known elements.
98. Today's modern periodic table is based on the periodic law which states that the chemical and physical properties of elements are periodic functions of their atomic numbers.
- 99. Graphic Transition – The Modern Periodic Table**
100. You may have seen the modern periodic table in a book...
101. While at first glance, it may look complicated; it contains an amazing amount of interesting information.
102. There are over 100 known elements in the modern periodic table. When new elements are discovered, they are added.
- 103. You Observe!** How is the periodic table divided?
104. The table is divided into many boxes. Each box represents an element.
105. Within each box is the complete name of the element, or just its abbreviated name, or both.
106. Calcium, a common element in our bones, is found here on the. . .
107. . . . modern periodic table, and is symbolized by the capital letter C and a small a. This is called its chemical symbol.
108. The element chlorine, often used to keep swimming pools clean is. . .
109. . . . found here with the chemical symbol Cl.
110. While chemical symbols of elements often use the first couple of letters of an element's name...



Script (cont.)

111. ...sometimes they do not.
112. For example, iron, an element found in nails...
113. ...has a chemical symbol of Fe.
114. Notice the number 26 found above the chemical symbol.
115. This is the atomic number, or number of protons.
116. To the right of iron on the table is the element cobalt. It has an atomic number of 27.
- 117. You Decide!** What is the atomic mass of cobalt?
118. You can see that cobalt has an atomic mass of 58.93 atomic mass units.
119. Whereas, iron has a lighter mass of 55.85 atomic mass units.
- 120. Graphic Transition – Patterns in the Modern Periodic Table**
121. Many big cities are designed with streets arranged in a grid-like pattern at right angles to each other.
122. Similarly, this chessboard is arranged in a grid.
123. The modern periodic table is also arranged in grid-like fashion.
124. Going from left to right are rows.
125. Starting at the left side of any row and going to the right the atomic number increases.
126. Notice how the atomic number increases from five of boron to six of carbon to seven of nitrogen, to eight of oxygen, and so on.
127. Each horizontal row is called a period.
128. The elements in a period do not tend to have much in common with each other.
129. The columns in the table are called groups or families.
130. Elements within groups or families do tend to have similar properties.
131. For example, the elements in the family labeled 11 include, copper, silver, and gold – all relatively heavy metals.
132. These are just a couple of the many patterns and relationships found in the modern periodic table.
- 133. Graphic Transition – Summing Up**
134. During the past few minutes we have explored some of the characteristics of matter, and the ways matter is classified.
135. We began by discussing how matter is made up of tiny particles, . . .
136. . . . and that the building blocks of matter are atoms.
137. We took a look at elements, the simplest types of pure substances.

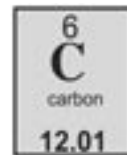


Script (cont.)

138. We discussed how the modern periodic table is organized by increasing atomic number, . . .
139. . . . and we explored the other types of information found in the periodic table such as atomic mass.
140. So, the next time you see a piece of matter, . . .
141. . . . utilize an element, . . .
142. . . . or use the Modern Periodic Table. . .
143. . . . think about some of the things we have discussed during the past few minutes.
144. You just might think about elements, and the way they are classified a little differently.
- 145. Graphic Transition - Video Assessment**

Fill in the correct word to complete the sentence. Good luck and let us get started.

1. An _____ is the simplest type of a pure substance.
2. The smallest part of an element is an _____.
3. H₂O is a _____ of water.
4. Atoms are made up of smaller _____ particles.
5. Most of an atom's mass is in the _____.
6. The Modern Periodic Table is organized by increasing atomic _____.
7. This chemical symbol C represents the element _____.
8. The number 58.93 AMUs represents the atomic _____.
9. The element oxygen has _____ protons.
10. Elements within a _____ tend to have similar properties.



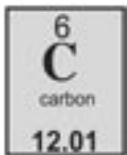
Student Assessments and Activities

Assessment Masters:

- Preliminary Assessment
- Video Review
- Post Assessment

Student Activity Masters:

- Navigating the Periodic Table
- Everyday Elements
- Vocabulary of *The Periodic Table*



Answers to Student Assessments

Preliminary Assessment (pgs. 20-21)

1. atom
2. subatomic
3. electrons
4. number
5. mass
6. isotopes
7. symbol
8. increases
9. element
10. periods
11. true
12. false
13. true
14. true
15. false
16. false
17. true
18. true
19. true
20. false

Video Review (pg. 22)

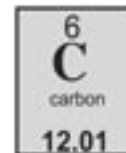
1. The smallest piece of aluminum that is obtainable is an atom. An atom is the smallest part of an element.
2. Carbon has a mass number of 12.
3. The periodic table is divided into small boxes. Each box contains a specific element.
4. The atomic mass of cobalt is 58.93.

Video Quiz (p. 22)

1. element
2. atom
3. molecule
4. subatomic
5. nucleus
6. number
7. carbon
8. mass
9. eight
10. group or family

Post Assessment (pgs. 23-24)

1. isotopes
2. element
3. electrons
4. periods
5. subatomic
6. mass
7. atom
8. symbol
9. number
10. increases
11. false
12. true
13. false
14. true
15. true
16. false
17. true
18. true
19. true
20. false



Answers to Student Activities

Navigating the Periodic Table (pgs. 25-27)

- There are 115 elements in the periodic table.
- Each box contains the name of an element, its chemical symbol, its atomic number, and its atomic mass.
- The atomic number is the number of protons found in an element. The atomic number is found written above the chemical symbol in each box.
- The atomic number of boron is 5.
- Chemical symbols are abbreviations which represent the full names of chemical elements. They often use the first couple of letters of an element's name, but sometimes do not. They provide a quicker way of writing an element's name.
- The chemical symbol for iron is Fe.
- Atomic mass is the weighted average of all the mass numbers of all the different isotopes of an element. Mass numbers are the numbers of protons and neutrons an element has added together.
- The atomic mass of oxygen is 16.
- The atomic mass of uranium is 238.
- The atomic mass of uranium is much bigger than the atomic mass of oxygen because it has many more protons and neutrons than oxygen.
- Most of the atomic masses in the periodic table are decimals because atomic mass is the weighted average of all the isotopes of an element. Isotopes are atoms of the same element that have differing numbers of neutrons. The weighted average often comes out to be a number with a decimal, not a whole number.
- As you go from left to right on the periodic table, the trend is for the atomic number to increase.
- Columns in the periodic table are called groups or families.
- The block of elements at the bottom of the table is separated from the rest of the table because it keeps the periodic table from having two extremely long periods.

- The element carbon has an atomic mass of about 12.

Everyday Elements (pgs. 28-29)

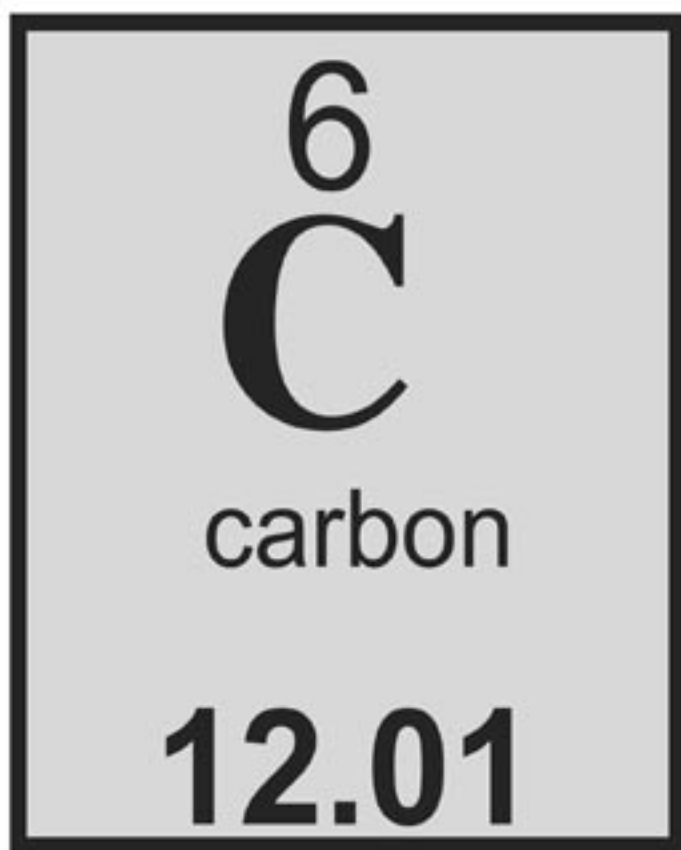
Examples of objects will vary.

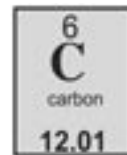
Element	Chemical Symbol	Atomic Number	Atomic Mass
Carbon	C	6	12.01
Iron	Fe	26	55.85
Neon	Ne	10	20.18
Calcium	Ca	20	40.08
Silver	Ag	47	107.9
Oxygen	O	8	16.00
Nitrogen	N	6	14.01
Sulfur	S	16	32.07
Gold	Au	79	197.0
Copper	Cu	29	63.55
Sodium	Na	11	22.99
Helium	He	2	4.003
Chlorine	Cl	17	35.45
Aluminum	Al	13	26.98
Potassium	K	19	39.10
Lead	Pb	82	207.2
Hydrogen	H	1	1.008
Titanium	Ti	22	47.88
Lithium	Li	3	6.941
Zinc	Zn	30	65.39

Vocabulary of The Periodic Table (p. 30)

- e - atom
- h - period
- g - atomic mass
- a - element
- i - chemical symbol
- c - atomic mass unit
- d - group
- j - neutron
- b - atomic number
- f - isotopes

Assessment and Student Activity Masters





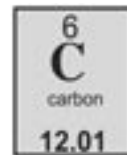
Preliminary Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. An _____ is the smallest possible part of an element that still has all the properties of that element.
2. Atoms are made up of smaller particles called _____ particles.
3. _____ have a negative charge.
4. Atomic _____ refers to the number of protons in the nucleus of an atom.
5. The _____ number is computed by adding together the protons and neutrons of an atom.
6. The atomic mass of a given element is the average of all its _____.
7. The letters Ca represent the chemical _____ for the element calcium.
8. When you go from left to right in a row in the periodic table the atomic number _____.
9. Each of the boxes in the periodic table contains information about a chemical _____.
10. The rows in the periodic table are called _____.

atom
electrons
element
increases
isotopes

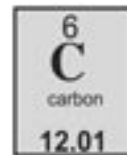
mass
number
periods
subatomic
symbol



Preliminary Assessment

Directions: Decide whether the statement is true (T) or false (F).

- | | | |
|---|---|---|
| 11. Matter is made up of tiny particles we cannot see. | T | F |
| 12. Most elements can be easily changed into other elements. | T | F |
| 13. Atoms are made up of smaller subatomic particles. | T | F |
| 14. Protons and neutrons are found in the nucleus. | T | F |
| 15. An atom's atomic number refers to its number of neutrons. | T | F |
| 16. The mass of a single electron is one atomic mass unit. | T | F |
| 17. Carbon, with six protons and six neutrons, has a mass number of 12. | T | F |
| 18. The modern periodic table is based on increasing atomic number. | T | F |
| 19. Cl is the chemical symbol for chlorine. | T | F |
| 20. The horizontal rows in the periodic table are called families. | T | F |



Video Review

Directions: During the course of the program, answer the questions as they are presented in the video. At the end of the video, answer the Video Quiz questions.

You Decide!

1. What is the smallest piece of aluminum that is obtainable?

You Compute!

2. What is the mass number of carbon?

You Observe!

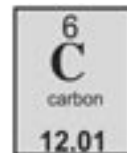
3. How is the periodic table divided?

You Decide!

4. What is the atomic mass of cobalt?

Video Quiz:

1. An _____ is the simplest type of a pure substance.
2. The smallest part of an element is an _____.
3. H_2O is a _____ of water.
4. Atoms are made up of smaller _____ particles.
5. Most of an atom's mass is in the _____.
6. The Modern Periodic Table is organized by increasing atomic _____.
7. This chemical symbol C represents the element _____.
8. The number 58.93 AMUs represents the atomic _____.
9. The element oxygen has _____ protons.
10. Elements within a _____ tend to have similar properties.



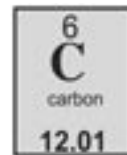
Post Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. The atomic mass of a given element is the average of all its _____.
2. Each of the boxes in the periodic table contains information about a chemical _____.
3. _____ have a negative charge.
4. The rows in the periodic table are called _____.
5. Atoms are made up of smaller particles called _____ particles.
6. The _____ number is computed by adding together the protons and neutrons of an atom.
7. An _____ is the smallest possible part of an element that still has all the properties of that element.
8. The letters Ca represent the chemical _____ for the element calcium.
9. Atomic _____ refers to the number of protons in the nucleus of an atom.
10. When you go from left to right in a row in the periodic table the atomic number _____.

atom
electrons
element
increases
isotopes

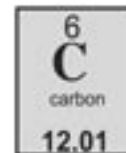
mass
number
periods
subatomic
symbol



Post Assessment

Directions: Decide whether the statement is true (T) or false (F).

- | | | |
|---|---|---|
| 11. An atom's atomic number refers to its number of neutrons. | T | F |
| 12. Cl is the chemical symbol for chlorine. | T | F |
| 13. Most elements can be easily changed into other elements. | T | F |
| 14. Carbon, with six protons and six neutrons, has a mass number of 12. | T | F |
| 15. Atoms are made up of smaller subatomic particles. | T | F |
| 16. The horizontal rows in the periodic table are called families. | T | F |
| 17. Matter is made up of tiny particles we cannot see. | T | F |
| 18. Protons and neutrons are found in the nucleus. | T | F |
| 19. The modern periodic table is based on increasing atomic number. | T | F |
| 20. The mass of a single electron is one atomic mass unit. | T | F |



Navigating the Periodic Table

Background:

Imagine how hard it would be to fix your bicycle if all the tools you needed were scattered around the garage. Or think how difficult it would be to cook if the ingredients you needed were strewn all over the kitchen. As you can imagine, this would be a very frustrating experience. Scientists working with elements were faced with a similar frustration until the mid 1800's.

The Russian scientist, Dmitri Mendeleev, developed the first meaningful arrangement or table of the elements. While his table was not completely accurate because it arranged the elements in order of increasing atomic mass, it served as the basis for the periodic table we use today.

The Modern Periodic Table is based on the Periodic Law which states that the chemical and physical properties of elements are periodic functions of their atomic numbers. In other words, the elements in the Modern Periodic Table are organized based on their increasing number of protons, or their atomic number.

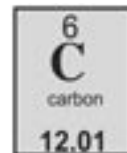
The periodic table contains an amazing amount of very useful information. In this exercise you will learn how to navigate the periodic table.

Materials:

Modern Periodic Table, pencil or pen.

Questions:

1. Count the number of elements in the periodic table. Record your answer.
2. Describe the different types of information each individual box contains.
3. What is meant by the atomic number? Where is this number found in each box?
4. What is the atomic number of boron?
5. What is meant by the term chemical symbol?



Navigating the Periodic Table

6. What is the chemical symbol for iron?

7. What is atomic mass?

8. What is the atomic mass of oxygen?

9. What is the atomic mass of uranium?

10. Explain why the atomic mass of uranium is so much greater than the atomic mass of oxygen.

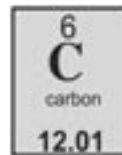
11. Why are most of the atomic masses in the periodic table decimals? Describe how the atomic mass is arrived at in relation to the isotopes of a given element.

12. Describe the trend you notice regarding atomic number as you go from left to right in the periodic table.

13. What are the columns in the periodic table called?

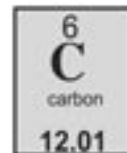
14. Explain why the block of elements at the bottom of the table are separated from the rest of the table.

15. Which element has an atomic mass of about 12?



Periodic Table of Elements

1A	2A	3A	4A	5A	6A	7A	8A
1 H hydrogen 1.008	4 Be beryllium 9.012	5 B boron 10.81	6 C carbon 12.01	7 N nitrogen 14.01	8 O oxygen 16.00	9 F fluorine 19.00	10 Ne neon 20.18
11 Na sodium 22.99	12 Mg magnesium 24.31	13 Al aluminum 26.98	14 Si silicon 28.09	15 P phosphorus 30.97	16 S sulfur 32.07	17 Cl chlorine 35.45	18 Ar argon 39.95
19 K potassium 39.10	20 Ca calcium 40.08	21 Sc scandium 44.96	22 Ti titanium 47.88	23 V vanadium 50.94	24 Cr chromium 52.00	25 Mn manganese 54.94	26 Fe iron 55.85
37 Rb rubidium 85.47	38 Sr strontium 87.62	39 Y yttrium 88.91	40 Zr zirconium 91.22	41 Nb niobium 92.91	42 Mo molybdenum 95.94	43 Tc technetium (98)	44 Ru ruthenium 101.1
55 Cs cesium 132.9	56 Ba barium 137.3	57 La* lanthanum 138.9	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.9	75 Re rhenium 186.2	76 Os osmium 190.2
87 Fr francium (223)	88 Ra radium (226)	89 Ac~ actinium (227)	104 Rf rutherfordium (257)	105 Db dubnium (260)	106 Sg seaborgium (263)	107 Bh bohrium (262)	108 Hs hassium (265)
			112 Uub (277)	111 Uuu (272)	110 Ds darmstadtium (271)	109 Mt meitnerium (266)	80 Hg mercury 200.5
			114 Uuq (296)	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 208.9	54 Xe xenon 131.3
				49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	86 Rn radon (222)
				31 Ga gallium 69.72	32 Ge germanium 72.58	33 As arsenic 74.92	52 Te tellurium 127.6
				30 Zn zinc 65.39	48 Cd cadmium 112.4	47 Ag silver 107.9	84 Po polonium (209)
				29 Cu copper 63.55	46 Pd palladium 106.4	79 Au gold 197.0	116 Uuh (298)
				28 Ni nickel 58.69	78 Pt platinum 195.1	111 Uuu (272)	
				27 Co cobalt 58.93	77 Ir iridium 190.2	110 Ds darmstadtium (271)	
				26 Fe iron 55.85	76 Os osmium 190.2	109 Mt meitnerium (266)	
				45 Rh rhodium 102.9	101 Ru ruthenium 101.1	108 Hs hassium (265)	
				44 Ru ruthenium 101.1	75 Re rhenium 186.2	64 Gd gadolinium 157.3	
				43 Tc technetium (98)	107 Bh bohrium (262)	63 Eu europium 152.0	
				42 Mo molybdenum 95.94	74 W tungsten 183.9	62 Sm samarium (150.4)	
				41 Nb niobium 92.91	106 Sg seaborgium (263)	61 Pm promethium (147)	
				23 V vanadium 50.94	105 Db dubnium (260)	60 Nd neodymium 144.2	
				24 Cr chromium 52.00	104 Rf rutherfordium (257)	93 Np neptunium (237)	
				25 Mn manganese 54.94	103 Lr lawrencium (257)	92 U uranium (238)	
				28 Ni nickel 58.69	112 Uub (277)	91 Pa protactinium (231)	
				29 Cu copper 63.55	111 Uuu (272)	90 Th thorium 232.0	
				30 Zn zinc 65.39	110 Ds darmstadtium (271)	89 Ac~ actinium (227)	
				48 Cd cadmium 112.4	109 Mt meitnerium (266)	88 Ra radium (226)	
				47 Ag silver 107.9	108 Hs hassium (265)	87 Fr francium (223)	
				79 Au gold 197.0	107 Bh bohrium (262)	86 Rn radon (222)	
				80 Hg mercury 200.5	106 Sg seaborgium (263)	85 At astatine (210)	
				112 Uub (277)	105 Db dubnium (260)	84 Po polonium (209)	
				111 Uuu (272)	104 Rf rutherfordium (257)	83 Bi bismuth 208.9	
				110 Ds darmstadtium (271)	103 Lr lawrencium (257)	82 Pb lead 207.2	
				109 Mt meitnerium (266)	102 No nobelium (254)	81 Tl thallium 204.4	
				108 Hs hassium (265)	101 Md mendelevium (256)	80 Hg mercury 200.5	
				107 Bh bohrium (262)	100 Fm fermium (253)	79 Au gold 197.0	
				106 Sg seaborgium (263)	99 Es einsteinium (254)	78 Pt platinum 195.1	
				105 Db dubnium (260)	98 Cf californium (249)	77 Ir iridium 190.2	
				104 Rf rutherfordium (257)	97 Bk berkelium (247)	76 Os osmium 190.2	
				103 Lr lawrencium (257)	96 Cm curium (247)	75 Re rhenium 186.2	
				102 No nobelium (254)	95 Am americium (243)	74 W tungsten 183.9	
				101 Md mendelevium (256)	94 Pu plutonium (242)	73 Ta tantalum 180.9	
				100 Fm fermium (253)	93 Np neptunium (237)	72 Hf hafnium 178.5	
				99 Es einsteinium (254)	92 U uranium (238)	71 Lu lutetium 175.0	
				98 Cf californium (249)	91 Pa protactinium (231)	70 Yb ytterbium 173.0	
				97 Bk berkelium (247)	90 Th thorium 232.0	69 Tm thulium 168.9	
				96 Cm curium (247)	89 Ac~ actinium (227)	68 Er erbium 167.3	
				95 Am americium (243)	88 Ra radium (226)	67 Ho holmium 164.9	
				94 Pu plutonium (242)	87 Fr francium (223)	66 Dy dysprosium 162.5	
				93 Np neptunium (237)	86 Rn radon (222)	65 Tb terbium 158.9	
				92 U uranium (238)	85 At astatine (210)	64 Gd gadolinium 157.3	
				91 Pa protactinium (231)	84 Po polonium (209)	63 Eu europium 152.0	
				90 Th thorium 232.0	83 Bi bismuth 208.9	62 Sm samarium (150.4)	
					82 Pb lead 207.2	61 Pm promethium (147)	
					81 Tl thallium 204.4	60 Nd neodymium 144.2	
					80 Hg mercury 200.5	59 Pr praseodymium 140.9	
					79 Au gold 197.0	58 Ce cerium 140.1	
					78 Pt platinum 195.1	57 La* lanthanum 138.9	
					77 Ir iridium 190.2	56 Ba barium 137.3	
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					74 W tungsten 183.9	53 I iodine 126.9	
					73 Ta tantalum 180.9	52 Te tellurium 127.6	
					72 Hf hafnium 178.5	51 Sb antimony 121.8	
					71 Lu lutetium 175.0	50 Sn tin 118.7	
					70 Yb ytterbium 173.0	49 In indium 114.8	
					69 Tm thulium 168.9	48 Cd cadmium 112.4	
					68 Er erbium 167.3	47 Ag silver 107.9	
					67 Ho holmium 164.9	46 Pd palladium 106.4	
					66 Dy dysprosium 162.5	45 Rh rhodium 102.9	
					65 Tb terbium 158.9	44 Ru ruthenium 101.1	
					64 Gd gadolinium 157.3	43 Tc technetium (98)	
					63 Eu europium 152.0	42 Mo molybdenum 95.94	
					62 Sm samarium (150.4)	41 Nb niobium 92.91	
					61 Pm promethium (147)	40 Zr zirconium 91.22	
					60 Nd neodymium 144.2	39 Y yttrium 88.91	
					59 Pr praseodymium 140.9	38 Sr strontium 87.62	
					58 Ce cerium 140.1	37 Rb rubidium 85.47	
					57 La* lanthanum 138.9	36 Kr krypton 83.80	
					56 Ba barium 137.3	35 Br bromine 79.90	
					55 Cs cesium 132.9	34 Se selenium 78.96	
					54 Xe xenon 131.3	33 As arsenic 74.92	
					53 I iodine 126.9	32 Ge germanium 72.58	
					52 Te tellurium 127.6	31 Ga gallium 69.72	
					51 Sb antimony 121.8	30 Zn zinc 65.39	
					50 Sn tin 118.7	29 Cu copper 63.55	
					49 In indium 114.8	28 Ni nickel 58.69	
					48 Cd cadmium 112.4	27 Co cobalt 58.93	
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					46 Pd palladium 106.4	25 Mn manganese 54.94	
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					39 Y yttrium 88.91	18 Ar argon 39.95	
					38 Sr strontium 87.62	17 Cl chlorine 35.45	
					37 Rb rubidium 85.47	16 S sulfur 32.07	
					36 Kr krypton 83.80	15 P phosphorus 30.97	
					35 Br bromine 79.90	14 Si silicon 28.09	
					34 Se selenium 78.96	13 Al aluminum 26.98	
					33 As arsenic 74.92	12 Mg magnesium 24.31	
					32 Ge germanium 72.58	11 Na sodium 22.99	
					31 Ga gallium 69.72	10 Ne neon 20.18	
					30 Zn zinc 65.39	9 F fluorine 19.00	
					29 Cu copper 63.55	8 O oxygen 16.00	
					28 Ni nickel 58.69	7 N nitrogen 14.01	
					27 Co cobalt 58.93	6 C carbon 12.01	
					26 Fe iron 55.85	5 B boron 10.81	
					25 Mn manganese 54.94		



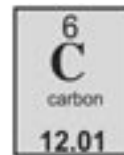
Everyday Elements

As you probably already know, an element is the simplest type of a pure substance. Elements are everywhere, from the air we breathe, to the food we eat, to the clothes we wear. Everything we see and touch is made up of elements. Matter is made up of elements.

There are 115 different elements found on earth. Many of these elements are quite common and are found in objects we use everyday. The element carbon, for example, is found in all living things including our bodies and the food we eat. The element iron is common in objects made up of steel. And the element oxygen is found in the air which surrounds us.

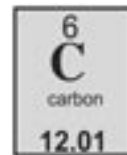
The Modern Periodic Table contains information about each of the 115 elements. This table is very useful in not only organizing the elements in a logical manner, but it also has lots of useful information about each element. Found in each box on the table is an element's chemical symbol, chemical name, atomic number, and atomic mass. In this activity, you will find everyday objects which contain the element listed in the table. Then, using the periodic table from the preceding activity, you will fill in the rest of the information about that element.





Everyday Elements

Element	Object/ Occurrence	Chemical Symbol	Atomic Number	Atomic Mass
Carbon				
Iron				
Neon				
Calcium				
Silver				
Oxygen				
Nitrogen				
Sulfur				
Gold				
Copper				
Sodium				
Helium				
Chlorine				
Aluminum				
Potassium				
Lead				
Hydrogen				
Titanium				
Lithium				
Zinc				



Vocabulary of The Periodic Table

Directions: Unscramble the vocabulary words in the first column. Match the words to the definitions in the second column.

____ 1. maot _____

____ 2. eopdir _____

____ 3. mcaiot smas _____

____ 4. netemel _____

____ 5. hcaelmi myobls _____

____ 6. amoitc ssma ntui _____

____ 7. oprug _____

____ 8. ernotun _____

____ 9. mcaiot unremb _____

____ 10. ipestoos _____

- a. the simplest type of a pure substance
- b. the number of protons in the nucleus of an atom
- c. a special unit that represents the mass of a single proton
- d. a vertical column in the periodic table
- e. the smallest possible part of an element that still has the properties of that element
- f. atoms of the same element that have differing numbers of neutrons
- g. the average of all the isotopes of an element; the mass of the protons and neutrons found in an atom's nucleus
- h. a horizontal row in the periodic table
- i. the abbreviated name for an element
- j. a subatomic particle with a neutral charge that is found in the nucleus of an atom