



## TEACHER GUIDE

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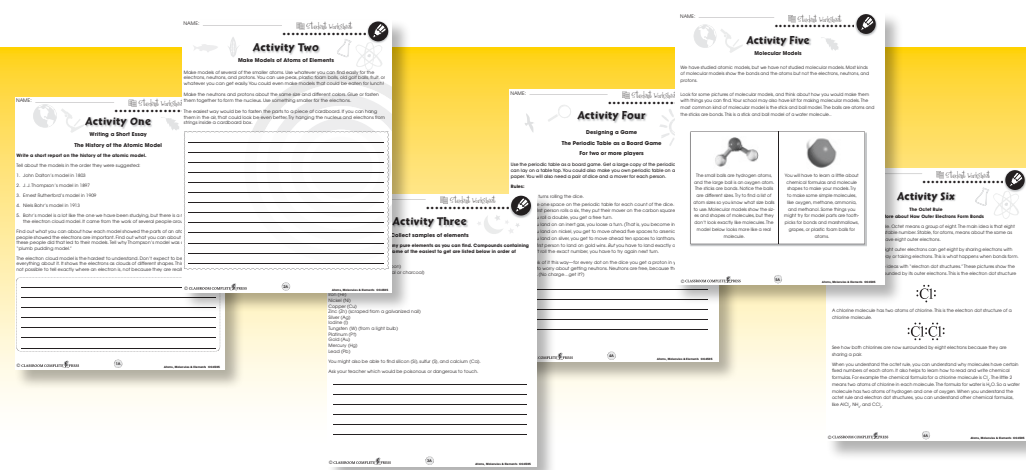
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- Enter pass code CC4505D





# What Are Elements?

1. Circle **T** if the statement is TRUE or **F** if it is FALSE.

- T F a) There are about 100 different kinds of atoms.
- T F b) Molecules contain two or more atoms.
- T F c) Fire, air, earth, and water are all elements.
- T F d) Forming rust is a chemical property of iron.
- T F e) All atoms have the same number of electrons.
- T F f) All atoms are the same size.

2. Draw one line from each word on the left to its meaning.

bonds	a	the parts of an atom equal in number to the atom's electrons
chemical	b	the properties that tell how and when an atom forms molecules
electrons	c	the connections that hold atoms together
elements	d	materials made of one kind of atom
protons	e	the parts of an atom that circle the nucleus



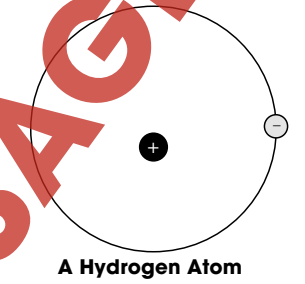
# What Are Elements?

**Y**ou learned earlier that there are about 100 kinds of atoms. A material made of only one kind of atom is called an **element**. Some elements you may know about are iron in nails, helium in balloons, and iodine in medicines.

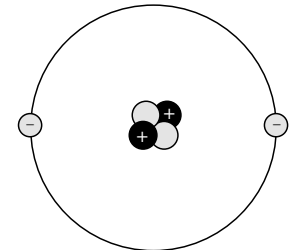
The atoms of each element have different chemical and physical properties. But why are the atoms different? Atoms of each element have a different number of protons in their nucleus. Hydrogen is the simplest element. Its atoms have only one proton. Uranium has much larger atoms with 92 protons.

Remember that the number of protons in an atom equals the number of electrons. Hydrogen atoms have one electron and uranium atoms have 92 electrons. The number of electrons in the atoms of an element give the element its chemical properties. This is because different numbers of electrons cause atoms to form bonds in different ways.

Atoms of the Two Simplest Elements

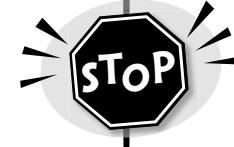


A Hydrogen Atom



A Helium Atom

Name **TWO** things that are different about atoms of different elements.



Elements can be made of single atoms, or they can be made of molecules. The helium in helium balloons is made of separate atoms. You may remember that oxygen we breathe is made of molecules that have two oxygen atoms bonded together.

Long ago people thought there were only four elements: fire, air, earth, and water. Now we know that none of these are elements. Water molecules are made of hydrogen and oxygen atoms. The other three are mixtures of different molecules.



# What Are Elements?

1. Put a check mark (✓) next to the answer that is most correct.

- a) How many elements are there?
  - A three
  - B four
  - C about 100
  - D many millions
- b) Why do all atoms of an element have the same chemical properties?
  - A They all have the same size electrons.
  - B Their electrons all have the same charge.
  - C They all have the same number of neutrons.
  - D They all have the same number of electrons.
- c) Long ago, people believed there were four elements: fire, air, earth, and water. How many of these are called elements today?
  - A none
  - B one
  - C two
  - D three

2. a) Circle the words that are the names of elements.

air    helium    hydrogen    iron    sunlight    water

b) Underline the words that are made of elements but are not elements.

air    helium    hydrogen    iron    sunlight    water



# What Are Elements?

3. Tell what an *element* is. Use the word "atoms" in your answer.

\_\_\_\_\_

4. What is the *simplest* element?

\_\_\_\_\_

5. Name *two* other elements.

\_\_\_\_\_

## Extensions & Applications

6. Look back at the pictures of the atoms of hydrogen and helium. Hydrogen has one proton in its nucleus circled by one electron. Helium has two protons and two neutrons in its nucleus circled by two electrons.

Make drawings of atoms of the elements **carbon** and **lithium**. For both atoms, put the first two electrons in an inner circle and the other electrons in an outer circle.

Carbon has six protons and six neutrons in its nucleus, circled by six electrons.

Lithium has three protons and four neutrons in its nucleus. You will have to figure out how many electrons circle the nucleus of a lithium atom.

\_\_\_\_\_



# Atomic Models

For this activity you will DRAW atomic models of these three atoms.

- fluorine (F)
- neon (Ne)
- sodium (Na)

Make them look like the model on page 8. Put two electrons in the first ring and no more than eight in the second. Make a third ring if you need it.

You do not have to draw each neutron in the nucleus. Just use numbers, and write **N** for neutrons and **P** for protons. For example, the nucleus of FLUORINE would look like this:



NEON has 10 neutrons, and SODIUM has 11 neutrons. Use the periodic table to find the number of protons and electrons. Remember to label each atomic model with the correct name.



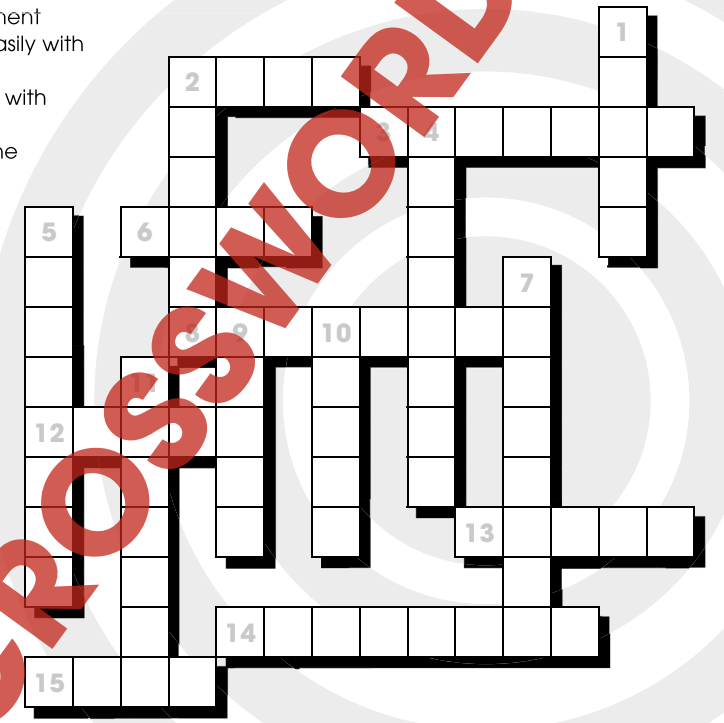
# Crossword Puzzle!

### Across

- All particles are the same in a \_\_\_\_\_ material
- The kind of molecules that contain carbon
- The smallest bit of an element
- An element that reacts easily with metals
- Elements that don't react with anything are \_\_\_\_\_
- An up-and-down row in the periodic table
- A pure material made of more than one element
- It connects atoms in a molecule

### Down

- A metal and oxygen form a metal \_\_\_\_\_
- Found inside the nucleus of an atom
- Groups 1 and 17 are very \_\_\_\_\_
- What you call an atom or a molecule
- It circles the nucleus
- Bonds are formed by the \_\_\_\_\_ electrons
- An atomic \_\_\_\_\_ shows how the parts of an atom are arranged
- It is in the nucleus and has no charge



Word List		
Bond	Reactive	Inert
Outer	Oxide	Atom
Pure	Proton	Neutron
Organic	Compound	Model
Particle	Group	Electron
Nonmetal		



# Comprehension Quiz

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### Part A

This is a model of a beryllium atom.

Label each part of the atom. Tell the name, charge, and mass of the part. For charge, write **minus**, **plus**, or **zero**. For mass, write **not much** or **a lot**.

1. Name \_\_\_\_\_  
 2. Charge \_\_\_\_\_  
 3. Mass \_\_\_\_\_

1. Name \_\_\_\_\_  
 2. Charge \_\_\_\_\_  
 3. Mass \_\_\_\_\_

1. Name \_\_\_\_\_  
 2. Charge \_\_\_\_\_  
 3. Mass \_\_\_\_\_

SUBTOTAL: /9

# History of the Atomic Model

Current electron cloud model proposed in 1926.



NAME: \_\_\_\_\_

After You Read 



# What Are Elements?

3. Tell what an *element* is. Use the word "atoms" in your answer.

---

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4. What is the *simplest* element?

---

---

5. Name *two* other elements.

---

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## Extensions & Applications

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Make drawings of atoms of the elements **carbon** and **lithium**. For both atoms, put the first two electrons in an inner circle and the other electrons in an outer circle.

Carbon has six protons and six neutrons in its nucleus, circled by six electrons.

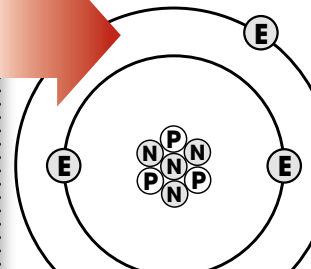
Lithium has three protons and four neutrons in its nucleus. You will have to figure out how many electrons circle the nucleus of a lithium atom.

3. A material made of one kind of atom

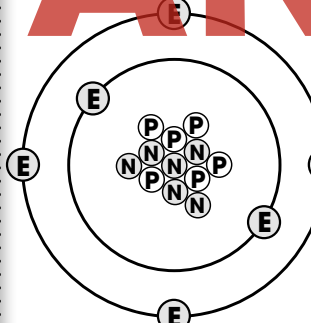
4. Hydrogen has the simplest atoms

5. Answers will vary

6. Lithium atom



Carbon atom



E Electron  
P Proton  
N Neutron

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- 1.
- a)  F
  - b)  T
  - c)  T
  - d)  T
  - e)  F
  - f)  F

- 2.
- a)  B

- b)  c

- c)  B

22

Accept one of:  
Water molecules contain more than one kind of atom.  
OR  
Water is made of more than one element.

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- 1.
- a) atoms
  - b) molecules
  - c) pure materials
  - d) elements
  - e) particles
  - f) compounds

- 2.
- a) aluminum  
copper
  - b) salt, sugar,  
rust, water

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- 3.
- Elements contain one kind of atom.
- 4.
- Molecules contain more than one atom.
- 5.
- Compounds are made of more than one element.

- 6.
- a) hydrogen, oxygen
  - b) silicon, oxygen
  - c) carbon, hydrogen, oxygen
  - d) Accept any verifiable answer

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# EASY MARKING ANSWER KEY