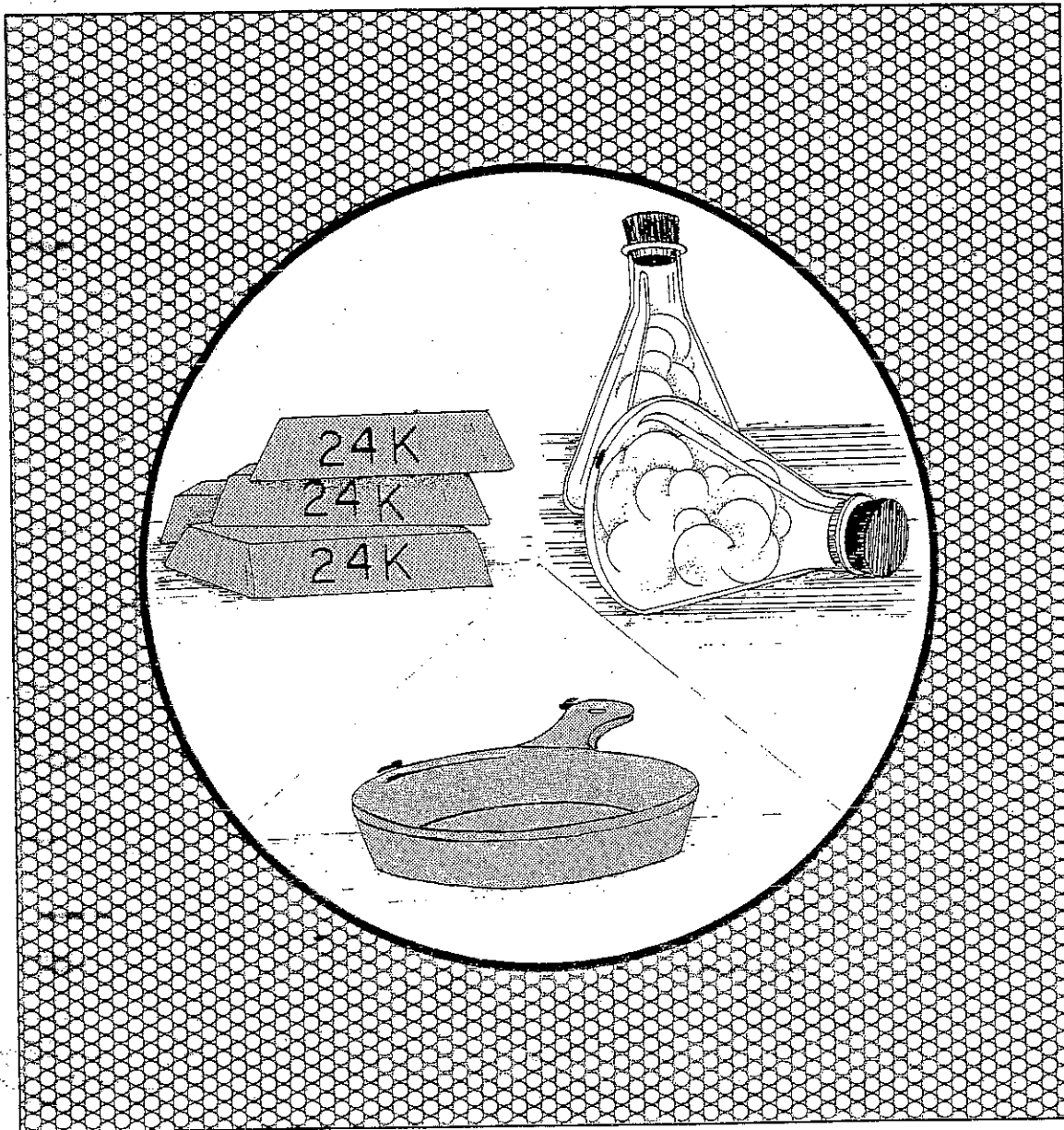


ATOMS and ELEMENTS

What are elements?

13



element [EL-uh-munt]: simple substances that cannot be broken down into simpler substances

symbol: short way of writing the name of an element

LESSON | What are elements?

13

There are 109 known different kinds of atoms that have been identified at the present time. This means that everything we know—every kind of matter—must be made up of one or more of these 109 kinds of atoms.

Most matter is made up of two or more kinds of atoms. But, some matter is made up of only one kind of atom. Any sample of matter that is made up of only one kind of atom is called an **element** (EL-uh-munt). An element is a simple substance that cannot be broken down into simpler substances.

Think about this. If there are only 109 kinds of atoms, there must be 109 different elements. There is one element for each kind of atom. The atoms of any one element are almost exactly alike. In addition, the atoms of any given element are different from the atoms of every other element.

You know the names of some elements—gold, copper, iron, oxygen, iodine, and probably many more. Only 92 of the known elements are found in nature. The other 17 have been made by scientists in the laboratory. Most of these have been made in very small amounts. In the future, more elements will probably be created. So, the total number of known elements will increase.

Most elements are found in the solid state. Some are found as gases. Only two elements—mercury and bromine—are found as liquids at room temperature.

The names of the elements can be written in symbol form. Symbols are signs that stand for something else. Here are some symbols that you may know: \$ % € & #. What does each one stand for?

RULES FOR WRITING SYMBOLS

1. The symbol always begins with a capital letter.
2. If there is a second letter, it is a lower case letter.
3. No period is used at the end of the symbol (unless it comes at the end of a sentence).

The symbols for the elements are the same all over the world. It makes no difference what country you are in—or what language is spoken there. The “language” of chemistry is the same all over the world.

MORE ABOUT ATOMS

Look at each figure below. Read about the figure. Then try to answer the questions.

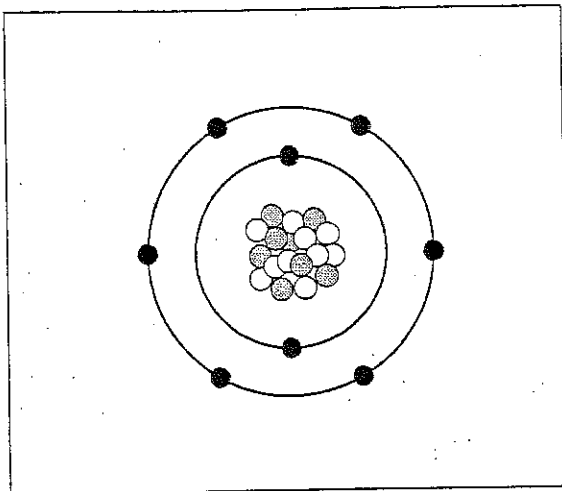


Figure A

This is a model of an atom.

Different elements have different atoms.

Sometimes the differences are very slight.

1. How many different kinds of atoms are there? _____
2. What do we call matter that has only one kind of atom? _____

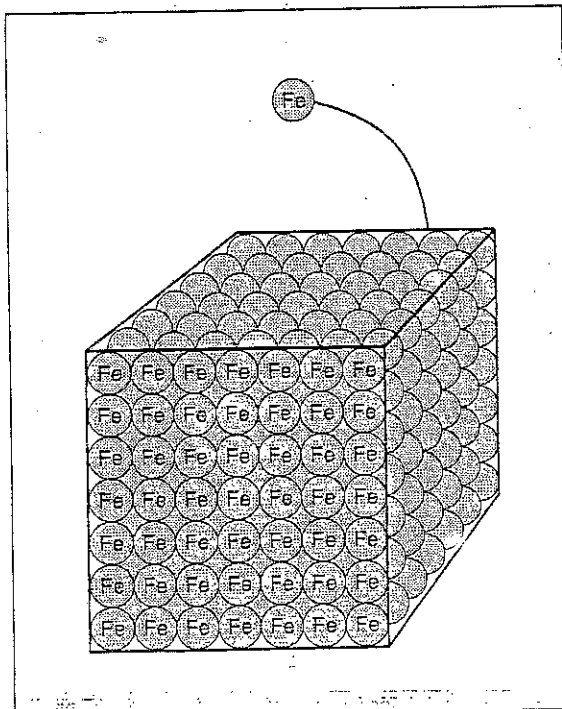


Figure B

The atoms of any one element are almost exactly alike.

Each of the circles in the picture stands for one atom of the element iron.

If we could study just one of these atoms, it would still have the properties of iron.

The smallest part of an element is just one atom of that element.

3. Is it possible to study just one atom?

4. Explain your answer. _____

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some answers may be used more than once.

different
element
17

one atom
92
atoms

109
alike
solid

1. All matter is made up of tiny particles called _____.
2. There are _____ different kinds of atoms.
3. Matter that is made up of only one kind of atom is called an _____.
4. There are _____ different elements.
5. There are _____ natural elements.
6. Scientists have made _____ elements in the laboratory.
7. The atoms of any one element are almost exactly _____.
8. The smallest part of an element is _____ of that element.
9. Atoms of different elements are always _____.
10. Most elements are found in the _____ state.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. Every atom in the world is exactly alike.
- _____ 2. There are only 109 different kind of atoms known.
- _____ 3. There are 90 different elements.
- _____ 4. An element has only one kind of atom.
- _____ 5. Atoms of different elements are alike.
- _____ 6. Scientist have made 92 elements in the laboratory.
- _____ 7. The symbols for elements are different in different countries.
- _____ 8. An atom of iron is the same as an atom of oxygen.
- _____ 9. The smallest part of an element is one atom.
- _____ 10. Scientists may make new elements in the future.

ELEMENTS AND THEIR SYMBOLS

HOW DO THE ELEMENTS GET THEIR SYMBOLS?

The symbol of an element is taken from its name. Often the first letter of an element's name is the symbol for that element. For example, the symbol for carbon is C.

Element	Symbol
oxygen	
carbon	
nitrogen	
hydrogen	

The name of an element may begin with a letter that is already the symbol for another element. In this case we use:

- the first two letters, as Os for osmium, or
- the first letter and some other letter from the name, as Cl for Chlorine.

Element	Symbol
osmium	
chlorine	
calcium	
helium	
aluminum	
nickel	

HOW DO ELEMENTS GET THEIR NAMES?

The symbols for most elements are taken from their names in other languages—mostly Latin and Greek. For example, the Latin name for iron is *ferrum*. The symbol for iron is Fe.

Element	Symbol	Foreign Name
lead		<i>plumbum</i> (Latin)
gold		<i>aurum</i> (Latin)
barium		<i>barys</i> (Greek)
lithium		<i>lithos</i> (Greek)

Several elements are named after places or after famous scientists. For example, Am for Americium and Es for Einsteinium.

Element	Symbol	Named for
californium		California
europium		Europe
curium		Marie Curie, French scientist
fermium		Enrico Fermi, Italian physicist

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

capital
Greek

two
lower case

symbol

1. The short way of writing an element is called its _____.
2. The first letter of a chemical symbol is always a _____ letter.
3. If a chemical symbol has two letters, the second letter is always a _____ letter.
4. A chemical symbol never has more than _____ letters.
5. The symbols for many elements come from Latin and _____ words for the element.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A

Column B

- | | |
|---|--|
| _____ 1. symbol | a) never used as a chemical symbol |
| _____ 2. each element | b) always a capital letter |
| _____ 3. second letter of a chemical symbol | c) has its own chemical symbol |
| _____ 4. three letters | d) sign that stands for something else |
| _____ 5. first letter of a chemical symbol | e) always a lower case letter |

REACHING OUT

Why is it so important to have only one set of chemical symbols in the world?
