

LESSON | What are the properties 15 | of metals?

Scientists divide all elements into two types—metals and nonmetals. They do this because most metals have certain properties that are the same. Most nonmetals share other properties that are the same.

You probably know many metals—tin, iron, silver, gold, copper, nickel. You would probably know if something is not a metal. But how would you explain what a metal is? What are the properties of metals? The properties of metals are:

- Metals are solid at room temperature. Think about iron, gold, copper, aluminum. They are all solids. Only one metal is not a solid at room temperature. That is mercury—a liquid.
- Metals are silver-gray. That is the color of all metal elements except two—gold and copper. Gold and copper are not silver-gray.
- Metals are good **conductors** of heat and electricity. That means that heat and electricity travel well through a metal.
- Metals have a certain shiny look. That shine is called **metallic luster**.
- Most metals are **malleable** [MAL-ee-uh-bul]. This means that you can hammer or press a piece of metal into a different shape without the metal breaking.

Metals have many uses because of their properties. For example, bridges, automobiles, ships, pots and pans, food cans, appliances, and jewelry are all made mostly of metal. How many other uses of metals can you think of?

CHOOSE THE RIGHT CAPTION

Below are six figures and six captions. Each caption matches one of the figures. Choose the caption that best describes each figure. Write the correct caption on the line provided.

Choose from these captions:

Metals are malleable.

Metals are solid except for mercury.

Metals are good conductors of heat.

Metals have a shiny metallic luster.

Metals are good conductors of electricity.

Metals are silver-gray—except gold and copper.

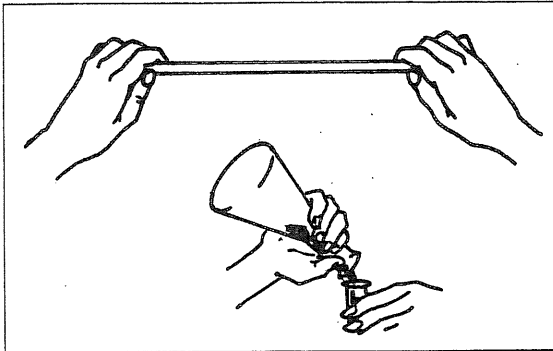


Figure A

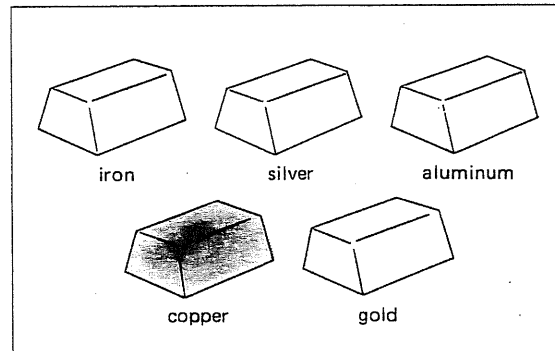


Figure B

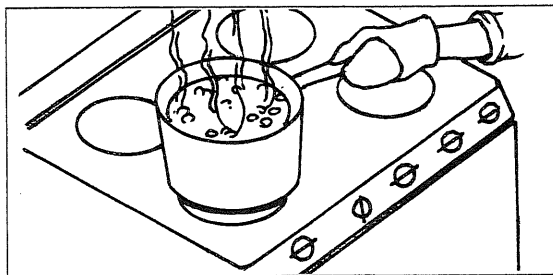


Figure C

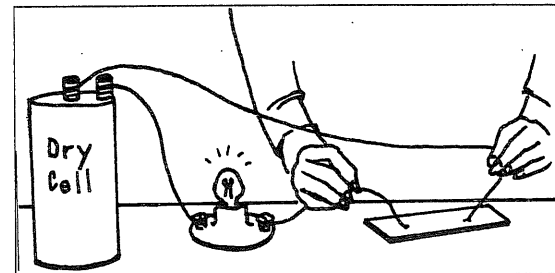


Figure D

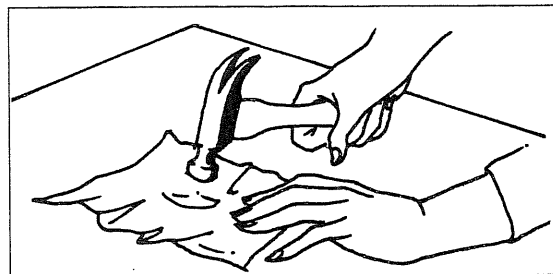


Figure E

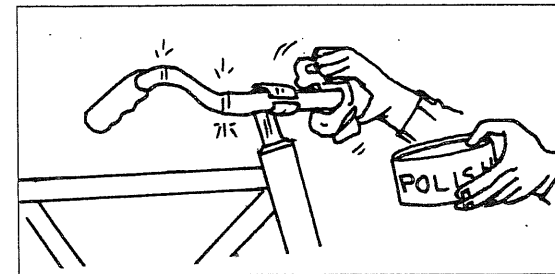


Figure F

FILL IN THE BLANK

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

element
heat
metal
silver-gray
copper

electricity
mercury
atoms
solid

metallic luster
malleable
nonmetal
gold

1. Matter is made up of tiny parts called _____.
2. Matter that has only one kind of atom is called an _____.
3. An element is identified as solid, liquid, or gas. An element is also identified as a _____ or _____.
4. All metals except one are in the _____ state.
5. The only metal that is a liquid at room temperature is _____.
6. The shine of a metal is called _____.
7. Most metals let some _____ and _____ pass through them.
8. Matter that can be hammered without breaking is said to be _____.
9. All but two metals have a _____ color.
10. Only the metals _____ and _____ are not silver-gray.

MATCHING

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

Column A

- _____ 1. metallic luster
_____ 2. malleable
_____ 3. silver-gray
_____ 4. mercury
_____ 5. element

Column B

- a) can be hammered without breaking
b) a liquid metal
c) has only one kind of atom
d) shine
e) color of most metals

ABOUT SOME METALS

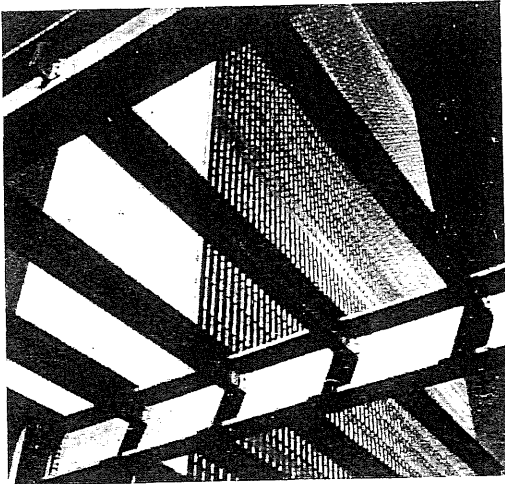


Figure G Metals are used where great strength is needed.

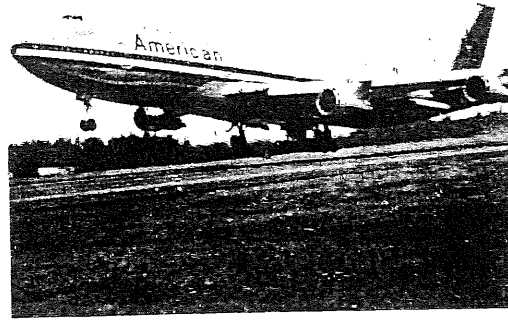


Figure H Aluminum is a light-weight metal. Most airplane bodies are made of aluminum.

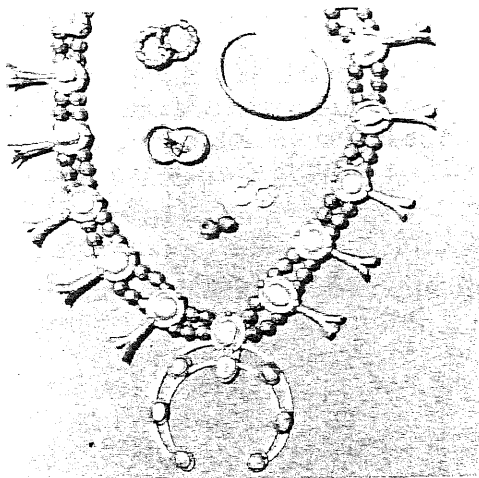


Figure I Metals, like gold and silver, are used as jewelry.

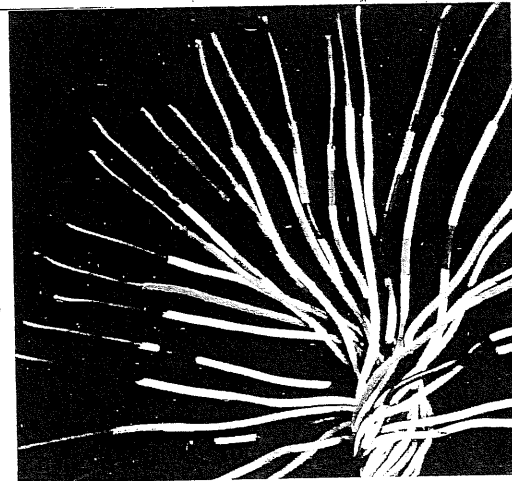


Figure J Most electrical wires are made of the metal copper.

WHICH PROPERTY?

Each of the following objects can be made because of a special property of metal. Which property makes it possible to make each of the objects? Write the name of the property in the space next to the object.

1. aluminum foil _____
2. electrical wire _____
3. pots and pans used for cooking _____
4. automobile trim _____
5. mercury thermometer _____

TRUE OR FALSE

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

- _____ 1. An element has only one kind of atom.
- _____ 2. A metal is a kind of matter.
- _____ 3. All metals are solid.
- _____ 4. Metals conduct heat well.
- _____ 5. Metals conduct electricity well.
- _____ 6. Mercury is a metal.
- _____ 7. Mercury takes the shape of its container.
- _____ 8. Iron takes the shape of its container.
- _____ 9. The color of copper is silver-gray.
- _____ 10. Matter that is malleable breaks apart easily.

WORD SCRAMBLE

Below are several scrambled words you have used in this Lesson. Unscramble the words and write your answers in the spaces provided.

- 1. RUSTEL _____
- 2. BLAMELEAL _____
- 3. CRUMYER _____
- 4. PROPEC _____
- 5. LETAM _____

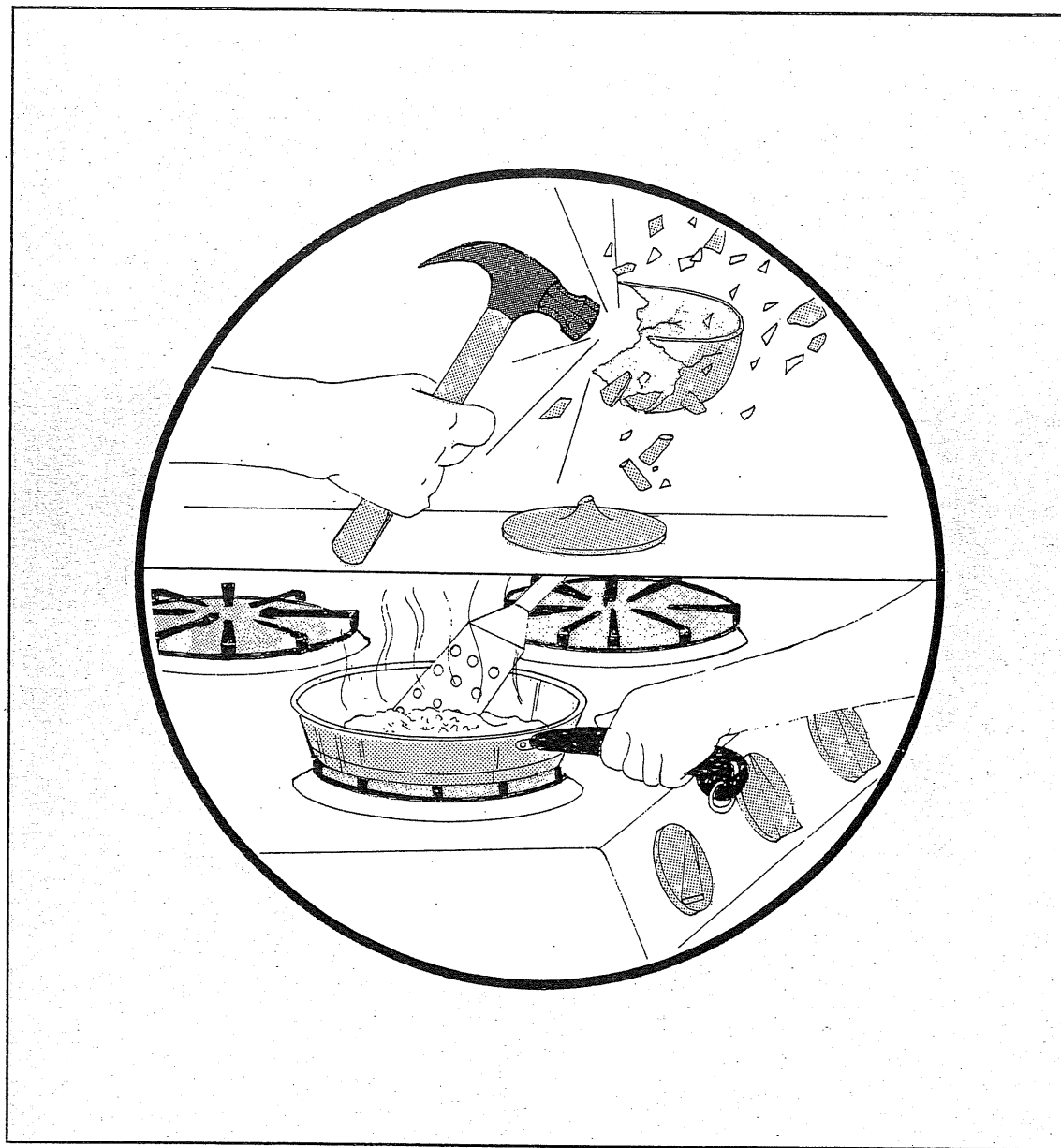
REACHING OUT

Gold is a metal. So is aluminum. Why is gold so expensive and aluminum so cheap?

ATOMS and ELEMENTS

What are the properties of nonmetals?

16



insulator [IN-suh-layt-ur]: substance that does not conduct heat or electricity easily

LESSON | What are the properties 16 | of nonmetals?

You know from your own experience what things are metals. You also have a good idea what things are not metals. What properties do all nonmetals have?

The properties of nonmetals are:

- Nonmetals are found in all states. Some are solids. Some are gases. And one nonmetal—bromine [BROH-meen]—is a liquid. All elements that are gases at room temperature are nonmetals.
- Nonmetals come in many colors. Bromine is a dark red liquid. Sulfur is yellow. Phosphorus [FAHS-fur-us] is white or red. Iodine is a steel-gray solid. Many gases have no color. They are invisible.

Some of the properties of nonmetals are exactly the opposite of the properties of metals.

- Nonmetals are poor conductors of heat and electricity. A substance that does not conduct heat and electricity is called an **insulator** [IN-suh-layt-ur].
- Nonmetals have no metallic luster.
- Nonmetals are not malleable. They break apart when they are hammered.
- Some nonmetals have odors. Chlorine is a greenish-yellow gas with a terrible odor. In fact, chlorine is poisonous.

We need nonmetals in our lives. The gases we breathe are nonmetals. Oxygen is the most important of these gases. Oxygen is a part of water, too. We cannot live without air and water.

WHAT DO THE PICTURES SHOW?

Look at each Figure. Then answer the questions.

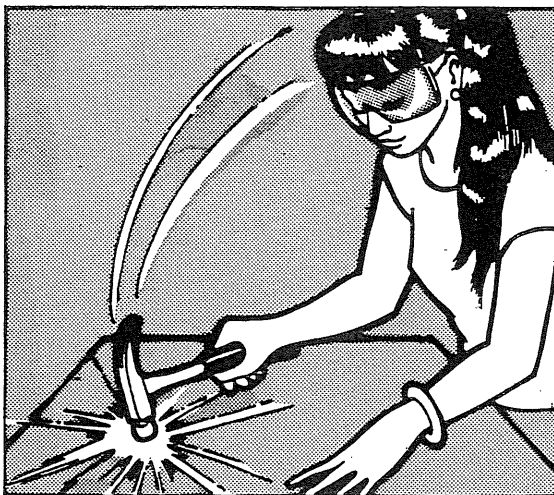


Figure A

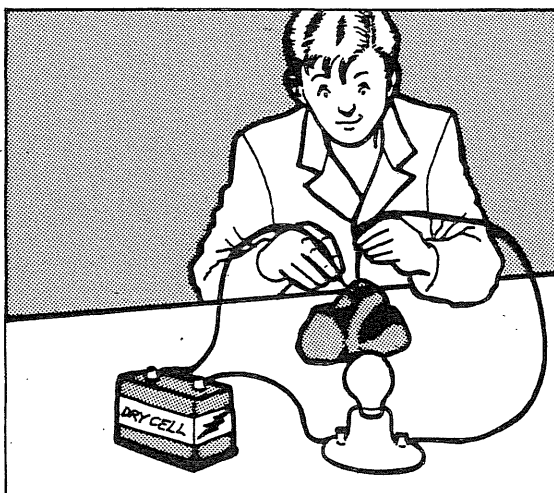


Figure B



Figure C

1. A malleable solid _____
does, ~~does~~ not
break apart when it is hammered.
2. The solid in this picture
_____ malleable.
is, is not
3. The solid in this picture probably is
a _____ .
metal, nonmetal
4. _____ are malleable.
Metals, Nonmetals
5. Sulfur is a _____ conduc-
tor of electricity.
good, poor
6. Sulfur is a _____ .
metal, nonmetal
7. Nonmetals are _____
good, poor
conductors of electricity.
8. Pots and pans are made of metals.
Metals are _____
good, poor
conductors of heat.
9. The handle of the pan in this picture
is covered with a _____
metal, nonmetal
10. Nonmetals are _____
good, poor
conductors of heat.

MULTIPLE CHOICE

In the space provided, write the letter of the word that best completes each statement.

- _____ 1. All nonmetals are
a) matter. b) energy.
c) liquids. d) malleable.
- _____ 2. Matter that is a gas at room temperature must be a
a) conductor. b) metal.
c) nonmetal. d) insulator.
- _____ 3. Nonmetals are
a) good conductors of heat and electricity. b) poor conductors of heat and electricity.
c) malleable. d) shiny.
- _____ 4. _____ know that sulfur is not malleable because sulfur is
a) matter. b) a metal.
c) a nonmetal. d) solid.
- _____ 5. An example of a poisonous gas is
a) oxygen. b) hydrogen.
c) bromine. d) chlorine.

TRUE OR FALSE

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

- _____ 1. Nonmetals are found in solid, liquid, and gas states.
- _____ 2. At room temperature, a metal can be invisible.
- _____ 3. Some nonmetals are invisible.
- _____ 4. Phosphorus is invisible.
- _____ 5. Nonmetals have a metallic luster.
- _____ 6. Nonmetals come in only a few colors.
- _____ 7. Metals are malleable.
- _____ 8. Nonmetals can be hammered. (*Careful, this is a trick question!*)
- _____ 9. Nonmetals are good conductors of electricity.
- _____ 10. Metals protect us from heat.

COMPLETE THE CHART

Complete the chart by filling in the missing information.

	Element	What is its state?	Is it a metal or nonmetal?	Does it have metallic luster?	Is it malleable?	Is it a good conductor of electricity?	Is it a good conductor of heat?
1.	aluminum						
2.	oxygen						
3.	phosphorus						
4.	iron						
5.	sulfur						
6.	chlorine						
7.	copper						

COMPLETE SENTENCES

Choose the correct word or term for each statement. Write your choice in the spaces provided.

- Gases are _____ .
metals, nonmetals
- This book is a _____ .
metal, nonmetal
- Metals are _____ conductors of electricity.
good, poor
- Nonmetals are _____ conductors of heat.
good, poor
- Metals _____ malleable.
are, are not
- _____ nonmetals are poisonous.
All, Some
- Chlorine is a _____ .
liquid, gas
- Chlorine is _____ .
dangerous, pleasant smelling
- _____ nonmetals have an odor.
Some, All
- Oxygen is a nonmetal because it is _____ .
a gas, needed for life