

Name: _____

EXPLAIN THAT ELEMENT

In "Name That Element!" (p. 20), you read about a mystery element. Use this skills sheet to summarize what you learned about the element.

1. Complete the box so that it represents the mystery element's box in the periodic table. Use your own words to define atomic mass and atomic number.

Group _____

Element Symbol

_____ . _____

Atomic Number

Definition: _____

Element Name

Atomic Mass

Definition: _____

2. Describe three other basic properties (such as color or abundance) of the mystery element that you learned about in the article.

A. _____

B. _____

C. _____

3. Explain the following:

A. Why is an element's atomic number a good way of distinguishing between different elements? _____

B. The mystery element, manganese, and silver are which type of metal? _____

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EATING ELEMENTS

In “Name That Element!” (p. 20), you read about the element copper. Like many elements, copper is an important dietary *mineral* that is needed for a healthy diet. These minerals play a vital role in many processes in the body. *Macrominerals* are elements your body needs in larger amounts. *Trace minerals* like copper are needed in much smaller amounts. The chart below shows some minerals that are important to human health. Study the chart and then answer the questions that follow.

DIETARY MINERALS

MINERAL	RECOMMENDED DAILY ALLOWANCE (RDA)*	USES IN THE BODY	BEST SOURCES
Potassium	4,700 mg	Potassium is a critical component of cells. It helps muscles contract and aids in maintaining fluid balance in the body. Potassium also helps your body maintain a healthy blood pressure.	Meats and fish, vegetables (including potatoes with the skin), fruits (citrus and bananas), dairy (milk and yogurt)
Calcium	1,000 milligrams (mg)	Most of the calcium in your body is used to build strong bones and teeth. It is also used in other processes, such as helping muscles and blood vessels expand and contract.	Dairy products (milk and yogurt), green leafy vegetables (spinach), small fish with bones you can eat (sardines)
Magnesium	320 mg (female) 420 mg (male)	Magnesium is used in many chemical reactions in your body, including those that produce energy and those that create proteins. It is also needed to make DNA molecules.	Fruits and vegetables, nuts (almonds and cashews), beans, soy, whole grains
Iron	18 mg (female) 8 mg (male)	Iron is a part of hemoglobin, the protein in red blood cells that carries oxygen through the body. It is also a component of myoglobin, an important protein in muscles.	Beans, dried fruits, eggs, red meats, seafood, iron-fortified cereals, whole grains
Copper	900 micrograms (mcg)	Copper helps drive the reactions that form hemoglobin in red blood cells. It is also needed to build collagen—a protein in the body's connective tissues and in your nose and earlobes.	Organ meats (liver), seafood (oysters), nuts, seeds, whole-grain cereals
Iodine	150 mcg	Iodine is used by the thyroid gland to power metabolism, which turns food into energy that can be used by the body.	Iodized table salt, fish (cod, haddock, perch), kelp

*ESTIMATED AMOUNT NEEDED EACH DAY FOR AN ADULT TO STAY HEALTHY. CHART IS ORDERED FROM LARGEST TO SMALLEST RECOMMENDED DAILY ALLOWANCE.

QUESTIONS

- How many milligrams of potassium does an adult need each day?
- Elements are classified as macrominerals if the minimum dietary requirement is greater than 100 milligrams. Which minerals in the chart are macrominerals?
- Meat is a good source of which element(s)?
- Which element(s) is/are involved in creating hemoglobin?
- Based on what you learned in the chart, what is one health risk a person might have if his or her diet doesn't include enough calcium?

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COLLECTING COPPER

In “Name That Element!” (p. 20), you learned about the element copper. Read the following passage to find out how the shiny reddish-brown metal is extracted from rocks. Then answer the questions that follow.

MINING FOR METAL

From coins to electrical wires, copper is one of the world’s most commonly used metals. But collecting copper from Earth’s crust is no easy task.

On average, every 1,000 kilograms (2,205 pounds) of Earth’s outer rock layer contains only 33 grams (1.1 ounces) of copper. It’s too expensive to separate the metal from these rocks. Ores are deposits with high enough concentrations of the metal to make mining feasible. A typical copper ore contains between 0.5 and 2.0 percent of the metal.

The vast majority of copper is collected in open-pit mines. Workers use explosives and machines to remove the ore—leaving behind massive holes. The collected ore is refined. The rock is brought to factories, where it is crushed. Chemicals, heat, and other techniques are used to separate pure copper from the rock.

Mining has major environmental impacts. Open-pit mines disrupt ecosystems, and chemicals used in mining can contaminate groundwater. Today, more copper is being recycled from sources like discarded wiring and pipes. Recovering used copper also uses 5 percent less energy than mining and reduces the environmental damage.

QUESTIONS

1. Which of the following is the BEST definition of Earth’s crust?

- (A) Earth’s outer layer of rock
- (B) rock that contains copper
- (C) rocks on Earth
- (D) rocks left on Earth’s surface after mining

2. Which of the following deposits would be classified as a copper ore? Rocks with:

- (A) 33 grams of copper in every 1,000 kilograms of rock.
- (B) 55 grams of copper in every 1,000 kilograms of rock.
- (C) 0.03% copper.
- (D) 0.5% copper.

3. Which of the following is the purpose of refining?

- (A) to remove ore from the ground
- (B) to separate pure copper from ore
- (C) to create ore deposits
- (D) to reduce the amount of mining needed

4. What is the purpose of the last paragraph?

- (A) to explain how copper is recycled
- (B) to describe how copper mining works
- (C) to encourage readers to use more copper
- (D) to explain the disadvantages of copper mining

5. The demand for copper continues to rise every year. Use evidence from the text to explain why recycling this metal is becoming more important.

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THE VALUE OF COPPER

In "Name That Element!" (p. 20), you read about the element copper. The properties of this element make it ideal for use in many different industries. The chart below shows some common uses of copper. Study the chart and then answer the questions that follow.

COMMON COPPER USES

USES	ADVANTAGES
Buildings	Copper and <i>alloys</i> made of the element combined with other metals are often used on the outsides of buildings because they are strong and have a unique reddish color. The metals have to be sealed to preserve the bright color. But many building designers prefer to let the copper weather naturally so that a characteristic greenish <i>patina</i> forms.
Electrical wiring	Of all metals, copper is the second-best <i>conductor</i> of electricity, behind silver. More electricity can flow through a thin copper wire than through wires made from other metals. That means less material is needed. Because copper has a high melting point, it can handle large loads of electricity without becoming damaged.
Plumbing	Many homes and buildings have copper plumbing pipes. Copper doesn't corrode as easily as other metals. It also has properties that kill bacteria. The sun's ultraviolet rays don't corrode copper, so it can be used for water pipes outside.
Automobiles	Nearly all cars have copper wiring to carry electric signals. The material is ideal for electric cars, which rely on electricity to power the motors. Because copper conducts electricity so efficiently, the cars can have smaller motors, go faster, and drive longer.
Marine industry	Seawater is highly corrosive to many materials. Alloys made from copper and nickel are resistant to salt deterioration. The alloys are often used to build ships, pipes in the ocean, and piping in <i>desalination plants</i> , where salt and minerals are removed from seawater to produce freshwater.

QUESTIONS

1. What property of copper is the main reason it is a common material for electrical uses?
2. What is a copper alloy?
3. Why might two similarly designed copper buildings look very different from one another after 10 years?
4. The motors in some electric cars have aluminum parts. What disadvantages might these cars have compared with those that have copper parts?
5. What other factors do you think affect which metals are used in these industries?