

What Makes Copper?

Track the particles that identify an element.

6.5.b "atoms of a particular element are similar but differ from atoms of other elements;"

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each statement that tells what determines an element's identity. Circle every number that describes protons, neutrons, or electrons.

Particle Clues

- ① Every element has its own kind of atom. The center of an atom, called the nucleus, contains protons. A proton has a positive charge. The number of protons identifies the element. For example, every copper atom has 29 protons, while every oxygen atom has 8 protons. Because their proton numbers differ, copper and oxygen are different elements. An atom also has electrons, tiny particles with negative charge, moving in regions outside the nucleus.
- ② Atoms of one element can have different numbers of neutrons. Neutrons are particles in the nucleus with no charge. Copper atoms always have 29 protons, but some copper atoms have 34 neutrons and others have 36 neutrons. These versions are still copper because the proton number did not change. Atoms with different neutron numbers have different masses. They are called isotopes. A change in neutron number can make atoms of the same element different without making a new element.
- ③ Electrons can change too. A neutral copper atom has 29 electrons, the same number as its 29 protons. If a copper atom loses one electron, it has 28 electrons and a 1^+ charge. It is a copper ion, not a new element, because it still has 29 protons. Oxygen can also form ions. When an oxygen atom gains two electrons, it has 10 electrons and a 2^- charge, yet it remains oxygen. Proton number, not electron number or charge, decides the element's identity.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Why are copper and oxygen different elements, according to the passage?

2 Two copper atoms have 34 neutrons and 36 neutrons. Why are both atoms still copper?

3 A neutral copper atom loses one electron. State its new number of electrons, its charge, and whether it is still copper.

4 Which particle number decides an atom's element identity? Name two particle changes that can happen without making a new element.

3 YOUR TURN _____ Your own words

Write four sentences about two copper atoms. Give both atoms 29 protons, but make them differ in neutron number. State one effect of the difference and explain why both atoms are copper.

PART 1 • READ AND MARK

Underline each statement that tells what determines an element's identity. Circle every number that describes protons, neutrons, or electrons. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Why are copper and oxygen different elements, according to the passage?	Copper atoms have 29 protons, while oxygen atoms have 8 protons. Different proton numbers mean different elements.
2	Two copper atoms have 34 neutrons and 36 neutrons. Why are both atoms still copper?	Both atoms still have 29 protons. The proton number identifies the element, even when the neutron number differs.
3	A neutral copper atom loses one electron. State its new number of electrons, its charge, and whether it is still copper.	It has 28 electrons and a 1^+ charge. It is still copper because it still has 29 protons.
4	Which particle number decides an atom's element identity? Name two particle changes that can happen without making a new element.	The number of protons decides identity. The number of neutrons can change, and the number of electrons can change, without making a new element.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Copper atom A has 29 protons and 34 neutrons. Copper atom B has 29 protons and 36 neutrons. The atoms have different masses because their neutron numbers differ. Both atoms are copper because they have the same number of protons.

Accept any accurate pair of copper atoms with 29 protons and different neutron numbers. Students should explain that neutron differences can change mass but do not change the element's identity.