

MATTER HAS A PATTERN

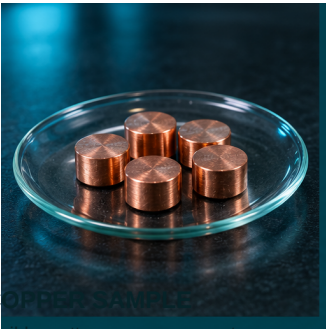
Read the pattern.
Use the evidence.
Escape the lab.

FIELD QUESTIONS

1. What does a position show?
2. Which properties are evidence?
3. What stays the same?

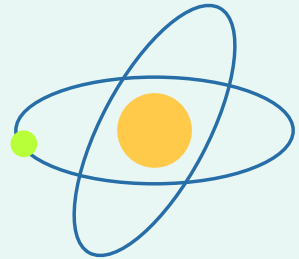
Elements and atoms

Matter is made of atoms. An element is matter made of one type of atom.
An atom is the smallest unit that keeps the properties of an element.



Copper coins
Visible matter: many copper atoms

SIMPLIFIED ATOM MODEL



Not to scale. Subatomic parts are not the focus.

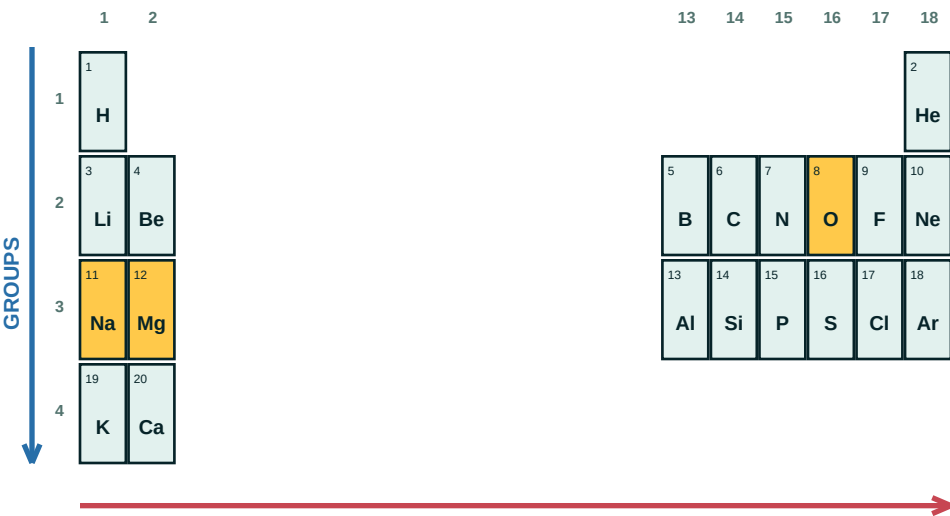
ELEMENT = ONE TYPE OF ATOM

Different samples can contain different numbers of atoms.
The type of atom identifies the element.

POINT + SAY Point to the copper sample. Point to the atom model. Say: Copper is an element.

Read the periodic table

The periodic table is a map of elements. Groups go down. Periods go across. An element's position helps scientists compare patterns.



Use coordinates

Na: Group 1, Period 3 | Mg: Group 2, Period 3 | O: Group 16, Period 2

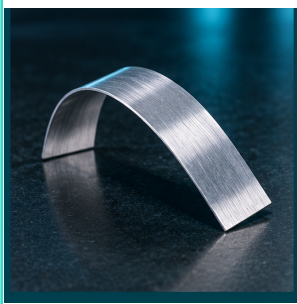
TRACE

Trace down Group 1. Then trace across Period 3. Which highlighted elements are in Period 3?

Grade 7 focus: use observable properties. Family names are not needed.

Classify with properties

Scientists use evidence to classify elements as metals, nonmetals, or metalloids. These are common patterns, not rules based on one clue alone.



METAL

- often shiny
- often bends
- conducts well



NONMETAL

- may look dull
- solid may break
- often poor conductor



METALLOID

- some metal clues
- some nonmetal clues
- mixed evidence

MATCH Match: bends and conducts well -> metal. Mixed evidence -> metalloid. Often conducts poorly -> nonmetal.

Illustrative samples: aluminum, sulfur, and silicon. Appearance alone is not enough.

Properties are evidence

A property is a characteristic that scientists observe or measure. Use more than one property when you compare substances.

**COLOR**

what it looks like

**SOLUBILITY**

how well it dissolves

**HARDNESS**

resistance to scratching

**DENSITY**

mass in a given volume

**CONDUCTIVITY**

transfer of heat or electricity

**MELTING POINT**

solid becomes liquid

**BOILING POINT**

liquid becomes gas

**VISCOSITY**

resistance to flowing

**MALLEABILITY**

ability to bend or flatten

SAY Choose one property. Say: I can compare ____ by observing or measuring ____.

Mixture or compound?

A mixture contains two or more substances that keep their separate compositions. A compound contains two or more different elements joined chemically in a fixed composition.

MIXTURE



Different substances remain separate.

COMPOUND



Different elements are joined together.

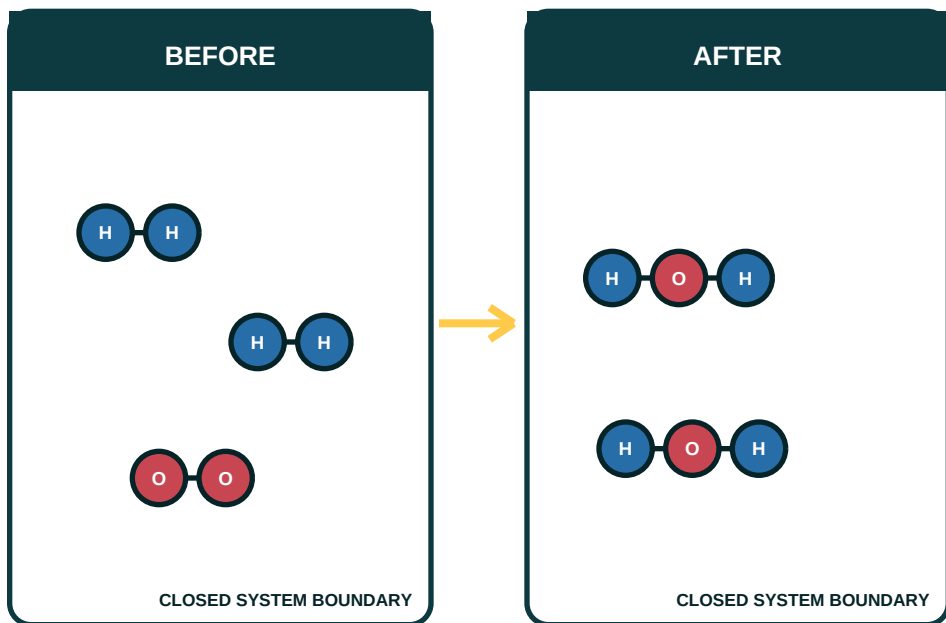
Particle models are simplified and not to scale. Letters identify particle types.

CIRCLE + SAY

Circle the model that can be separated by physical processes. Explain using the word separate or joined.

Atoms stay accounted for

In a closed system, matter cannot enter or leave. Atoms can rearrange into new molecules, but the number and type of atoms stay the same. Therefore, total mass stays constant.



BEFORE: H = 4, O = 2

AFTER: H = 4, O = 2

SAME TYPES + SAME NUMBERS OF ATOMS = MASS CONSERVED

Model: 2 H₂ molecules + 1 O₂ molecule rearrange into 2 H₂O molecules

COUNT Count the H atoms and O atoms before and after. What changed? What stayed the same?

Words for the mission

Use these words when you explain evidence in the game.

ELEMENT

one type of atom

ATOM

smallest unit of an element

PROPERTY

a characteristic to observe or measure

METAL

often shiny, bendable, conductive

NONMETAL

often a poor conductor

METALLOID

mixed metal and nonmetal properties

CONDUCTIVITY

ability to transfer heat or electricity

MELTING POINT

temperature when solid becomes liquid

BOILING POINT

temperature when liquid becomes gas

SENTENCE FRAMES

This element is a ____.

It is ____ and ____.

The atoms moved. The number stayed ____.

SAY OR WRITE

Choose one frame. Say or write a complete science explanation before you enter the lab.