

Matter Model Detectives

Use particle models to sort and compare kinds of matter.

S8P1.a "Develop and use a model to compare and contrast pure substances (elements and compounds) and mixtures."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline clues that describe a pure substance, and circle clues that describe a mixture. Number the sentences that explain elements, compounds, and mixtures 1, 2, and 3.

Seeing Matter with Models

- ① Scientists use particle models to represent matter that is too small to see. In a model, each circle can stand for an atom, and circles joined together stand for particles. A pure substance contains only one kind of particle throughout a sample. Its composition stays the same, even if the sample is divided. Pure substances include elements and compounds, but the particle model helps show an important difference between them. It also lets scientists compare a sample with a mixture.
- ② An element is a pure substance made of one type of atom. Its model shows identical single atoms or identical groups made from that one atom type. For example, a sample of copper has only copper atoms. A compound is also pure, yet each particle contains atoms of two or more elements chemically joined in a fixed ratio. Water has particles with hydrogen and oxygen atoms joined together. Every water particle has the same atom combination.
- ③ A mixture contains two or more substances physically combined, not chemically joined into one repeated particle. A model of trail mix would show separate raisins, nuts, and chocolate pieces together. Different parts of a mixture can have different amounts of each substance. The substances keep many of their own properties and can often be separated by physical methods. Filtering can remove sand from water, while evaporation can leave dissolved salt behind. Compared with a pure substance, a mixture has more than one kind of particle.

2 ANSWER WITH EVIDENCE

- 1** A particle model shows only identical, single atoms. Is the sample an element, a compound, or a mixture? Explain using the model.

- 2** Another model shows identical particles, each built from two different atom types joined in the same ratio. How is this model like an element model, and how is it different?

- 3** A model contains several kinds of separate particles together. Which category of matter does it represent? Give two reasons from the passage.

- 4** Two containers hold the same pure substance. One sample is divided into smaller portions. What should remain the same in every portion?

3 YOUR TURN _____ Your own words

Create three particle models in the panels: an element, a compound, and a mixture. Make a symbol key, label each panel, and use your models to show what makes the three categories different.

Three empty rectangular boxes are provided for drawing. Each box has a dashed horizontal line near the bottom, indicating where to draw the base of the object. The boxes are arranged horizontally and are identical in size and layout.

PART 1 • READ AND MARK

Underline clues that describe a pure substance, and circle clues that describe a mixture. Number the sentences that explain elements, compounds, and mixtures 1, 2, and 3. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	A particle model shows only identical, single atoms. Is the sample an element, a compound, or a mixture? Explain using the model.	It is an element because it has one type of atom and only one kind of particle.
2	Another model shows identical particles, each built from two different atom types joined in the same ratio. How is this model like an element model, and how is it different?	Both models show pure substances with one kind of particle. The compound model has two or more atom types joined together, while an element model has only one atom type.
3	A model contains several kinds of separate particles together. Which category of matter does it represent? Give two reasons from the passage.	It represents a mixture. It has more than one kind of particle, and its substances are physically combined rather than joined into one repeated particle.
4	Two containers hold the same pure substance. One sample is divided into smaller portions. What should remain the same in every portion?	The composition should remain the same. Each portion should contain the same one kind of particle.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Key: ● = helium atom, ○ = carbon atom, △ = oxygen atom. Panel 1, Element: several separate ● atoms. Panel 2, Compound: several identical ○△△ particles, with the symbols touching. Panel 3, Mixture: separate ● atoms mixed with several ○△△ particles.

Accept any accurate symbol key and particle models. An element must show one atom type, a compound must show identical joined particles with at least two atom types, and a mixture must show at least two kinds of particles together.