

Tracing Sugar Atoms

Use model evidence to build and revise scientific explanations.

HS-LS1-6 "Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline evidence that shows where atoms from sugar go. Circle each word or phrase that limits what the model can support, so your explanation stays matched to the evidence.

Following Atoms Through a Model

- ① In a cell-model simulation, colored atoms help scientists trace matter. A glucose molecule begins with carbon, hydrogen, and oxygen atoms. The model shows the glucose molecule breaking into smaller carbon-containing pieces. These pieces do not disappear. Some join molecules that contain nitrogen. In the next frame, the new molecule has a carbon framework from the glucose pieces and includes nitrogen from a separate source. This model is evidence that atoms from sugar can be rearranged and combined with other elements. It does not show atoms being created or destroyed. Scientists use the changing connections and color labels to follow where atoms go.
- ② Evidence from a model must match the claim. Suppose a simulation labels carbon from sugar and sulfur from another source. Later, sulfur connects to a carbon-containing piece labeled as from sugar. This supports the claim that carbon from sugar may combine with sulfur in a larger carbon-based molecule. It does not show that hydrogen or oxygen from sugar joined sulfur. A careful explanation names only the atoms the model tracks. If additional frames label hydrogen and oxygen entering the product, a scientist could revise the explanation to include that evidence. Models can support pathways without showing every chemical reaction detail.
- ③ Scientists also compare models with observations or other simulations before accepting an explanation. In one model, each carbon atom in sugar carries a visible tag. After several steps, tagged carbon appears in a new large molecule that also contains nitrogen atoms from outside the sugar. A sound explanation links this result to a claim: sugar provided carbon, and nitrogen came from another source. It should use words such as may or supports because a model represents a possible process. When new evidence appears, scientists revise the claim rather than adding atoms that were not tracked. The goal is to explain how matter is rearranged into new carbon-based molecules.

2 ANSWER WITH EVIDENCE Use the passage

- 1 Use evidence from paragraph 1 to explain how matter from glucose can become part of a different molecule. Include what happens to glucose and one element from another source.

- 2 What two features of a model can scientists use to trace where atoms go?

- 3 Write a claim supported by the tagged-carbon model in paragraph 3. Include both the sugar source and the outside source.

- 4 A student claims that carbon, hydrogen, and oxygen from sugar combined with sulfur. The simulation tracked only sulfur joining a carbon-containing piece from sugar. Revise the student's claim so it matches the evidence.

3 YOUR TURN Your own words

A simulation first shows tagged carbon from sugar connected to phosphorus from another source in a large carbon-based molecule. A later frame also shows tagged oxygen from sugar in that molecule. Write exactly 3 sentences: an initial explanation from the first frame, a revised explanation from the later frame, and a sentence that names the model evidence.

PART 1 • READ AND MARK

Underline evidence that shows where atoms from sugar go. Circle each word or phrase that limits what the model can support, so your explanation stays matched to the evidence. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Use evidence from paragraph 1 to explain how matter from glucose can become part of a different molecule. Include what happens to glucose and one element from another source.	Glucose breaks into smaller carbon-containing pieces, and some pieces join molecules containing nitrogen from a separate source.
2	What two features of a model can scientists use to trace where atoms go?	Color labels and changing connections between atoms.
3	Write a claim supported by the tagged-carbon model in paragraph 3. Include both the sugar source and the outside source.	Carbon from sugar may become part of a new large carbon-based molecule that also contains nitrogen from another source.
4	A student claims that carbon, hydrogen, and oxygen from sugar combined with sulfur. The simulation tracked only sulfur joining a carbon-containing piece from sugar. Revise the student's claim so it matches the evidence.	Carbon from sugar may combine with sulfur in a larger carbon-based molecule.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Frame A supports the claim that carbon from sugar may combine with phosphorus from another source in a large carbon-based molecule. After Frame B, I would revise my explanation to say that carbon and oxygen from sugar may combine with phosphorus. The tagged atoms and their new connections are evidence for this revision.

Accept explanations that connect a claim to tracked labels or changing atom connections and use cautious language such as may or supports. Do not require students to name a specific macromolecule or describe chemical reaction steps.