Water From Air

Trace evidence through a technical explanation.

CCSS.ELA-Literacy.RST.9-10.1 "Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two details that support a conclusion about what controls the device's water collection. Number the details that describe the process in the order they occur, so you can trace how air becomes liquid water.

A Device That Collects Humidity

1. On a clear spring morning, engineers at a coastal research station tested a device that makes drinking water from humid air. The device contains a metal-organic framework, a porous material whose tiny spaces attract water molecules. At night, when relative humidity rose to 65 percent, a fan pulled air through 200 grams of the material. The material gained 35 grams of mass by morning. Researchers then sealed the chamber and warmed it with sunlight. As the material heated, it released water vapor, which traveled to a cooler surface and condensed into liquid.

2. To determine whether the porous material, rather than the chamber itself, captured the water, the team ran a control test. They used the same fan, humidity, and time, but left the material tray empty. The empty chamber gained less than two grams overnight. In a second trial, researchers reduced nighttime humidity to 30 percent. The material then gained only 12 grams. These comparisons show that both the material's pores and the amount of water vapor in the air affect collection. They do not show that the device can supply all of a household's daily water needs.

3. Several limits remain before such systems could be widely used. The test collected water from air that was fairly humid, and the lower-humidity trial produced much less captured water. In addition, sunlight heated the chamber only after sunrise, so no liquid was collected during the nighttime capture step. Engineers could increase output by using more of the porous material or by improving heat transfer to the condenser. However, those changes could raise cost or require a larger device. The experiment supports a limited conclusion: this design can collect and release water under tested conditions, but its performance depends on humidity and design choices.

2 ANSWER WITH EVIDENCE

Use the passage

1. What specific evidence supports the conclusion that the porous material, not just the chamber, captured most of the water?

2. How do the two humidity trials support the claim that humidity affects water collection? Cite the measurements from both trials.

3. Why does the passage say the experiment does not prove that the device can meet a household's daily water needs? Use two precise details.

4. What evidence shows that liquid water is produced after the nighttime capture step rather than during it?

3 YOUR TURN

Your own words

A town with dry nighttime air is considering this device. Write exactly three sentences that state a recommendation, cite at least two precise details from the passage, and explain one limitation or trade-off.

ANSWER KEY

Water From Air

HIGH SCHOOL · RST.9-10.1

PART 1 · READ AND MARK

Underline two details that support a conclusion about what controls the device's water collection. Number the details that describe the process in the order they occur, so you can trace how air becomes liquid water. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What specific evidence supports the conclusion that the porous material, not just the chamber, captured most of the water?	**The material gained 35 grams by morning, while the empty chamber in the control test gained less than two grams overnight.**
2	How do the two humidity trials support the claim that humidity affects water collection? Cite the measurements from both trials.	**At 65 percent relative humidity, the material gained 35 grams. At 30 percent humidity, it gained only 12 grams, showing that less water vapor in the air led to less collection.**
3	Why does the passage say the experiment does not prove that the device can meet a household's daily water needs? Use two precise details.	**The device collected only 35 grams in the humid test and only 12 grams at lower humidity. The passage also says output depends on humidity and design choices.**
4	What evidence shows that liquid water is produced after the nighttime capture step rather than during it?	**The passage says the fan pulled air through the material at night, then researchers warmed the chamber with sunlight. It also states that sunlight heated the chamber only after sunrise and that no liquid was collected during nighttime capture.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would not rely on this device as the town's main water source because the material collected only 12 grams when nighttime humidity was 30 percent. Under 65 percent humidity, it collected 35 grams, so the tested output changes substantially with air moisture. Using more porous material might increase output, but the passage notes that this change could raise cost or require a larger device.

Accept equivalent claims when students use accurate, specific evidence from the passage and explain how that evidence supports the claim. For the open task, require exactly three sentences, two or more precise details, a clear recommendation, and a stated limitation or trade-off.