Finding Usable Carbon in a Model Algae Test

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

An algae exhibit models carbon in water as dissolved carbon dioxide and dissolved bicarbonate. Each molecule or ion in either form contains one carbon atom. In this simplified model, algae use dissolved carbon dioxide directly during the short test. Temperature, light, and algae amount match across the trials. The model treats bicarbonate carbon as unavailable to the algae during this short test.

Trial	**CO_2 carbon (model units)**	**Bicarbonate carbon (model units)**	**Oxygen released during test (model units)**
P	6	4	5
Q	2	8	2

1 Which statement describes the starting carbon records?

(1) P has more total carbon and less CO_2 carbon.

(2) Q has more total carbon and more CO_2 carbon.

(3) The total carbon is the same, but P has more CO_2 carbon.

(4) Both trials have the same amount of each form.

2 Evaluate the claim that equal total carbon guarantees the same oxygen output in these tests. [1]

Answer and work

A later model changes the distribution in Q to 6 units of CO_2 carbon and 4 of bicarbonate carbon without changing the total. Other conditions match P.

3 Under the supplied model, predict which earlier oxygen reading the changed Q should approach. Explain. [1]

Answer and work

4 Describe what two measurements would check whether a high total carbon reading hides low availability to these algae. [1]

Answer and work