Tracking Carbon Inside a Leaf Model

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

A leaf model tracks carbon dioxide in a small internal store. During one light interval the store gains carbon dioxide from the chamber air and loses it as photosynthesis uses it. The model counts both routes and ignores other changes to the store.

Trial	Internal count at start	Count entering from air	Internal count at end
P	10	6	10
Q	10	2	6

1 Which trial receives less carbon dioxide from the chamber air?

(1) P only

(2) Q only

(3) Both receive the same count.

(4) The air transfer is not measured.

2 Calculate how much carbon dioxide photosynthesis uses in each trial. Use the internal store at both times. [1]

Answer and work

3 A student says the lower transfer from air in Q establishes that photosynthesis used less carbon dioxide. Evaluate the claim using the internal readings. [1]

Answer and work

In a later trial the store starts at ten, receives two units from the air, and ends at six. An additional measurement shows that respiration supplies three units of carbon dioxide to the store during the same interval.

4 Calculate how much carbon dioxide photosynthesis uses in the later trial. Explain how respiration enters the balance. [1]

Answer and work