Spotting a Leak in a Plant Gas Chamber

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

A class uses chambers to measure carbon dioxide in the air around a plant. It compares readings taken ten minutes apart. In an illuminated sealed chamber, a decline can indicate that the plant removes more CO_2 by photosynthesis than it releases through respiration. The class also runs a chamber with no plant as a blank.

Chamber	**Initial CO_2 (ppm)**	**CO_2 after ten minutes (ppm)**
Plant, lid sealed	650	570
No plant, lid sealed	650	650
No plant, lid unlatched	650	590

1 What does the no-plant, sealed trial show about the meter readings under the test conditions? [1]

Answer and work

2 Calculate the average change per minute in CO_2 concentration for the sealed plant chamber. Include the sign. [1]

Answer and work

A student tests a plant in a chamber with an unlatched lid. The CO_2 reading drops from 650 to 610 ppm in ten minutes. The student argues that this reading by itself demonstrates net CO_2 uptake by that plant.

3 Which result shows why the new reading alone cannot demonstrate that claim?

(1) CO_2 fell in the no-plant chamber with an unlatched lid.

(2) CO_2 stayed the same in the no-plant chamber with a sealed lid.

(3) All chambers began at the same measured concentration.

(4) CO_2 fell in the sealed plant chamber.

4 Propose a fair comparison to test whether changing light level affects net CO_2 uptake by the same plant. Identify what to measure and one condition besides the plant to hold constant. [1]

Answer and work