Counting Carbon Left After a Light Cycle

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

A sealed plant simulation reports net movement of CO_2 between air and plant. Each molecule of CO_2 has one carbon atom. During the light interval the plant removes carbon dioxide from the air on balance. In the dark interval the plant releases some carbon dioxide through respiration.

Interval	**Change in CO_2 in chamber air (mol)**
Light	−0.012
Dark	+0.006

1 Calculate how many moles of carbon atoms the plant gains on balance over both intervals. [1]

Answer and work

2 Which reading describes what respiration does to the retained carbon in the dark interval?

(1) It returns some carbon from the plant to the air.

(2) It brings more carbon from air into the plant.

(3) It changes carbon atoms into oxygen atoms.

(4) It gives the same net carbon uptake as the light interval.

One model assumes all carbon retained during the cycle goes into new glucose. Each glucose molecule has six carbon atoms. A follow-up measurement attributes only 0.00060 mol of new glucose to the cycle.

3 Calculate how much glucose the all-glucose model predicts. Show how the carbon count enters the calculation. [1]

Answer and work

4 How many moles of the retained carbon atoms does the new glucose account for? Use that result to explain why the carbon and glucose readings can both be correct. [1]

Answer and work