Comparing Leaf Readings Under Two Light Colors

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

A plant chamber simulation compares red and green light using matched leaves. The same number of photons reaches each leaf during the same interval. Temperature and the starting carbon dioxide concentration match. The model reports the fraction of incoming photons absorbed and net carbon dioxide uptake per hour.

Light	**Photon units reaching the leaf**	**Incoming photons absorbed (%)**	**Net CO_2 uptake (mmol/h)**
Red	100	80	2.1
Green	100	35	0.8

1 What do the readings support for the two matched trials?

(1) Red gives greater measured absorption and greater net CO_2 uptake.

(2) Green gives greater measured absorption and greater net CO_2 uptake.

(3) Both give the same uptake because they receive equal photon counts.

(4) The two trials differ only in temperature.

2 By how many photon units does the amount absorbed differ between the two trials? Use the incoming amounts and percentages. [1]

Answer and work

A follow-up increases the green lamp to 200 incoming photon units. A student wants to compare that result directly with the original red trial to isolate the effect of color.

3 Explain why this new comparison would not isolate color. [1]

Answer and work

4 Describe a comparison at the higher photon count that would isolate color more directly. [1]

Answer and work