

Photosynthesis: find the limiting factor

Compare light and carbon dioxide while holding the other inputs constant.

Name: _____ Date: _____

1. Set water = 100, carbon dioxide = 100 and temperature = 25°C. Change light using the first table.

2. Repeat with carbon dioxide = 40, water = 100, temperature = 25°C and light = 20, 40, 60, 100.

Record the rate on the back.

Light	CO ₂	Water	Temperature	Rate	Net gain
0	100	100	25°C		
25	100	100	25°C		
50	100	100	25°C		
75	100	100	25°C		
100	100	100	25°C		

1. When CO₂ is 40, which light values give the same rate? Explain.

2. Why is Net gain negative in darkness?

3. Name one limitation of this virtual investigation.

Teacher notes and answers

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First table rates: 0, 25, 50, 75, 100. Net gain: -12, 13, 38, 63, 88.

With CO₂ = 40, rates for light 20, 40, 60, 100 are 20, 40, 40, 40. CO₂ becomes the limiting input.

At zero light, photosynthesis is zero but the model subtracts 12 for respiration. Real respiration and photosynthesis are more complex.

Teaching notes

These results are relative model values, not measured biochemical quantities. Change one variable at a time.

Open the matching resource

<https://kiwibee.io/en/simulations/photosynthesis-simulation>

Use the student page separately from this answer section. Model outputs are illustrative and depend on the stated settings.