Jan 22 2009

Report 1 due date ? Mon Feb 09

No late submissions

No e- submissions

Hand in O_2 electrode data

Thursday Jan 29th

CALCULATIONS!

O_2 electrode

Don't refer to handout....

1) The max. solubility of O_2 in buffer (i.e. 100% O_2 solubility) is

$$13.79 \text{ mg } O_2 \text{ l}^{-1}$$

This is an approximation.

2) Obtain your data as a 'slope'. This gives you

$$\% \text{ change } O_2 \text{ min}^{-1}$$

Knowing that 100% O_2 solubility is $13.79 \text{ mg } O_2 \text{ l}^{-1}$ you can calc. the % change

e.g. If your % change was 10 (i.e. slope) then your change is

$1.38\ mg\ O_2\ min^{-1}\ l^{-1}$

3) Correct for the volume in the O_2 electrode

e.g. Volume = 25ml cps or 0.025l

$1.38\ mg\ O_2\ min^{-1}\ l^{-1} \times 0.025\ l =$

$0.0345\ mg\ O_2\ min^{-1}$

4) Calculate the amount of chlorophyll in 0.025l cps.

Note. You measured chl. in 0.5mL cp + You diluted this 1:20

Use your A_{652} reading...

$$\text{Chl } (\mu g\ ml^{-1}) = \frac{A_{652}}{0.0345}$$

Correct for your dilution factor

then calc. amount chl in 0.025L cps

5) Express O_2 data on the basis of chl content

Units: $mg\ O_2\ min^{-1}\ mg\ Chlorophyll^{-1}$

Changes to Protocol for Cp P/S

1) Prior to the centrifugation step Your filtrate needs to be divided into 6 tubes

2) After centrifugation resuspend ea. pellet in 15.6 ml sucrose buffer

3) To tube #6 add 10 ml 1/10 dilution sucrose buffer. After the centrifugation step resuspend cps in 13 ml 1/4 dilution Sucrose buffer.
Combine Your cps with those from the other group.

∴ You should have 1 tube $\bar{w}$ broken cps
5 tubes $\bar{w}$ 'intact' cps

Combine the 'intact' cps to minimize the # chl measurements that need to be done.

CALCULATIONS !

IRGA

1) Calculate ΔCO_2

Reference CO_2 – analysis CO_2

e.g 450 – 250

= 200 ppm CO_2

2) Convert ppm CO_2 into μmol CO_2 l^{-1}

$$\frac{\Delta CO_2}{22.415\left(\frac{(T+C)}{T}\right)}$$

T = 273 °K

C = temp °C

22.415 = vol. 1 mol gas

$$\frac{200}{22.415\left(\frac{(273+20)}{273}\right)}$$

= 8.3 μmol CO_2 l^{-1}

3) Multiply by flow rate

Typical flow rate = $0.1\ L\ min^{-1}$

$$0.83\ \mu mol\ CO_2\ min^{-1}$$

4) Express CO_2 exchange rate for a leaf area of $1 m^2$.

$0.83\ \mu mol\ CO_2\ min^{-1}$ is for $9\ cm^2$

$$922\ \mu mol\ CO_2\ min^{-1}\ m^{-2}$$

or

$$15.4\ \mu mol\ CO_2\ s^{-1}\ m^{-2}$$

CO_2 assimilation values

Corn: $25 \mu mol\ m^{-2}\ s^{-1}$

PPFD $1000 \mu mol\ m^{-2}\ s^{-1}$

Bean (*P. vulgaris*) $14 \mu mol\ m^{-2}\ s^{-1}$

PPFD $1200 \mu mol\ m^{-2}\ s^{-1}$ (saturating light)

P/S lab report

Introduction

* Present general info for P/S
  - find info in - Plant Phys texts
    - P/S books
    - review articles

look for recent publications

* Clearly state the objectives
  - Study light responses in C4 plant
  - Study light responses in C3 plant
  - Study influence $[O_2]$ on light response in C4 plant
  - Study influence $[O_2]$ on light response in C3 plant

Materials + Method

* Follow + cite the lab protocol
  BUT
  You must record any deviations!

Data / Results

Post on-line early next week