

ALGAE GROWTH STUDIES

Objectives: To determine the growth characteristics of a select algae species

Algae Species: *Scenedesmus dimorphus* or *Chlorella Vulgaris*

Sample Source: UTEX

Algae Media for Growth: Modified Bold Basal's Medium

Supplies: Growth Media, Tubing, Stir bar, Droppers, Cuvettes, Kimwipes, 1 Liter Filtration Flasks, 23 Watt Compact Fluorescent Bulbs

Equipment: Spectrophotometer, Hot/Stir Plate, Air Diffusers, Thermometer, pH kits, Light Meters

Safety: Gloves are to be worn during the sample handling process.

Method:

1. Measure 600 mL algae growth media into a 1 Liter Filtration Flask.
2. Add 200 mL of algae suspension.
3. Place on Hot/Stir plate and mix well. Take initial Optical Density reading at 625 nm.
4. Add air diffuser to sparge air into sample.
5. Adjust heat until the sample maintains a temperature of 30°C.
6. Turn light on and measure light intensity in foot candles with the light meter provided.
7. Measure pH, kH and temperature of the sample.
8. Determine airflow rate of air diffuser.(to be measured in the next lab)
9. Take readings for optical density and temperature every Monday and Thursday, preferably at the same time (All groups need to maintain this schedule).
10. Measure light intensity, pH, kH, NO_3^- and NO_2^- every Monday at the same time.
11. Use Excel to plot optical density as a function of time in days.
12. Use Excel to plot pH, kH, light intensity, Nitrogen and temperature with time.
13. Calculate growth rate and doubling time.
14. Calculate CO_2 concentration using pH-kH values. Plot CO_2 versus time.

Group Name _____

Initial conditions

Air flow rate:

Light Intensity:

Algae Added: 200 mL from Stock

Date	Time	OD		pH		Temp.		NO ₃ ⁻		Light		COMMENT
		Biweekly	Weekly	Biweekly	Weekly	Biweekly	Weekly	Biweekly	Weekly	Biweekly	Weekly	

ALGAE MEDIA RECIPE

Bold Basal's Medium

Modified from original

This medium is highly enriched and is used for many of the green algae

	STOCK	STOCK SOLUTION	ml/Litre
1.	KH_2PO_4	8.75 g / 500 ml	10 ml
2.	$\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$	1.25 g / 500 ml	10 ml
3.	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	3.75 g / 500 ml	10 ml
4.	NaNO_3	12.5 g / 500 ml	10 ml
5.	K_2HPO_4	3.75 g / 500 ml	10 ml
6.	NaCl	1.25 g / 500 ml	10 ml
7.	Na_2EDTA	10 g/L	1 ml
	KOH	6.2 g/L	
8.	$\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$	4.98 g/L	1 ml
	H_2SO_4	1 ml/L	
9.	Trace Metal Solution	See below*	1 ml
10.	H_3BO_3	5.75 g / 500 ml	0.7 ml

*Trace Metal

Solution:

	Substance	g/Litre
1.	H_3BO_3	2.86 g
2.	$\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$	1.81 g
3.	$\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$	0.222 g
4.	$\text{NaMoO}_4 \cdot 5\text{H}_2\text{O}$	0.390 g
5.	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	0.079 g
6.	$\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$	0.0494 g

Reference:

Stein, J. (ED.) Handbook of Phycological Methods. Culture methods and growth measurements. Cambridge University Press. 448 pp.

CORRELATION BETWEEN OPTICAL DENSITY AND DRY WEIGHT:

(Reference: Determined Experimentally for *Chlorella vulgaris*)

$$y = 0.3018x - 0.0127$$

where y is the dry weight of algae in grams and x is the Optical Density measured at 625 nm.

EXPERIMENTAL SETUP

