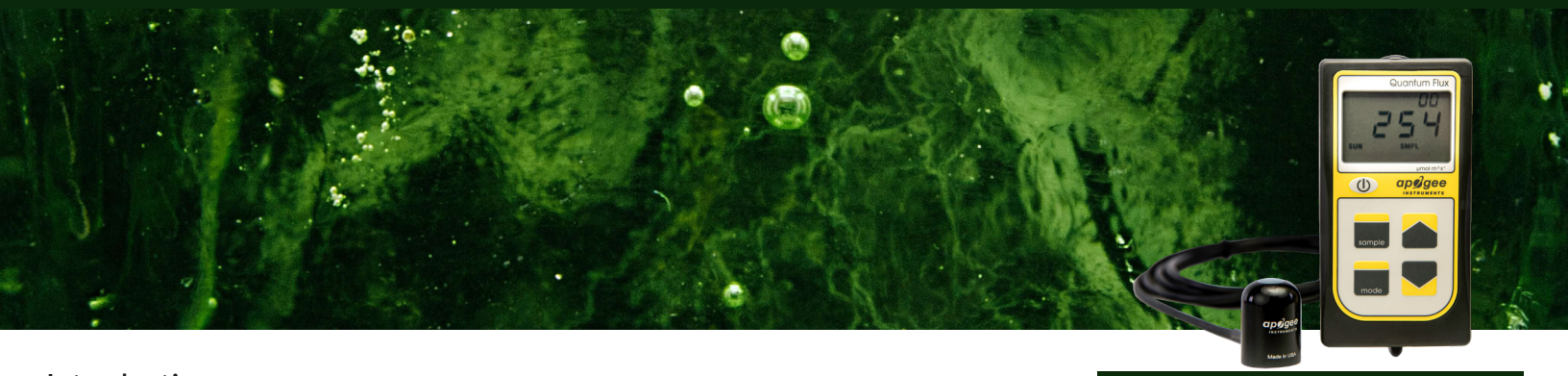
Effects of pH and CO_2 on Microalgae

MQ-200X Quantum Meter



Introduction:

While microalgae are some of the most promising alternative energy sources, microalgal biodiesel production is not yet competitive with petroleum production costs. In this study, the researchers focused on how pH and CO_2 affected microalgae growth. pH level is one of the most important factors in algal cultivation, as it determines the availability of CO_2 and algal metabolism. The production and transportation of CO_2 can also be a large cost factor.

Set Up:

The researchers used the microalgae *Chlorella sorokiniana* DOE1412 to evaluate cell growth and lipids at different pH. An optimal culturing pH range was determined by measuring the cell growth, lipid production, and CO_2 addition. The algae were first tested in Erlenmeyer flasks, but then scaled up to a flat panel photobioreactor at higher pH levels. An Apogee MQ-200X quantum meter ensured the top of the flasks were illuminated at 200 µmol photons m^{-2} s^{-1}.

Results:

This research found that biomass productivity increased in microalgae with decreasing pH levels. They found that a pH of 8 resulted in the lowest value of CO_2 addition (2.01 g CO_2 /g biomass). The fatty acid profiles and biodiesel properties were determined as a function of pH. Protein content in microalgal biomass increased with increasing pH, while the carbon to nitrogen ratio in cells decreased.

Conclusion:

pH 6 seems most beneficial for growth and lipid accumulation. However, pH 8 was more cost-effective, even though the growth rate was lower. The amount of lipid was similar regardless of pH. This research shows that there must be a balance between biomass growth, lipid production and CO_2 addition in microalgal production.

Application Summary

Summary:

Apogee's MQ-200X quantum meter helped demonstrate the need for balance between biomass growth, lipid production and CO_2 addition in microalgal production.

Apogee Sensors Used:

MQ-200X Quantum Meter

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Reference Article:

Effects of pH on cell growth, lipid production and CO2 addition of microalgae *Chlorella sorokiniana*

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