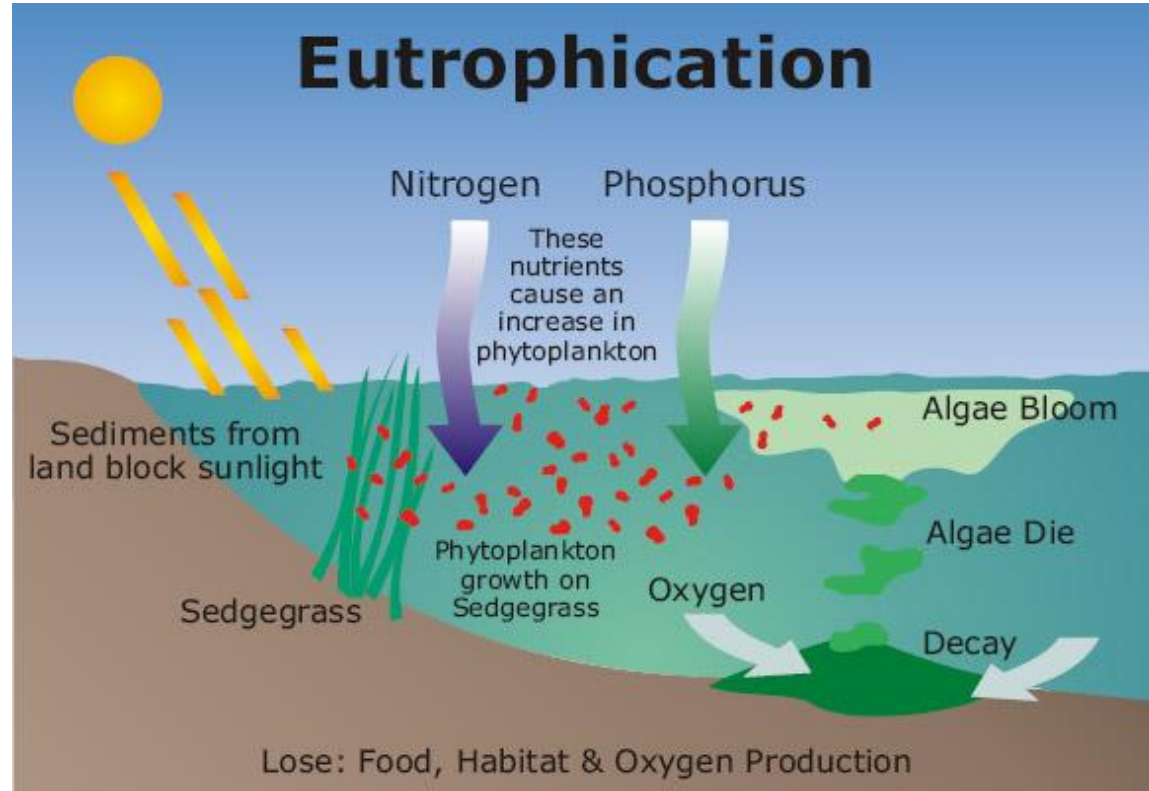


Phosphorus Wastewater Treatment

Eleanor Quirk • Michelle Nguyen • Arturo Medina • Ezequiel Ansaldi • Julia House
Paige Park • Jackson Albright • Jasmine Prince • Evan Santos • Nicholas Wan

Excess Phosphorus in the Ocean can cause Cultural Eutrophication

- Depleting Resource
- Agricultural Run-off leaks into bodies of water



Overall Goal of the Project

- Recover vital phosphorus from wastewater for use as fertilizer
- Filter nutrients such as phosphorus from wastewater to prevent eutrophication
- Our Process includes two steps: E/D and chemical precipitation



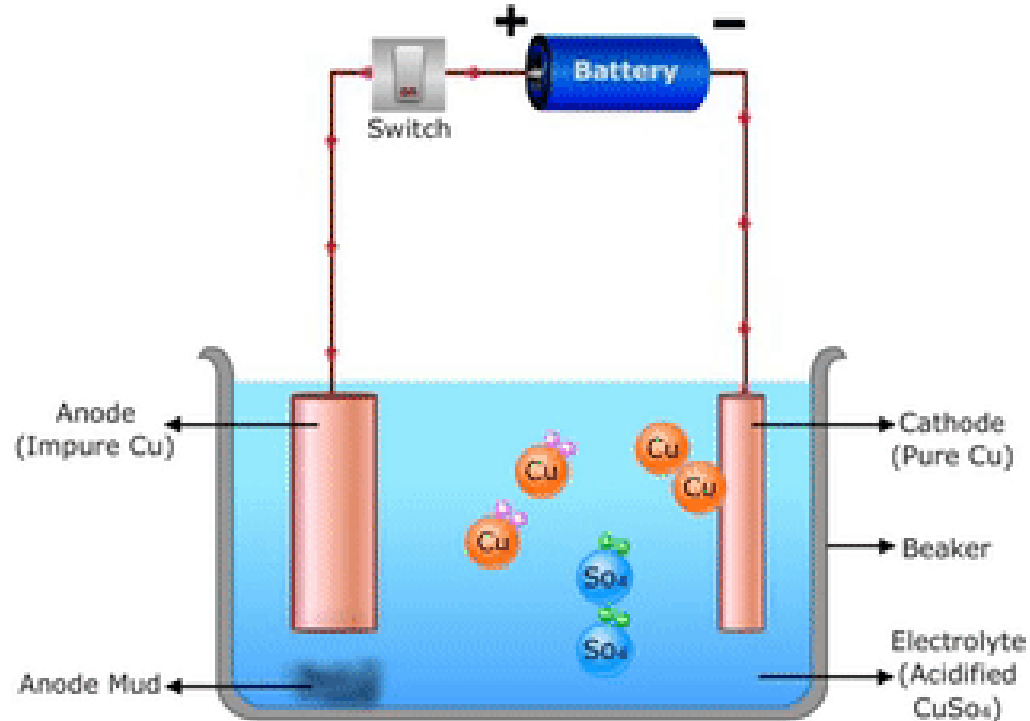
Chemical Precipitation

- Definition: Method of forming an insoluble precipitate from a solution
- Can be done by:
 - Changing the composition of the solvent to reduce the solute's solubility;
 - Converting the solute into an insoluble form
- Our method: Chemical reaction between an aqueous solute (calcium hydroxide) and an acid (phosphoric acid) to produce an insoluble precipitate (calcium phosphate)

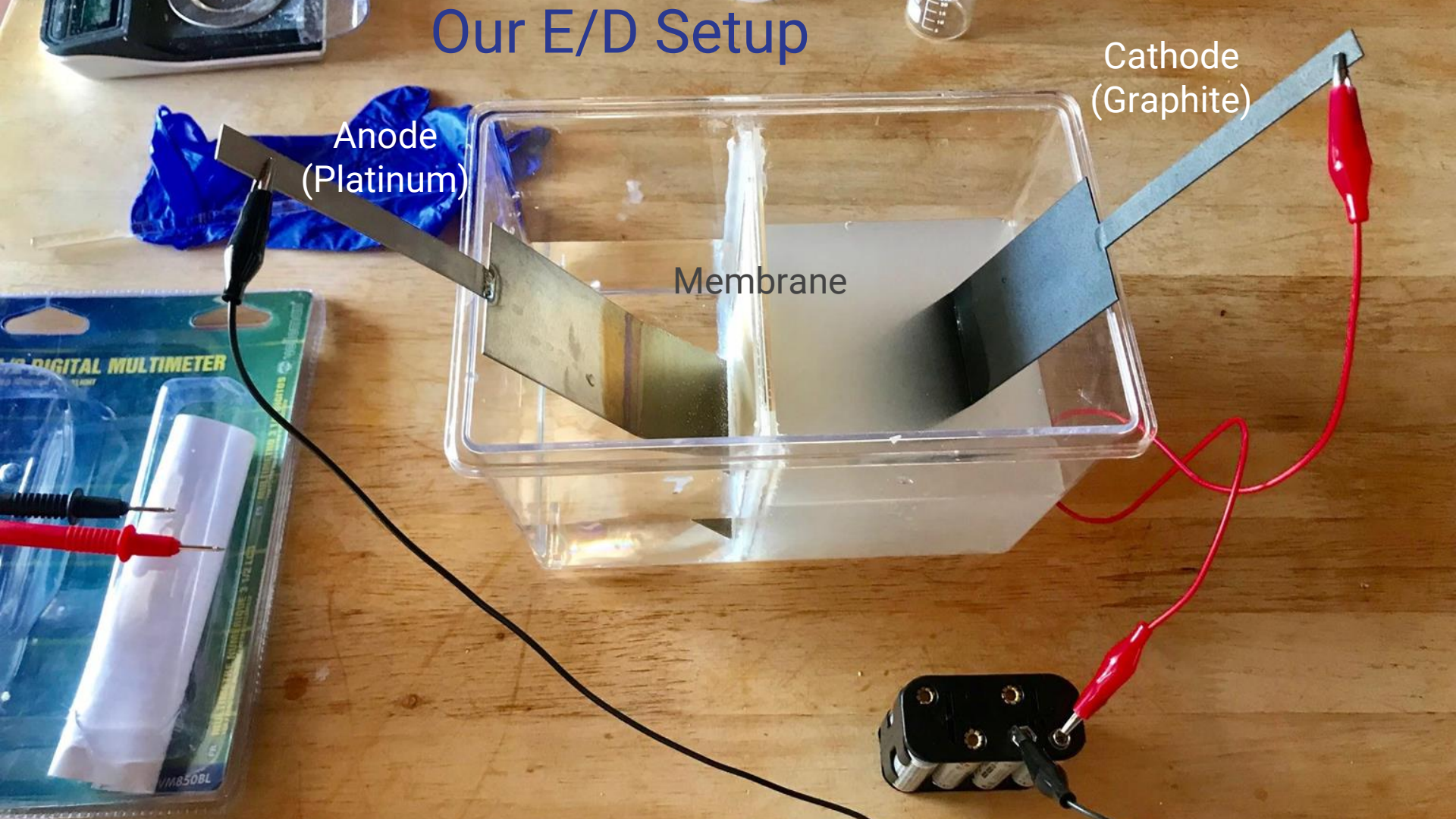


Electrodialysis Introduction

- Definition:
 - Specific form of dialysis
 - Electric field moves ions
 - Semipermeable membrane
- Purpose: separate organophosphate ions from wastewater



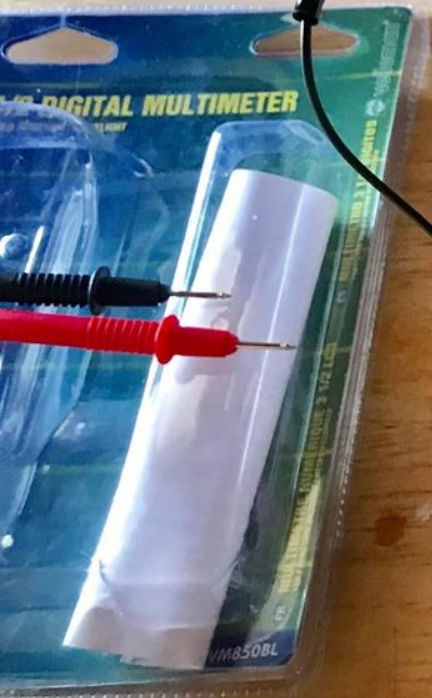
Our E/D Setup



Anode
(Platinum)

Cathode
(Graphite)

Membrane



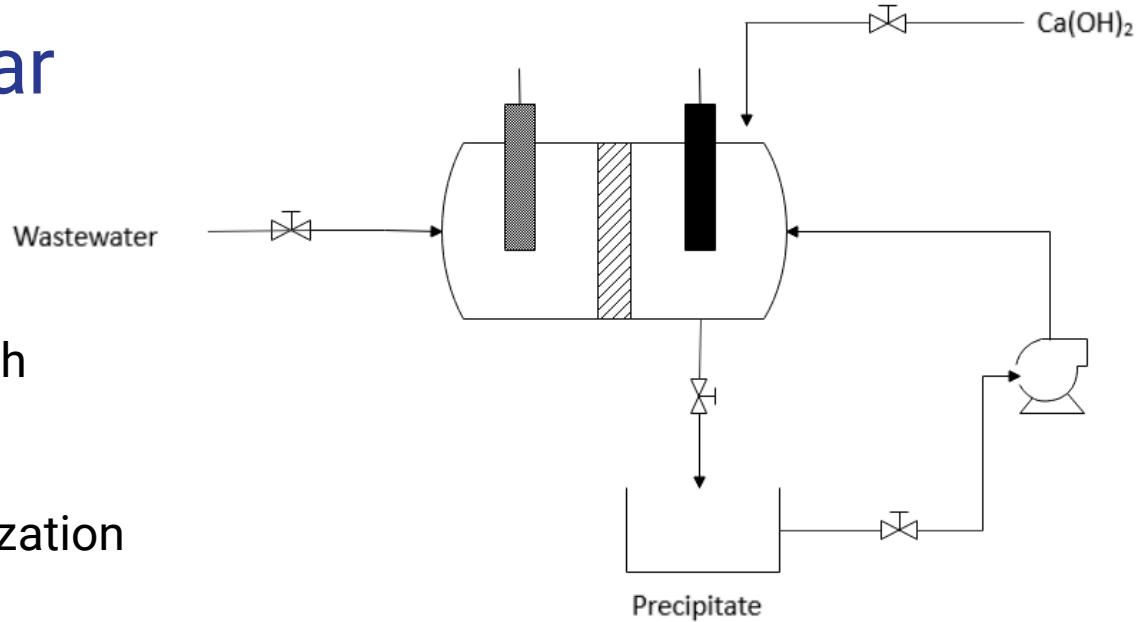
Results

- Phosphoric acid added to tank, E/D system ran for 30 minutes
- Chemical precipitation done on other side
- Ran our E/D system in various conditions
- Best Results:
 - Adding a base first $\text{Ca}(\text{OH})_2$
 - Having an electrolyte yields better results
 - Running for a longer time period
 - Adding more acid yields more precipitate
- Used testing kit to determine presence of phosphorus
- Focused on optimization



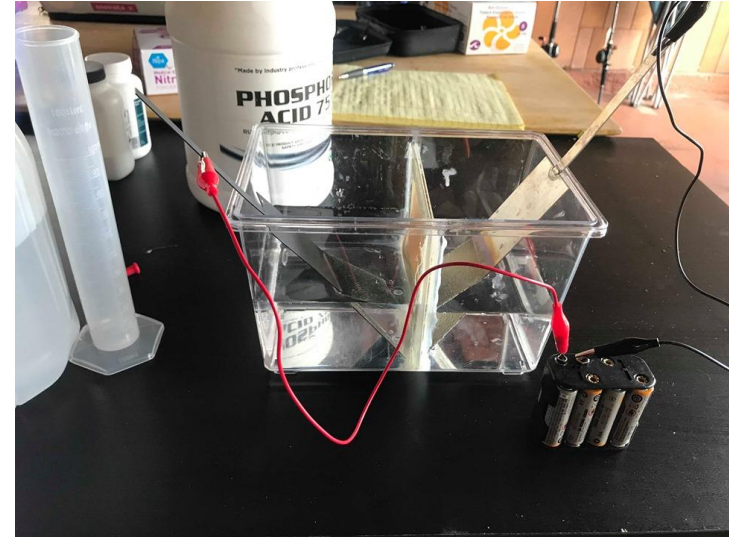
Goals for Next Year

- New Tank
 - Batch to Semi-Batch
- Quantitative Data
 - Validity and Optimization
- Wastewater
 - Real World Scalability



Conclusion

- Determined optimal pH for chemical precipitation and prototype developed
- Determined E/D system works, added electrolyte to improve efficiency of the system.
- Developing new system that includes multiple flows, agitation, possible recycling, and multiple tanks



Thank you

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