

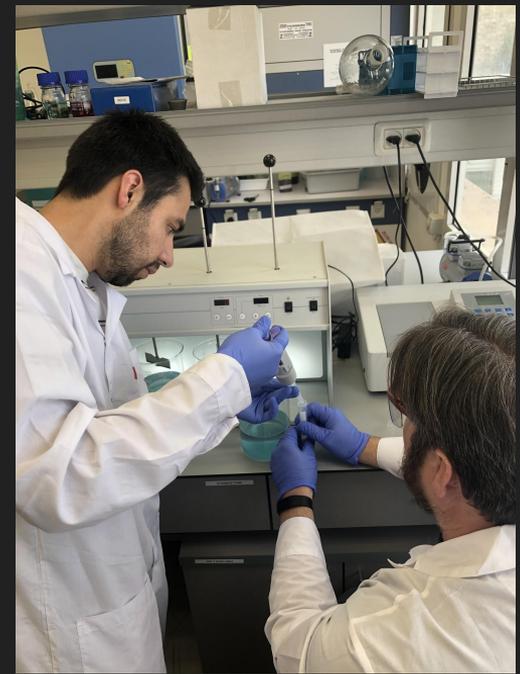
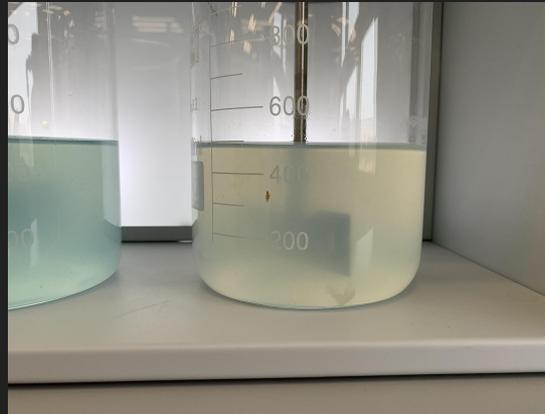
# Industrial Wastewater to Crop Irrigation



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# Industrial Wastewater Background

- **Source of Water**
  - Discharge from Metal Finishing Plant
- **Analysis/Contaminants**
  - pH, suspended solids, toxic metals
- **Treatment**
  - Main focus, remove copper
- **Use**
  - Direct Crop Irrigation



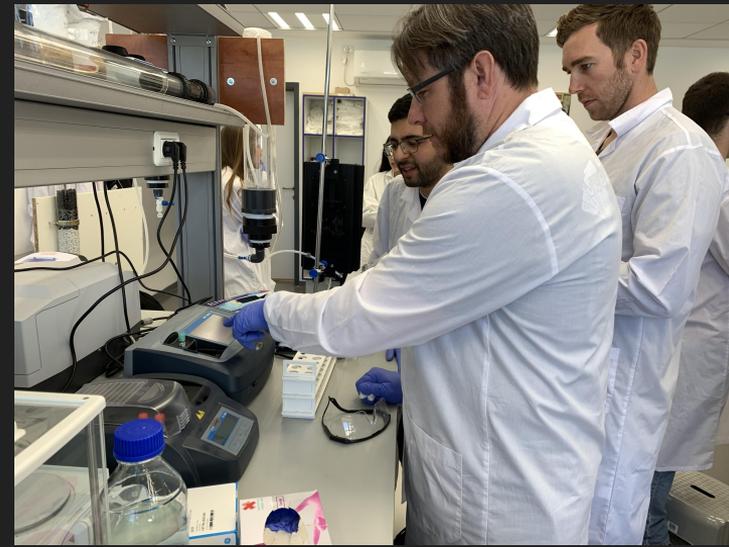
# Industrial Wastewater Analysis

- Analysis Physical Parameters

- pH Test - 3.5
- Turbidity Test - 4.80 NTU
- TSS- Total Suspended Solids - 120 mg/L
- TDS- Total Dissolved Solids - 514.5 mg/L
- Conductivity - 1029 $\mu$ s/cm

- Analysis Chemical Parameters

- Spectrophotometer - .086A
- BOD/COD -No BOD, COD - 35 mg/L
- Ion Chromatograph - 15.4 mg/L Phosphate
- Colorimetric - 1.94 mg/L  $\text{NH}_4^+$



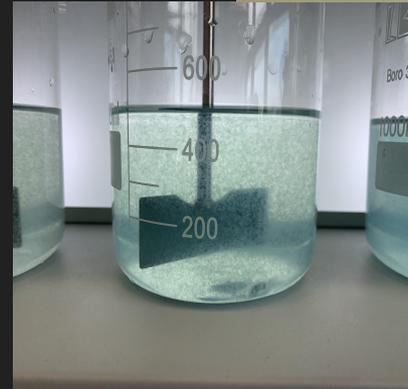
# Copper Used in Metal Plating

- Toxic Metal Measurement
  - Copper
    - Mixed 4.5mL of Copper solution with 0.5mL ammonia
      - Measured absorptivity of sample
- High levels of copper
  - Toxic to plants



# Treatment Method

- Determine Optimum pH Level For Copper Precipitation
  - 6 - 0.5L of wastewater
  - NaOH added 0, 0.5, 1, 1.5, 2, 3mL
  - Solubility of Metals is Dependent on pH
  - **Results determined 3mL was necessary**
- Determine Optimum PAIC Addition for Copper Concentration Coagulation
  - 6 - 0.5L of wastewater
  - PAIC coagulant: 0, 50, 200, 400, 600, 1000  $\mu$ L
  - Measure TSS to determine effectiveness
  - **Results determined 1000 $\mu$ L was necessary**



# Recycling Industrial Wastewater in Israel

- Applications in Israel
  - Direct Crop Irrigation
    - Unrestricted/Restricted
- Applications in California
  - Direct Crop Irrigation: Currently 80% of CA water usage.



# Metal Finishing in California

- Copper is used extensively in the chroming and electroplating process of metals.
- Southern California has a several chroming and electroplating facilities and washing off the parts carries the contamination to the waste water system.



# Acknowledgments



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