

Yihua Liang

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EDUCATION

Bachelor of Science in Water Engineering (GPA: 3.77)

Expected June 2023

Wuhan Polytechnic University, Wuhan, CN

School: School of Civil Engineering and Architecture

Overall academic performance: Top 5% (2/237) in the school in first two years

Coursework includes: Physical Chemistry (93), Inorganic and Analytic Chemistry (98), Water Quality Analytical Chemistry (91), Microbiology Experiments in Water Treatment (94), Rational Mechanics (94), Engineering Mechanics(94), Electronic Technique (90), Pump And Pump Station (91)

RESEARCH EXPERIENCE

An Ultrafiltration-Reverse Osmosis Dual Membrane System for Wastewater Treatment

Summer 2022

Facility: Sewage Treatment Lab

Position: Research Assistant

- Fine sand, activated carbon, pp cotton, nylon, etc. were used as filter elements for sewage pretreatment (filtration) to remove larger particles.
- Under the pressure of 0-6 bar of a peristaltic pump, the livestock sewage was filtered by the ultrafiltration membrane, and then the concentration of TN, TP, NH₃-N and COD were determined by a UV spectrophotometer, and the turbidity was measured by a turbidity meter.
- Under different pressures of 1, 2, and 4 bar, the wastewater filtered by the reverse osmosis membrane was used to measure the concentrations of the above four substances and various ions with a UV spectrophotometer. Line charts were drawn using excel to determine the relationship between pressure and the removal rate of the measured species, and to discover the reasons for differences in filtration rates between ions.
- A conductivity meter was used to measure the electric conductivity(EC) of sewage before and after reverse osmosis membrane filtration, and Pearson correlation analysis and fitting tool of SPSS were used to determine the relationship between pressure and EC retention rate.
- An article called "Study on the Effect of Ultrafiltration Reverse Osmosis Dual Membrane Method on Livestock Wastewater and Examination of Bisphenol A in Wastewater" was published in an EI Conference Journal.

Phase Change Material Used in Thermal Energy Storage

Fall 2021 - Present

Facility: Material Lab

Position: Research Assistant

- A thermostatic magnetic stirrer was used to melt and mix the heat storage material, i.e. the sodium sulfate decahydrate, together with the nucleating agent.
- A electronic analytical balance was utilized to weigh the molten salt and SAP material and they were mixed in different mass ratios.
- The leakage experiment was done with some pieces of filter paper and a thermostatic drying oven to test whether the salt and SAP were interlocked tightly.
- Differential scanning calorimetry was used to measure the enthalpy change and melting point of nine mixture samples, each with different ratios of PCM and SAP, to determine the corresponding ratio with the highest heat storage capacity.
- An article called "Preparation of Sodium Sulfate Decahydrate Composite Phase Change Material and Its Application in External Wall Insulation" is under preparation.

Biochar Material Used in Adsorption of Phosphate

Spring 2021 - Summer 2021

Facility: Water Supply and Drainage Engineering Lab

Position: Research Assistant

- After weighing with an electronic analytical balance, the biochar powder and the oyster shell powder were mixed to modify the surface of the porous material, and part of the hole surface was blocked with calcium oxide to facilitate phosphorus adsorption.
- Five mixtures with different proportions of components was added to the phosphorus solutions and the variable-speed shaker was used for 24 hours to promote the precipitation reaction and the sediment adsorption.
- The syringe filters with microfiltration membranes whose pore sizes are 0.45 μ m, were used to filter out the precipitate to obtain the filtrate.
- Ascorbic acid and molybdate solution were added to the five filtrates with a pipettor, and the remaining phosphorus ion concentration of each one was measured three times in parallel using a UV spectrophotometer to observe the average adsorption effect and determine the best proportion of the mixture components.
- An article called "Study on Modification Methods of Peanut Shell Biochar Modified by Oyster Shell" was published.

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ACADEMIC ACTIVITIES

Experiments of Microbiology in the Water Treatment

Fall 2021

- Gram staining experiments on Staphylococcus aureus and Escherichia coli.
- Observation of actinomycetes, cyanobacteria, algae with optical microscope.
- Preparation and observation of mold water-immersed tablets.
- Counting diluted yeast broth using a hemocytometer.
- Streaking and observation of Escherichia coli on peptone medium and eosin methylene blue medium.
- Sterilized culture experiments on a medium with iodine tincture, penicillin, alcohol and on a UV sterile bench. Use of steam sterilizer.
- Use of a steam sterilizer and preparation of peptone and eosin methylene blue medium.
- Final grade: 94.

Course design of water supply and drainage pipe network(Individual Project)

Fall 2021

- Flow distribution calculation & Head loss adjustment of pipe network according to Newton-Raphson method.
- Calculation of more than 20 pipe buried depths based on Excel and Drawing of the pipeline system based on CAD.
- Rainwater flow calculated based on the catchment area and the local rainfall intensity.
- Final grade : 85.

China Undergraduate Mathematical Contest in Modelling(Group Competition)

Fall 2021

Position: Team Leader

- Used the Sigmoid function to do the curve fitting so as to recognize the pattern between catalyst selectivity and temperature.
- Utilized BP neural network system to conduct the data classification to predict the catalytic condition type of an unknown sample.
- Used grey association analysis method to determine how temperature and the combinations of catalytic agents affect selectivity of side reactions and percent conversion.
- Used TOPSIS evaluation method to find the best catalytic condition.
- Final Achievement: Paper submitted and awarded the second prize in Hubei Province: Optimization model for C4 olefins preparation conditions based on grey system theory and TOPSIS evaluation method.

Hydrochemical Analysis Experiment(Individual Project)

Fall 2020

- Determination of hardness, basicity and COD of water samples by titration experiment.
- Measurement of alkalinity expressed as pH by pH meter(calibration & measurement).
- Testing the concentration of ferrous ion (combined with phenanthroline) by spectrophotometer(including fitting a linear regression model in Matlab).
- Using a centrifuge to completely precipitate the cuprous oxide formed by the reaction of Fehling's reagent with glucose to observe the color of the precipitate.
- The turbidity after flocculation with a six-unit electric stirrer for different times was measured with a turbidimeter, and a graph of the relationship between time and turbidity was made with matlab.
- Final grade in the course Hydrochemical Analysis : 91.

Innovation and entrepreneurship focused on scientific research training(Individual Project)

Fall 2020

- Read 30 papers about bio-char material.
- Write a summary about the factors affecting the property of the bio-char material.(temperature of charring, modifiers adding groups on the surface of char material, different actions of the coexisting ions in the solution, etc.)
- Final grade: 85.

SKILLS

Language skills

IELTS: Overall 7 (Listening 6.5 Reading 8.5 Writing 6.5 Speaking 6.5) ; Mandarin(native)

Tools and Programming Languages

Matlab(advanced), SPSS(advanced), Python(medium), LaTeX(advanced), C++(medium), CAD(advanced), Origin(medium)

Quantitative Research

Mathematical optimization, Mathematical Modeling

Other Measurement Tools

Electronic Total Station(different types), Theodolite(different types)

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HONERS AND AWARDS

- Second Award in Hubei Province in CUMCM (China Undergraduate Mathematical Contest in Modelling) 2021
- First Award in the preliminary Round in the FLTRP Cup National English Speaking Contest 2020
- Second Award in the Preliminary Round in the Chinese Mathematics Competitions (Non-Mathematics Professional Group) 2020
- National Encouragement Scholarship (5000 RMB, only 15 students awarded in the department) 2021-2022
- Designated as Successful Participant in MCM/ICM (Interdisciplinary Contest In Modeling) 2022

PUBLICATIONS

Liang.Y et al, 2021. Study on Modification Methods of Peanut Shell Biochar Modified by Oyster Shell. *Green Technology*, 24(2), p.143:145. (Published)

Fu.W and Liang.Y, 2022. Preparation of sodium sulfate decahydrate composite phase change material and its Application in external wall insulation. (In Process)

Liang.Y et al, 2022. Study on the Effect of Ultrafiltration Reverse Osmosis Dual Membrane Method on Livestock Wastewater and Examination of Bisphenol A in Wastewater. (Published)

OTHER SKILLS

- Proficient in mathematical modelling and good at critical thinking according to mathematical way.
- Being practical and realistic in daily routine and being rigorous when dealing with troubles.
- Holding good habits for sorting study resources and being proficient in academic writing skills for literature review.

INTERESTS

- Read books or articles about philosophy, history, psychology, medicine and economy.

REFERENCES

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