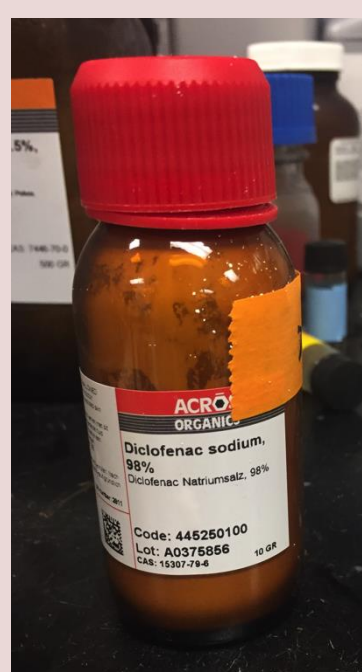


Removal of pharmaceuticals from aqueous solutions using Al-Mg/rGO composite

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Introduction

Al-Mg/rGO is a composite media that is fabricated by a facile hydrothermal processes and has shown promising adsorption results in other water contaminants including Nutrients and Heavy Metals. The purpose of this research is to further evaluate Al-Mg/rGO's absorption properties with respect to pharmaceuticals (Diclofenac, DCF). Multiple facets of Al-Mg/rGO's absorption abilities were tested including Isothermal, Kinetic, and the effect of pH and Ions.



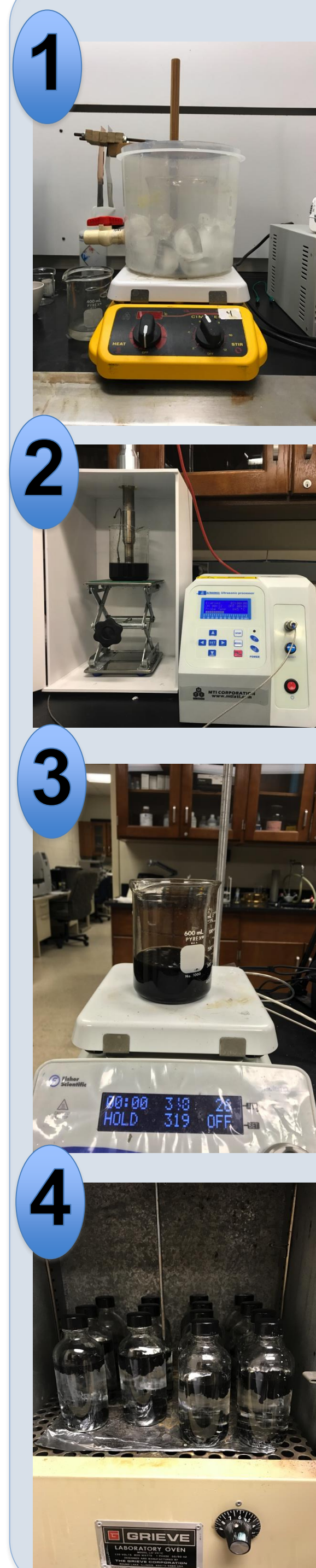
Adsorption Experiments



- 1 → Adsorption Experiments were performed using an initial DCF concentration of 0.02mM – 0.2mM for isotherm and 0.05 mM for Kinetics, pH, and Ions. 5mM NaCl was used to provide background ionic strength and the tests had a solution to media ratio of 40mL/50mg.
- 2 → Samples were placed in a water bath at 25°C at 60rpm for isothermal, pH, and Ions testing and 120rpm for Kinetics testing.
- 3 → After each trial, the DCF concentration was analyzed using HPLC.

Materials

- 1 → GO powder was prepared using Hummer's method.
- 2 → The GO powder in DI waster was ultrasonicated for 10 hours to prepare the GO solution.
- 3 → 40 mM of Aluminum and 120 mM of Magnesium were slowly stirred into the GO solution.
- 4 → The AL-Mg/GO Solution was sealed in glass bottles and placed in the oven at 90°C for 6 hours.
- 5 → The media was then washed with DI water and then dried at 70°C.

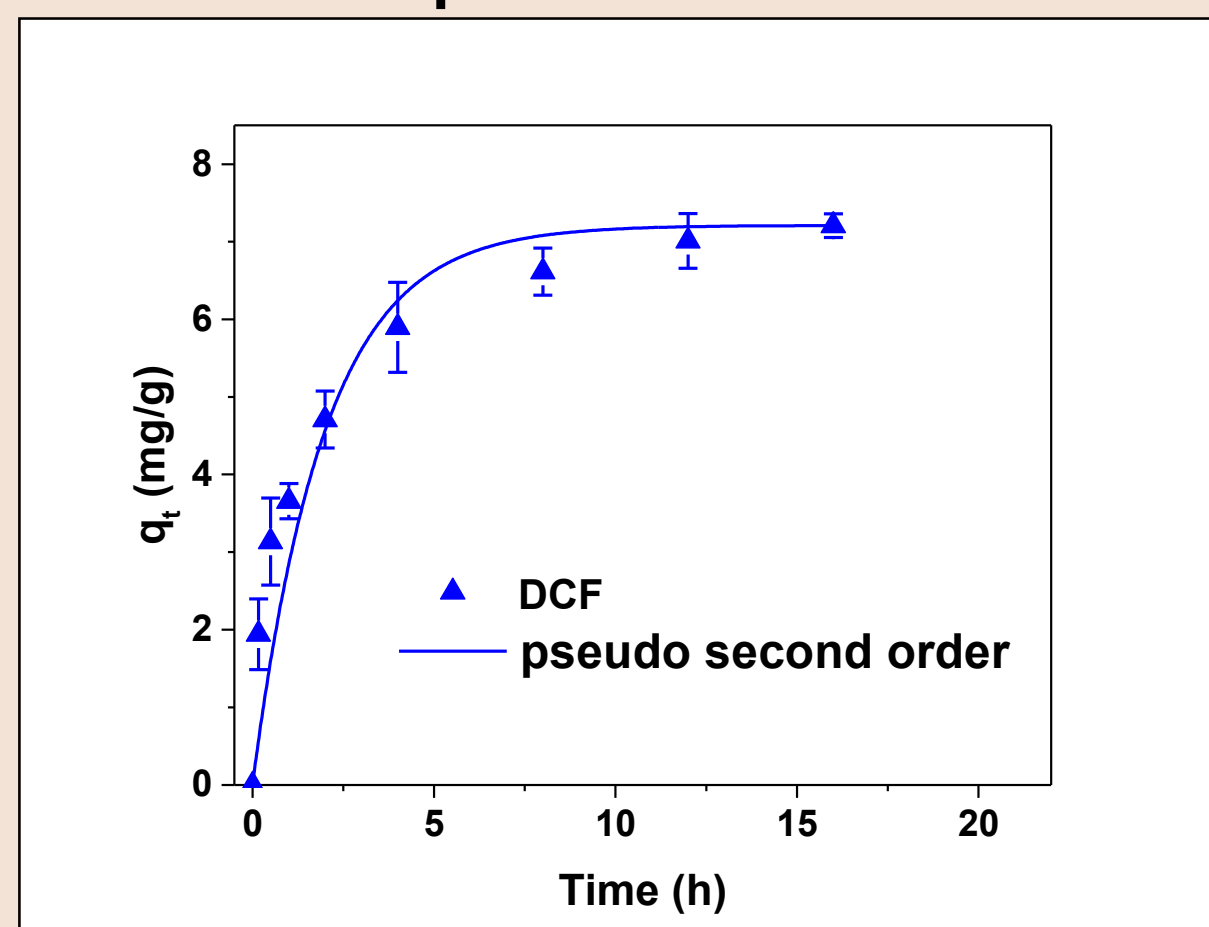


Al-Mg/rGO

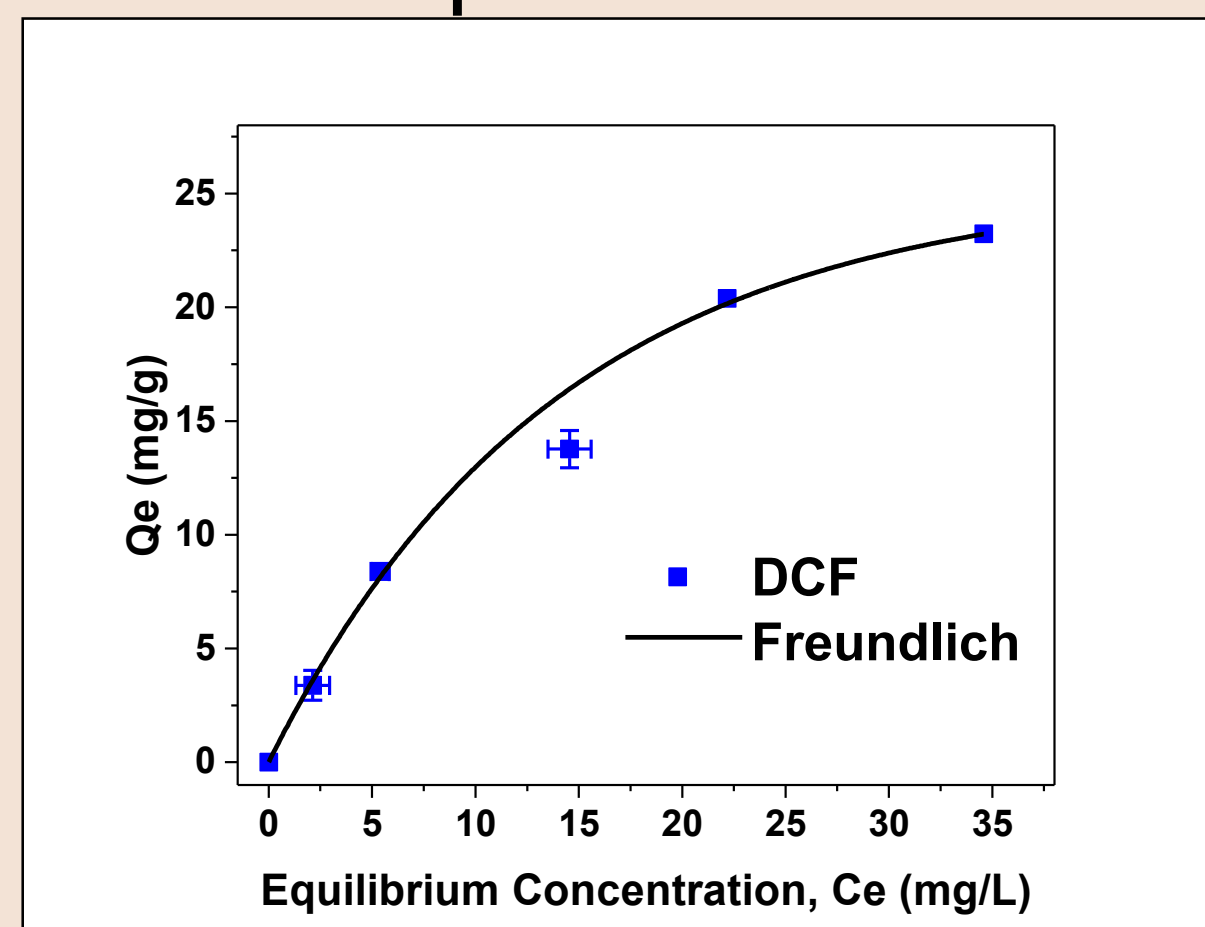


Results

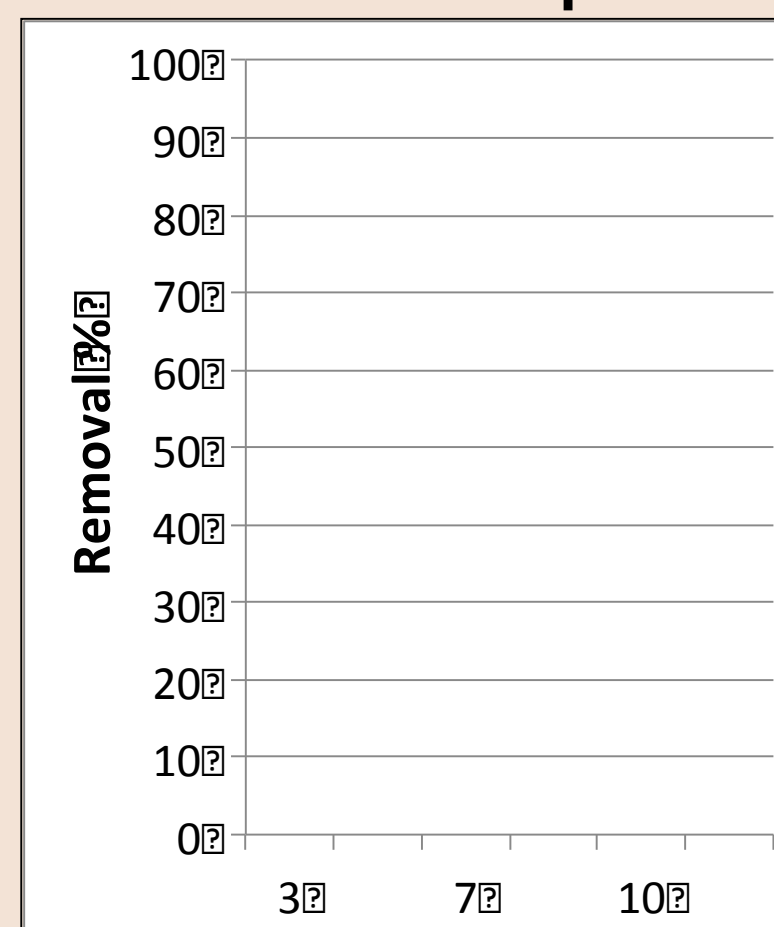
Adsorption Isotherm



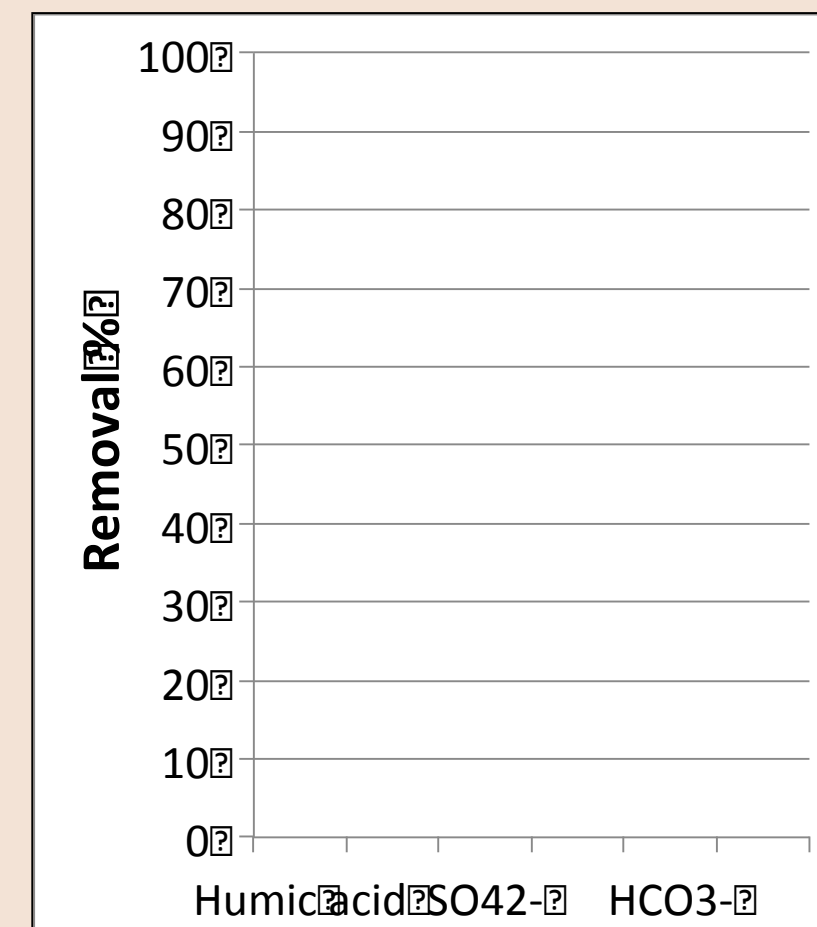
Adsorption Kinetics



Effects of pH



Effects of Ions



Conclusion and Future Directions

Al-Mg/rGO prepared by the above facile hydrothermal process has shown to be a promising media for DCF removal in an aqueous solution. The next step will be to evaluate Al-Mg/rGO's absorption abilities after regeneration and whether or not the media will be reusable.

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