

Optimization of Porous Pellets for Phosphate Recovery

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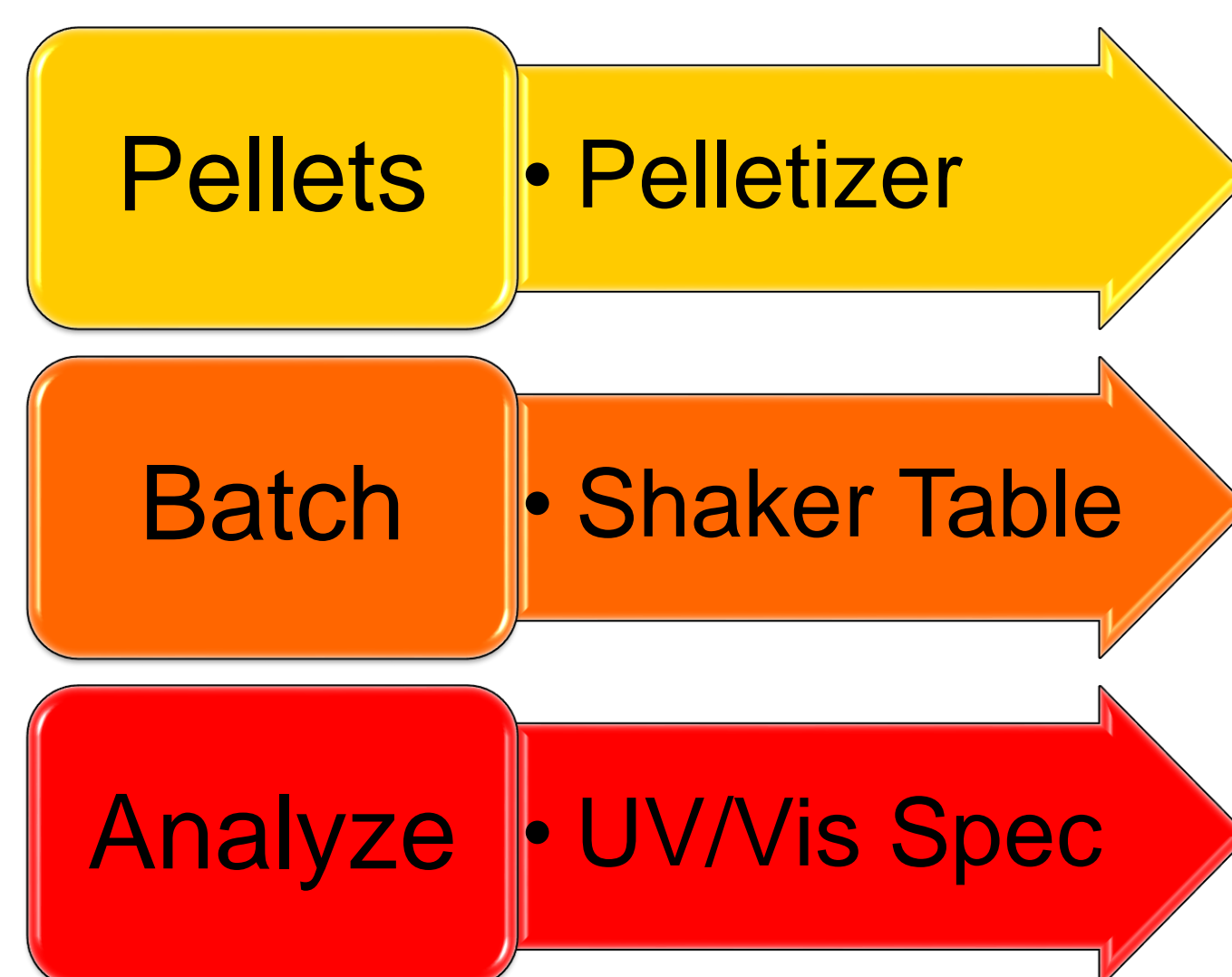
Introduction

Phosphorus is an essential nutrient and the natural supply is becoming insufficient to meet demand for food production¹⁻⁴. Peak level could occur in 2033, making this an imminent threat¹⁻². Phosphorus can be recovered from water for reuse using adsorptive materials³⁻⁴, such as pellets. Adding a binder material during pellet synthesis can provide stability then porosity can be created through calcining after to return some of the surface area lost by making the pellet.

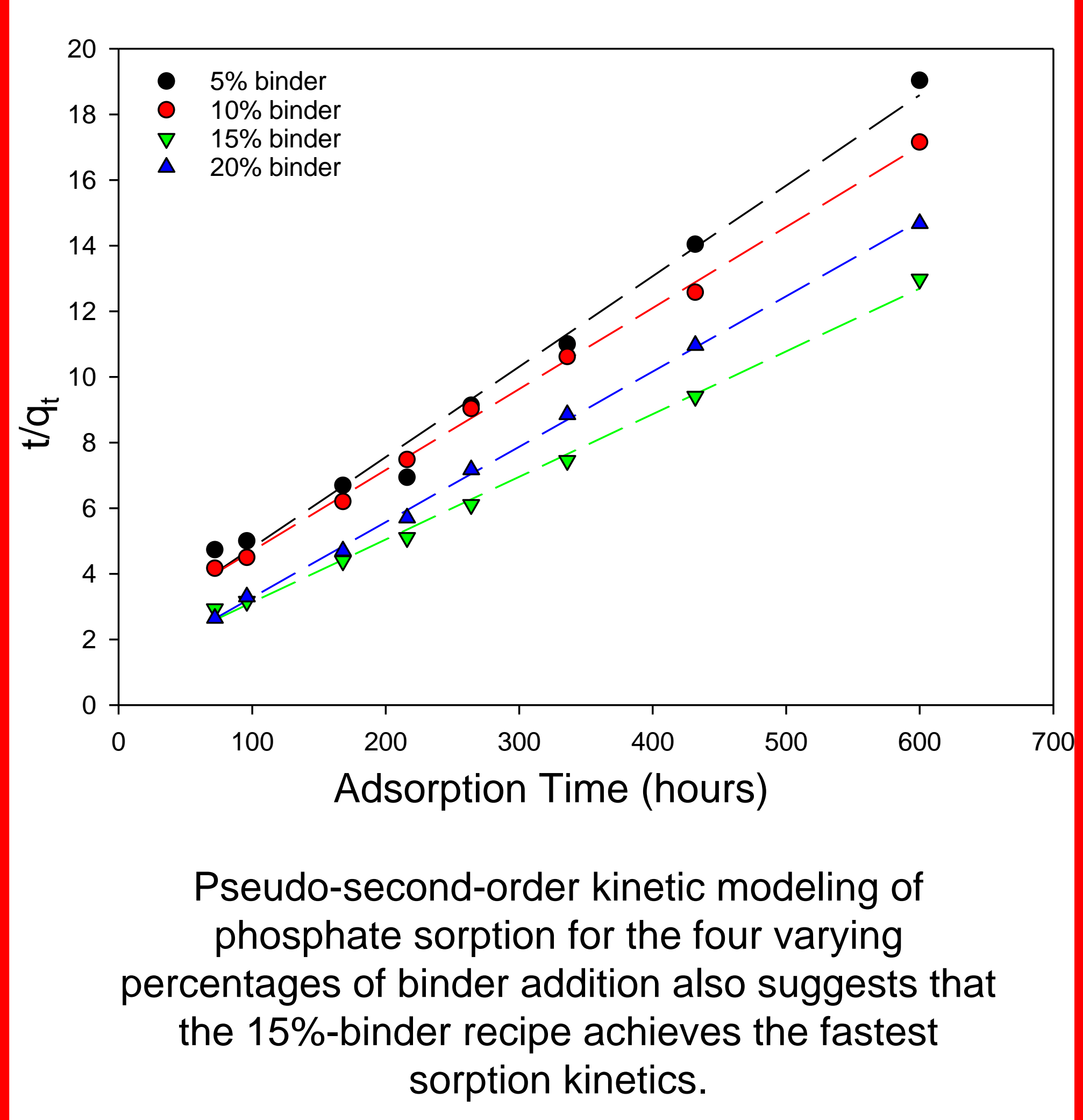
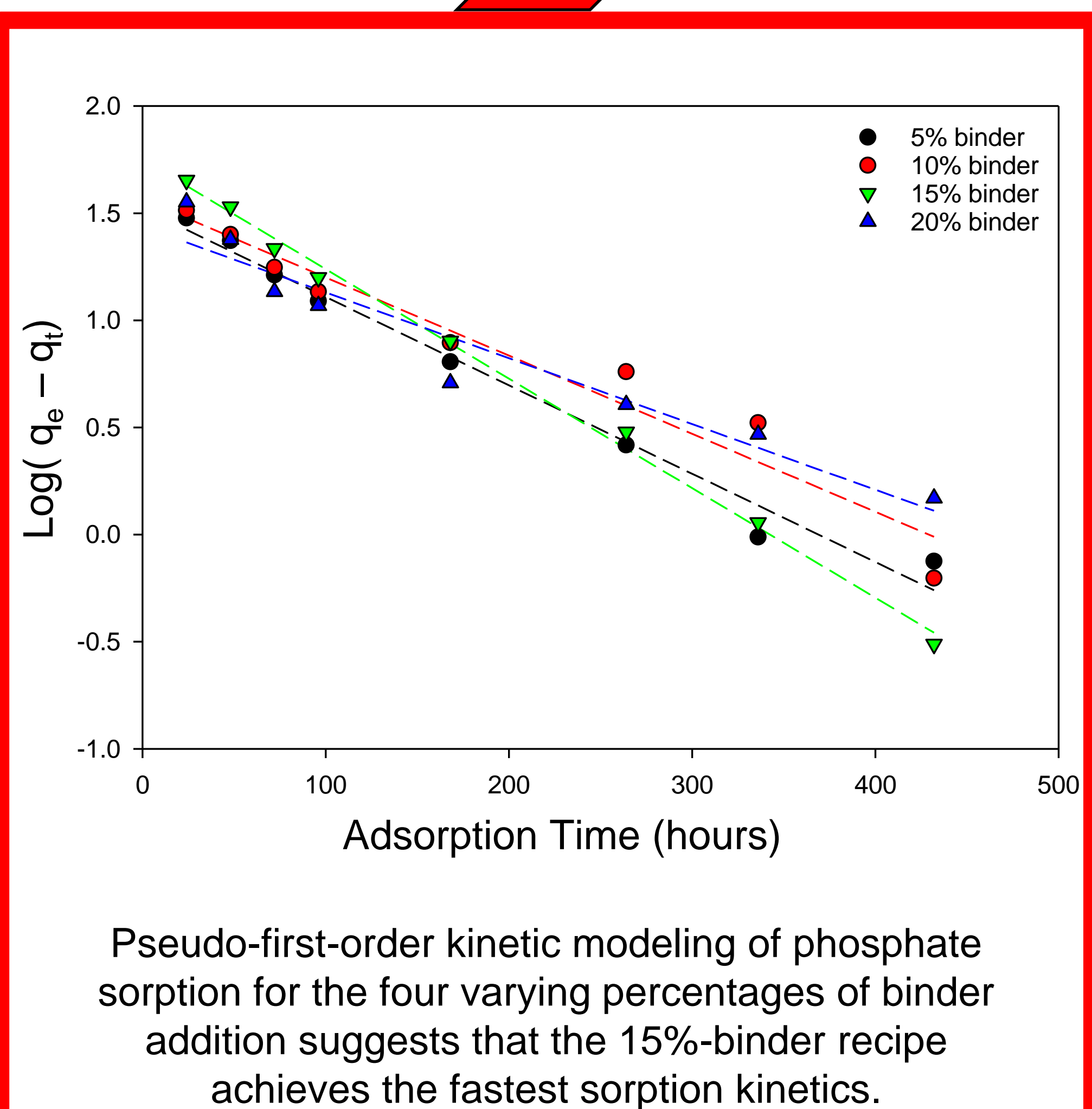
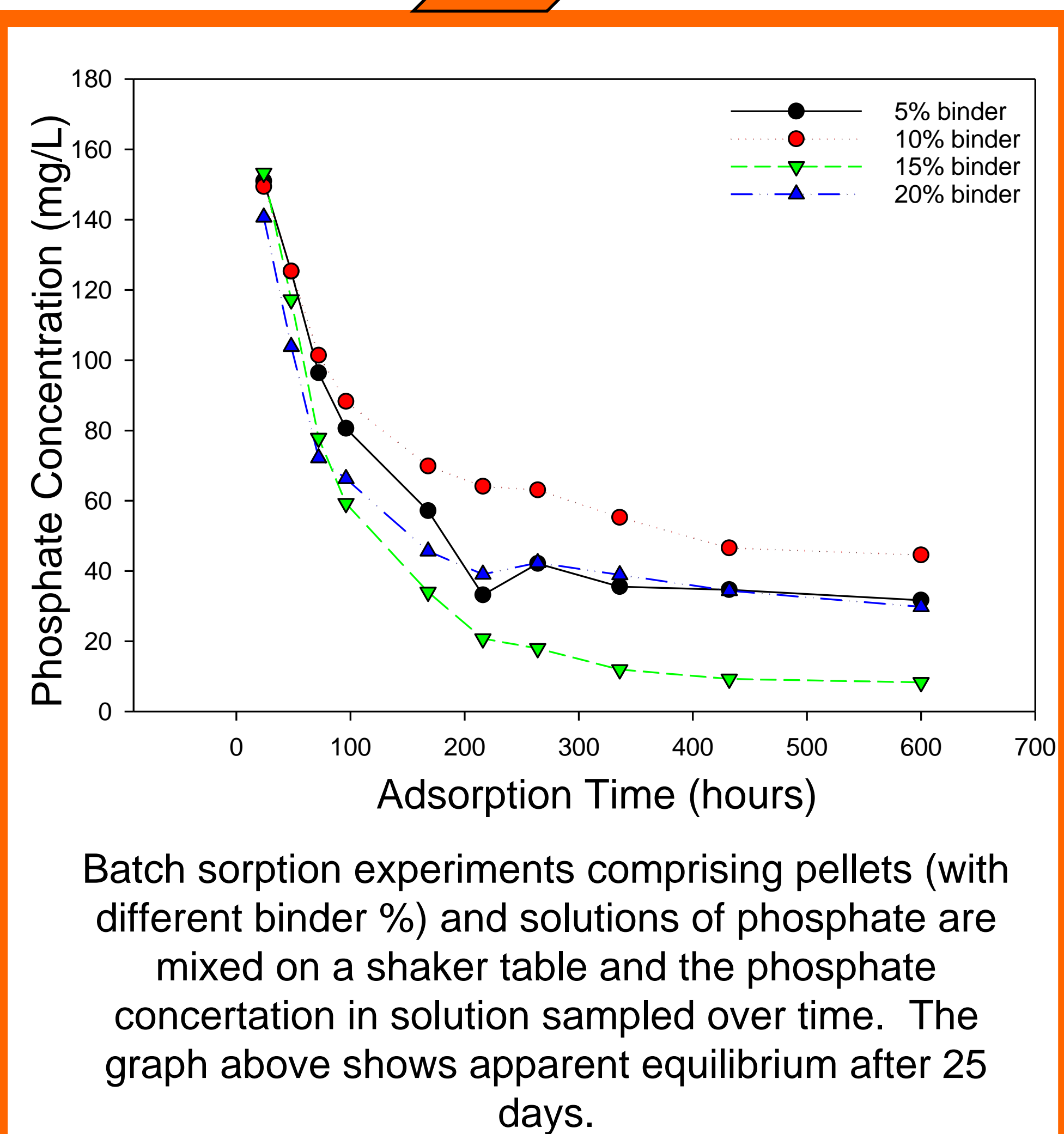
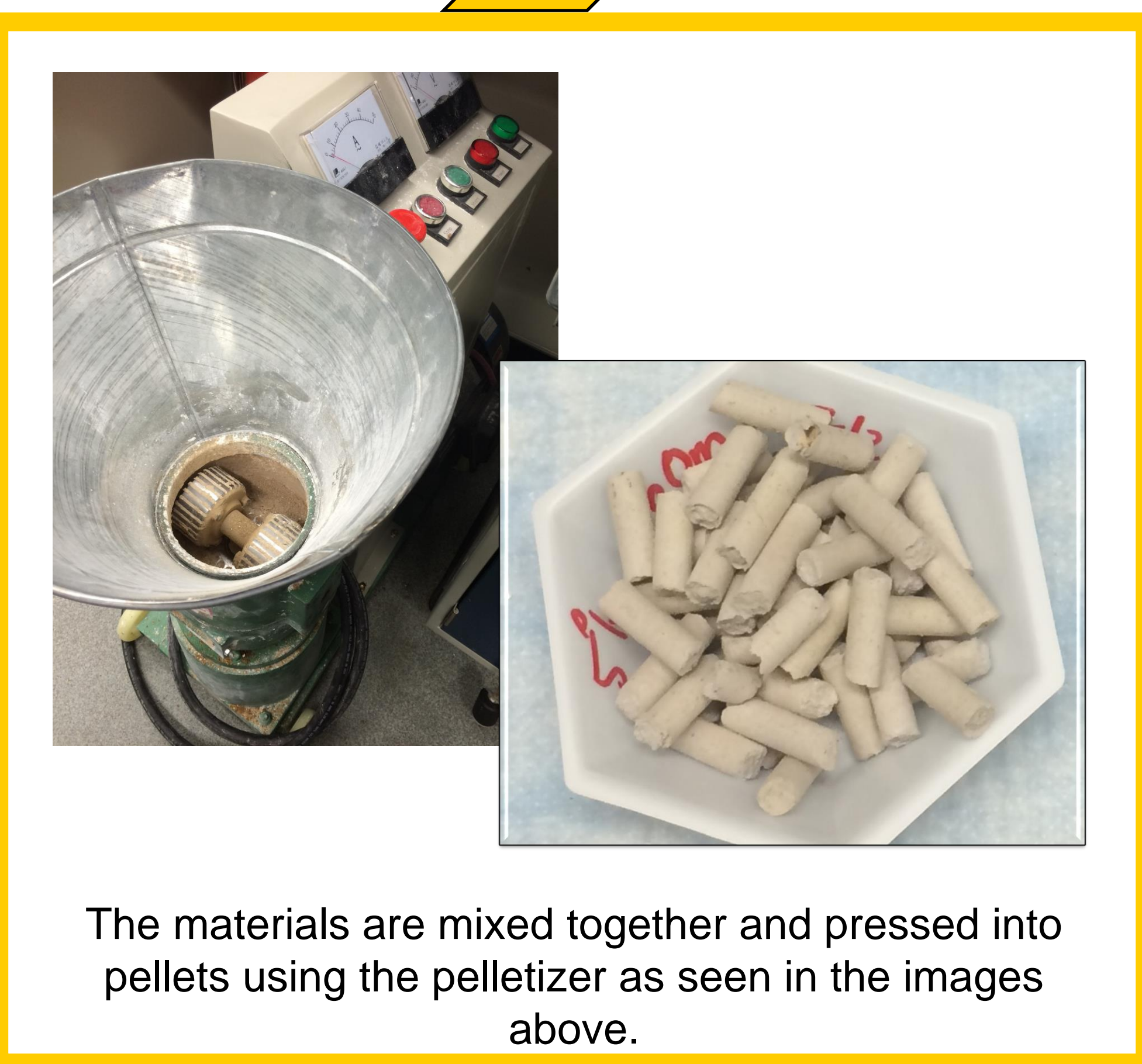
Objectives

- 1 • Optimize synthesis for stability and porosity
- 2 • Batch study pellets for equilibrium time
- 3 • Model kinetics to determine model adsorption capacity

Method



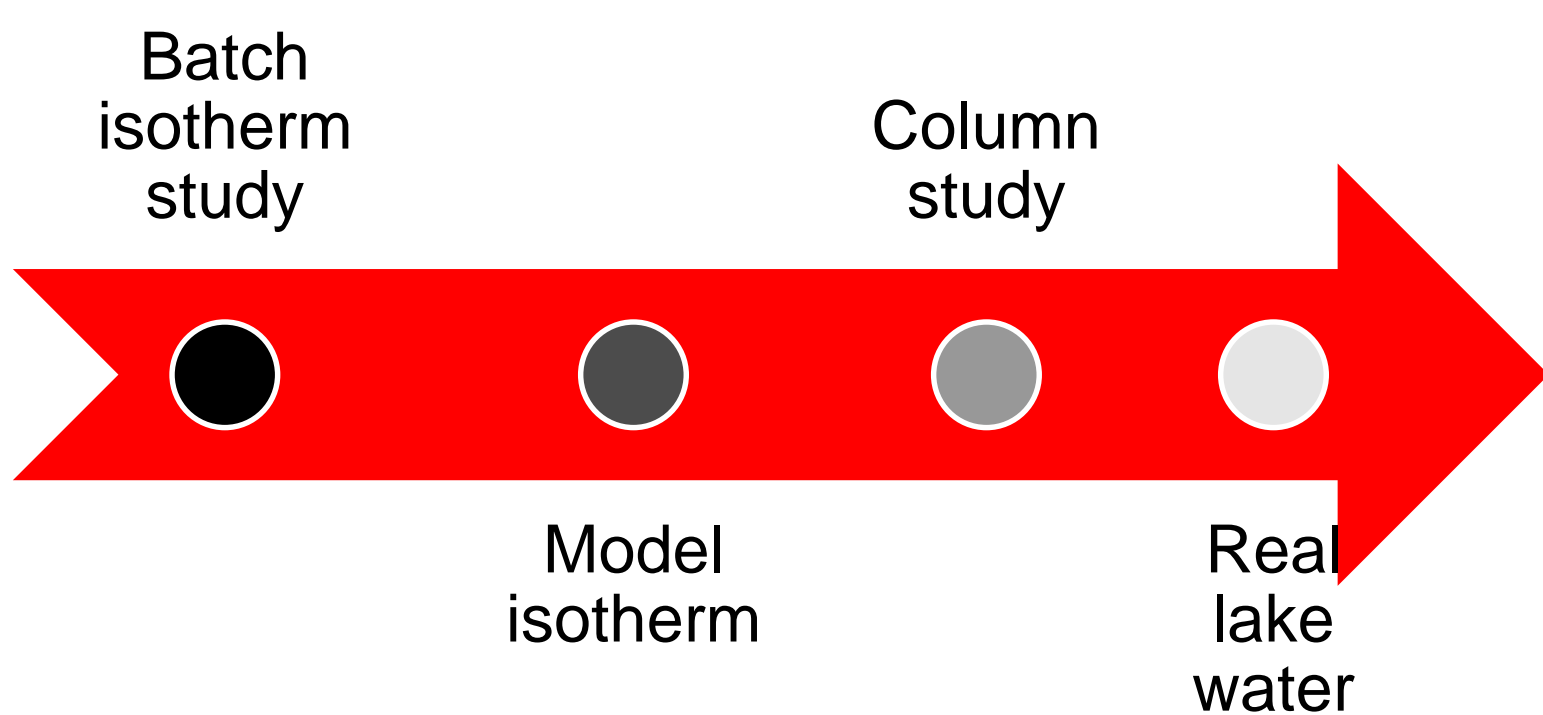
Results



Conclusion

% Binder	BET Surface Area (m ² /g)	Adsorption Capacity (mg/g)
0	27.5	N/A
5	33.2	39.1
10	38.0	42.4
15	43.1	56.2
20	37.6	44.6

Future Work



References

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- (3) Cornel, P.; Schaum, C. Phosphorus Recovery from Wastewater: Needs, Technologies and Costs. Water Science & Technology 2009, 59 (6), 1069.
- (4) Driver, J.; Lijmbach, D.; Steen, I. Why Recover Phosphorus for Recycling, and How? Environmental Technology 1999, 20 (7), 651–662.

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The U.S. Environmental Protection Agency, through its Office of Research and Development, funded and managed, or partially funded and collaborated in, the research described herein. It has been subjected to the Agency's administrative review and has been approved for external publication. Any opinions expressed in this paper are those of the author(s) and do not necessarily reflect the views of the Agency, therefore, no official endorsement should be inferred. Any mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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