

Supplementary Materials

# Adsorptive Removal of Phosphate from Aqueous Solutions Using Low-Cost Volcanic Rocks: Kinetics and Equilibrium Approaches

Dereje Tadesse Mekonnen <sup>1,2</sup>, Esayas Alemayehu <sup>3,4,\*</sup> and Bernd Lennartz <sup>2,\*</sup>

<sup>1</sup> Jimma Institute of Technology, Jimma University, School of Chemical Engineering, Jimma P.O. Box 378, Ethiopia; getdere@gmail.com

<sup>2</sup> Agricultural and Environmental Sciences, University of Rostock, Justus Von-Liebig Weg 6, 18059 Rostock, Germany

<sup>3</sup> Faculty of Civil and Environmental Engineering, Jimma Institute of Technology, Jimma University, Jimma P. O. Box 378, Ethiopia

<sup>4</sup> Africa Center of Excellence for Water Management, Addis Ababa University, Addis Ababa P.O. Box 1176, Ethiopia

\* Correspondence: esayas16@yahoo.com (E.A.); bernd.lennartz@uni-rostock.de (B.L.); Tel.: +251-917-017-002 (E.A.); +49-381-498-3180 (B.L.)

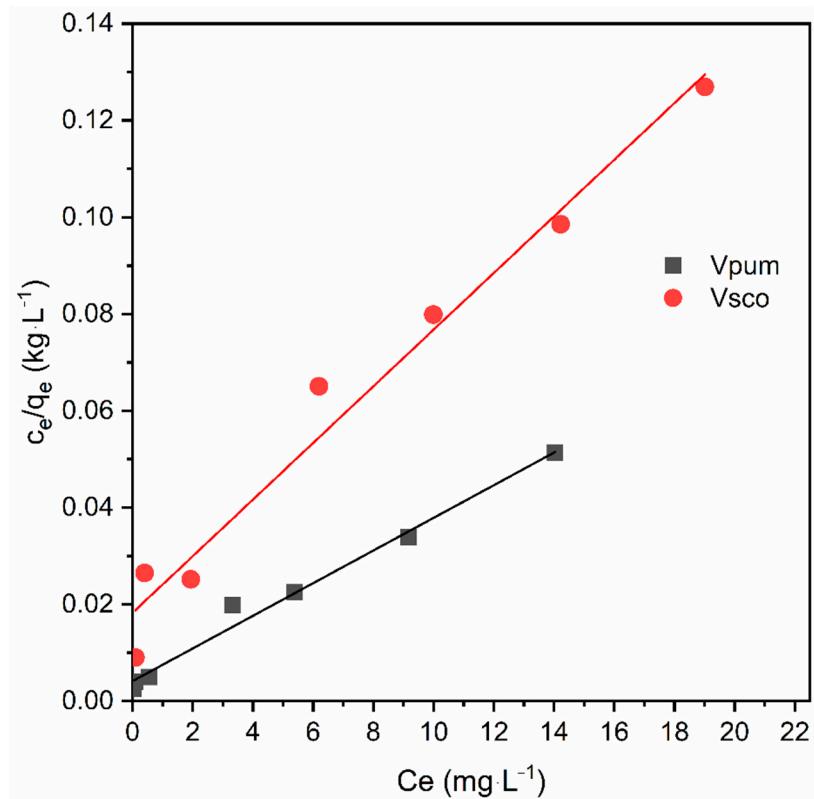
**Citation:** Mekonnen, D.T.; Alemayehu, E.; Lennartz, B. Adsorptive Removal of Phosphate from Aqueous Solutions Using Low-Cost Volcanic Rocks: Kinetics and Equilibrium Approaches. *Materials* **2021**, *14*, 1312. <https://doi.org/10.3390/ma14051312>

Academic Editors: Ewa Skwarek and Agnieszka Gladysz-Płaska

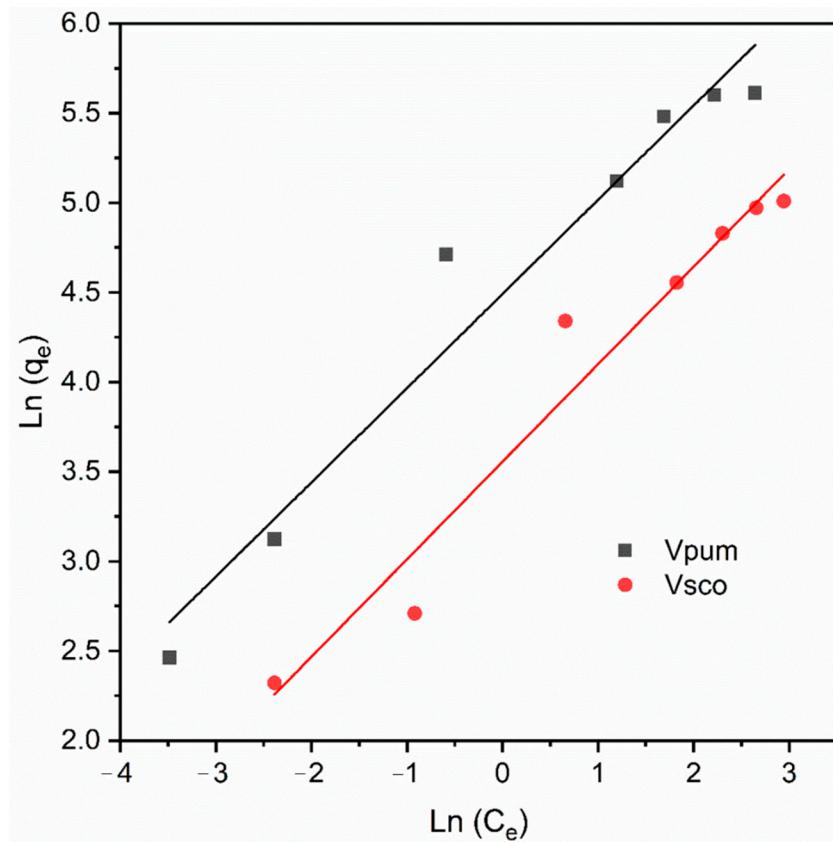
**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



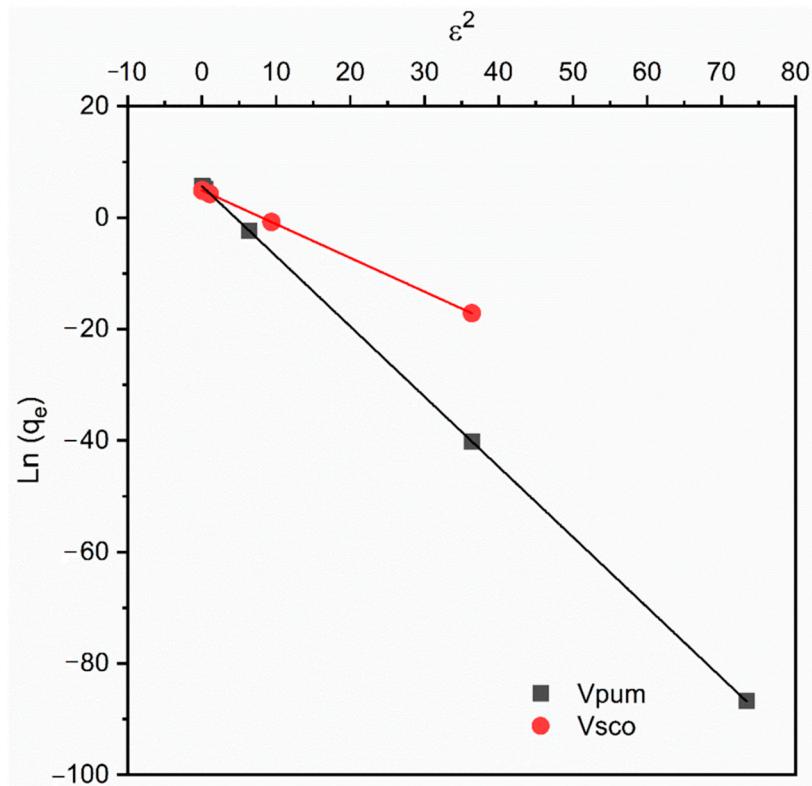
**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).



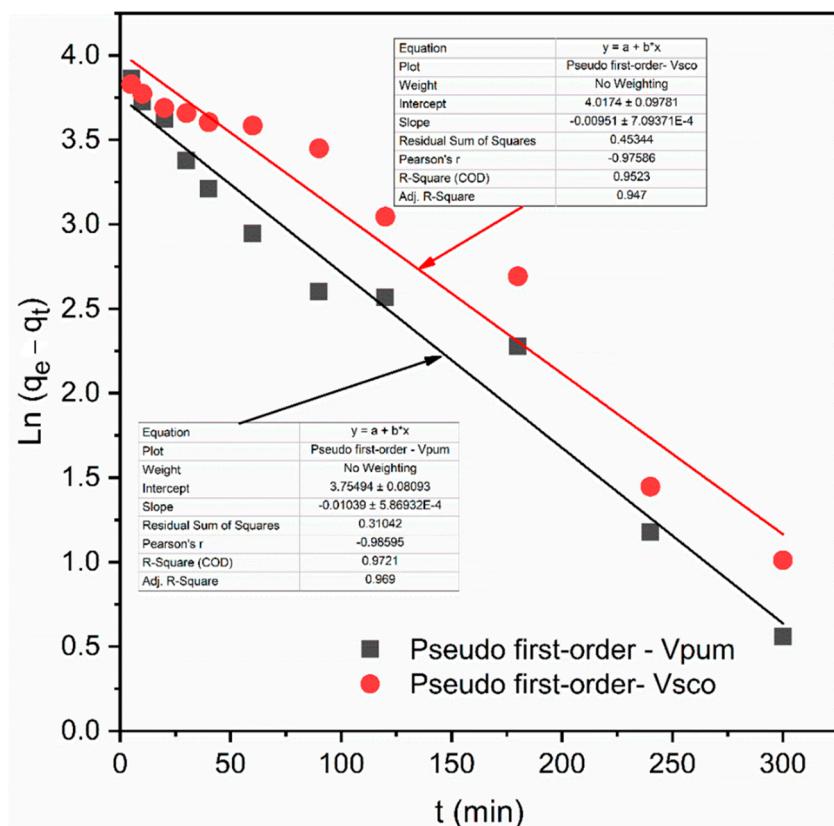
**Figure S1.** Linear plot of Langmuir isotherm for Vpum and Vsco.



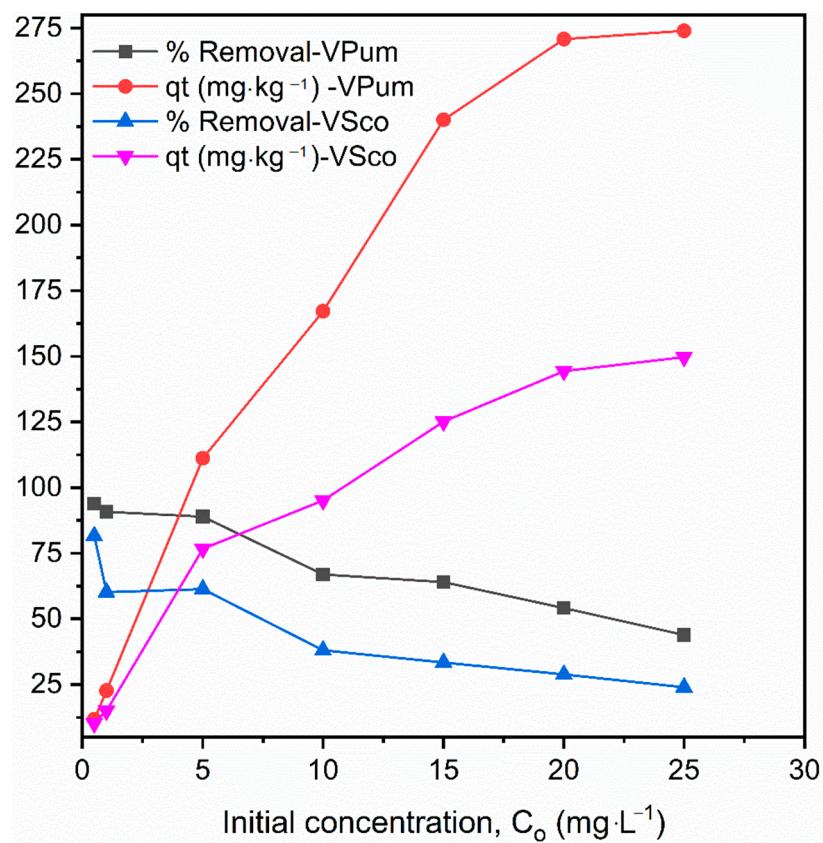
**Figure S2.** Linear plot of Freundlich isotherm model for Vpum and Vsco.



**Figure S3.** Linear plot of Dubinin-Radushkevich isotherm model for Vpum and Vsco.



**Figure S4.** Pseudo first-order kinetic plot for Vpum and Vsco.



**Figure S5.** Effects of initial concentration.