

Supplementary Information

Acetaminophen and Caffeine Removal By $\text{MnO}_{x(s)}$ and GAC Media in Column Experiments

*Rachael Miera¹, Nabil Shaikh¹, Kateryna Artyushkova², Abdul-Mehdi Ali³, Carlo Santoro⁴,
Bruce M. Thomson¹, Kerry J. Howe¹, and José M. Cerrato^{1*}*

* Corresponding authors' email address: jcerrato@unm.edu

¹ Department of Civil, Construction, & Environmental Engineering, MSC01 1070, University of New Mexico, Albuquerque, New Mexico 87131, USA

² Department of Chemical & Biological Engineering, MSC01 1120, 1 University of New Mexico Albuquerque, NM 87131, USA

³ Department of Earth and Planetary Sciences, MSC03 2040, University of New Mexico, Albuquerque, New Mexico 87131, USA

⁴ Department of Chemical Engineering and Analytical Science, The University of Manchester, The Mill, Sackville Street, M13AL Manchester, UK

Manuscript to be submitted to Environmental Science: Water Research & Technology

Table S1. Energy dispersive X-ray spectroscopy (EDX) components for unreacted and reacted MnO_x(s) and GAC from column experiments in series.

Element	% Weight Content			
	Unreacted MnO _x (s)	Reacted MnO _x (s).	Unreacted GAC	Reacted GAC
C	0.236	0.379	93.170	84.065
O	42.272	52.132	6.830	12.088
Al	5.969	13.609	B.D.	0.739
Si	3.941	12.248	B.D.	1.449
Mn	47.582	20.279	B.D.	B.D.
K	B.D. ^a	1.353	B.D.	B.D.
Ca	B.D.	B.D.	B.D.	0.828
Mg	B.D.	B.D.	B.D.	0.831

B.D.^a = Below Detection

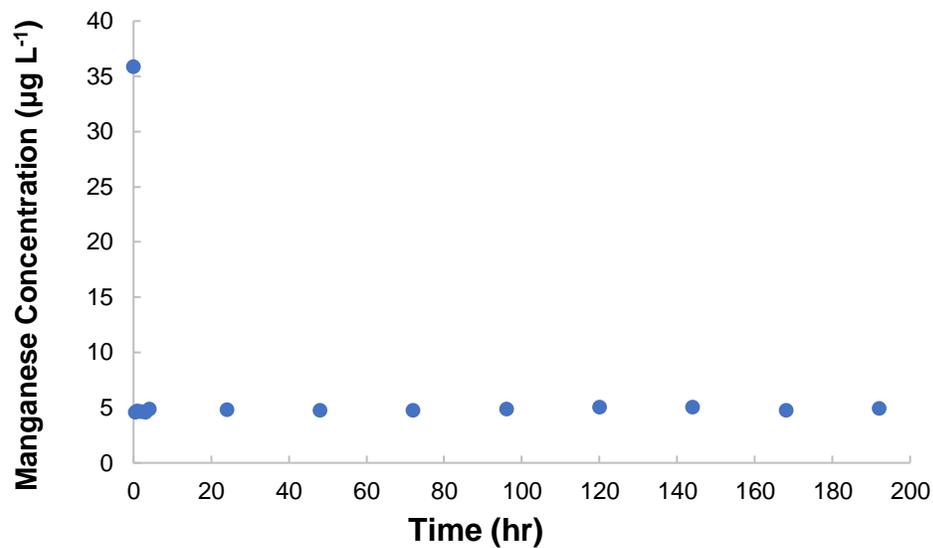


Figure S1. Effluent manganese (Mn) concentrations for 100% MnOx media column.

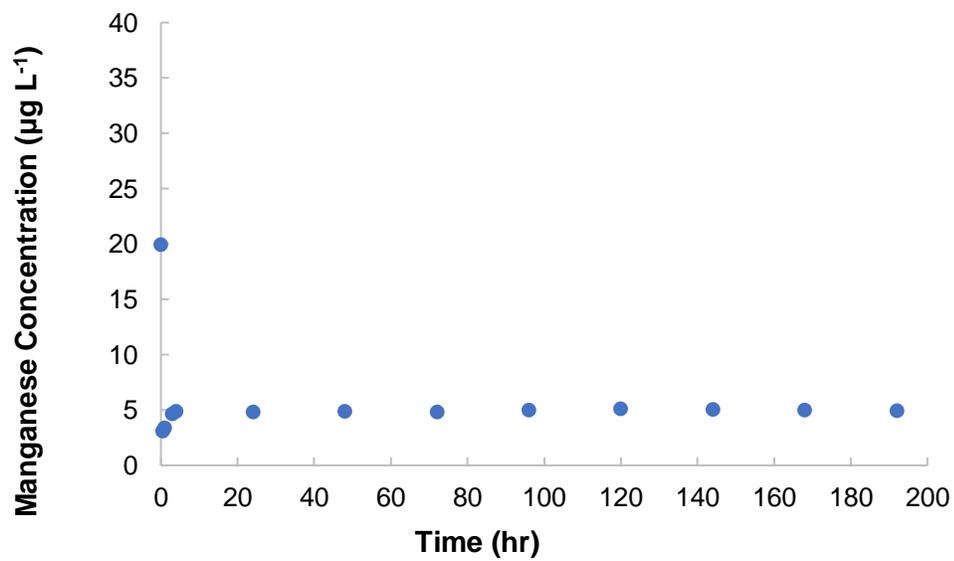


Figure S2. Effluent manganese (Mn) concentration for 50% MnOx/50% GAC media column.

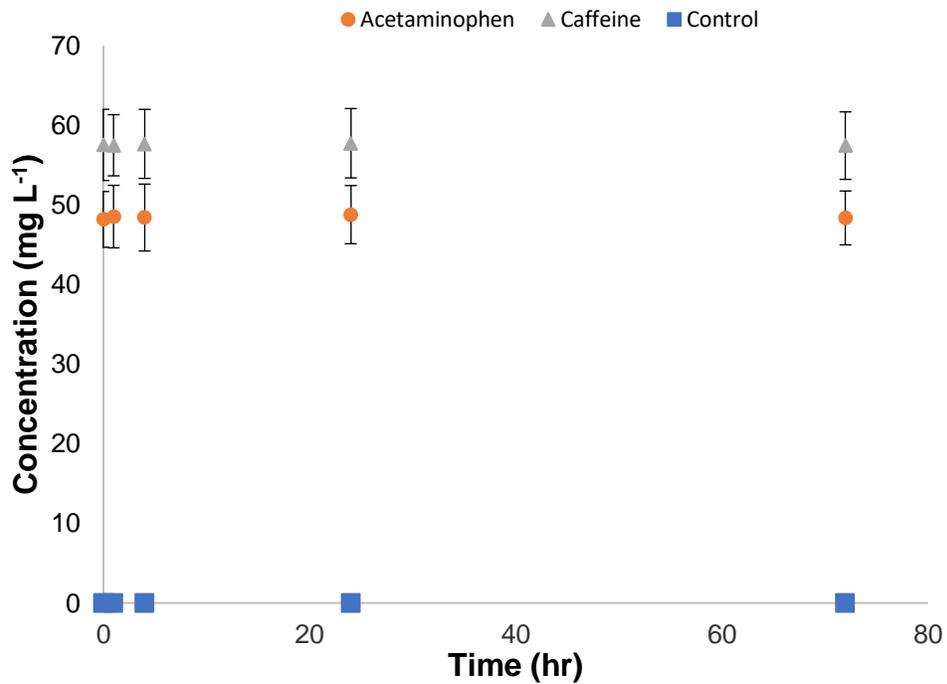


Figure S3. Results for acetaminophen and caffeine concentration over 72 hours for the spiked tap water batch experiment. The initial concentration of the acetaminophen and caffeine solution was 50 mg L⁻¹. The negative control was contained 50 mL of tap water with no spiked acetaminophen and caffeine. Error bars represent the standard deviation of the average.

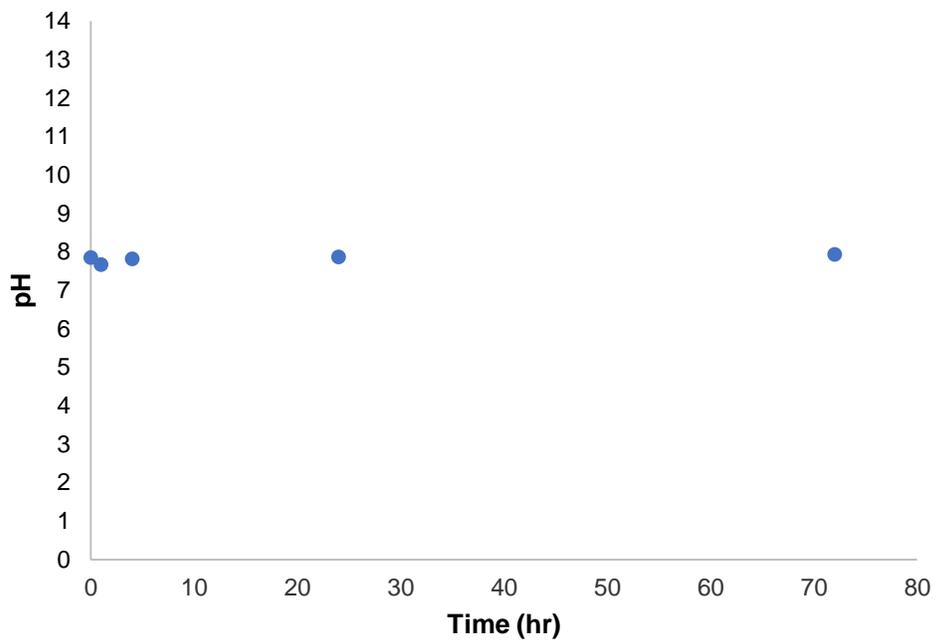


Figure S4. Spiked tap water batch experiment pH over 72 hours.

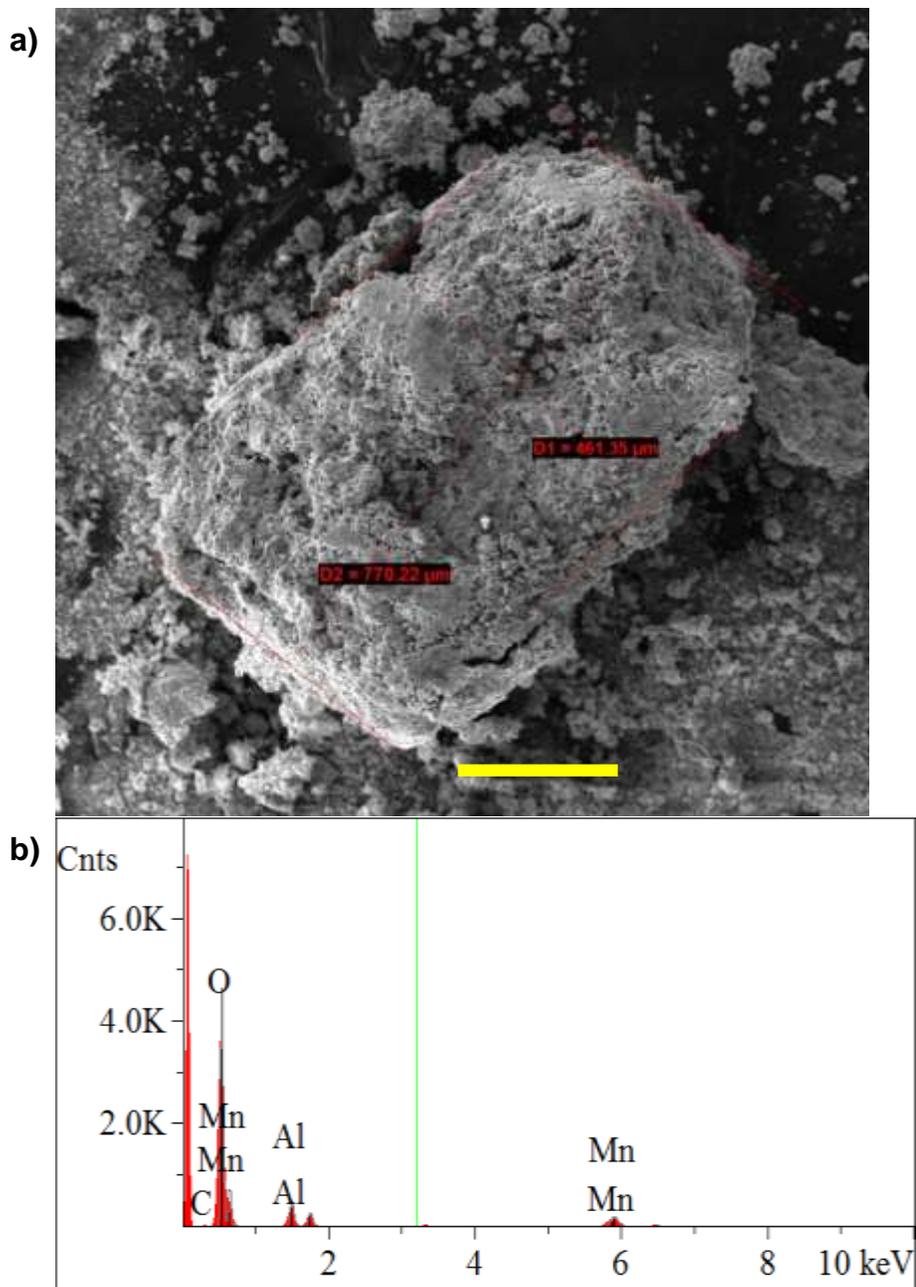


Figure S5. a) Scanning electron microscopy (SEM) imaging of unreacted $\text{MnO}_x(\text{s})$; **b)** Energy dispersive X-ray spectroscopy (EDX) spectrum for unreacted $\text{MnO}_x(\text{s})$.

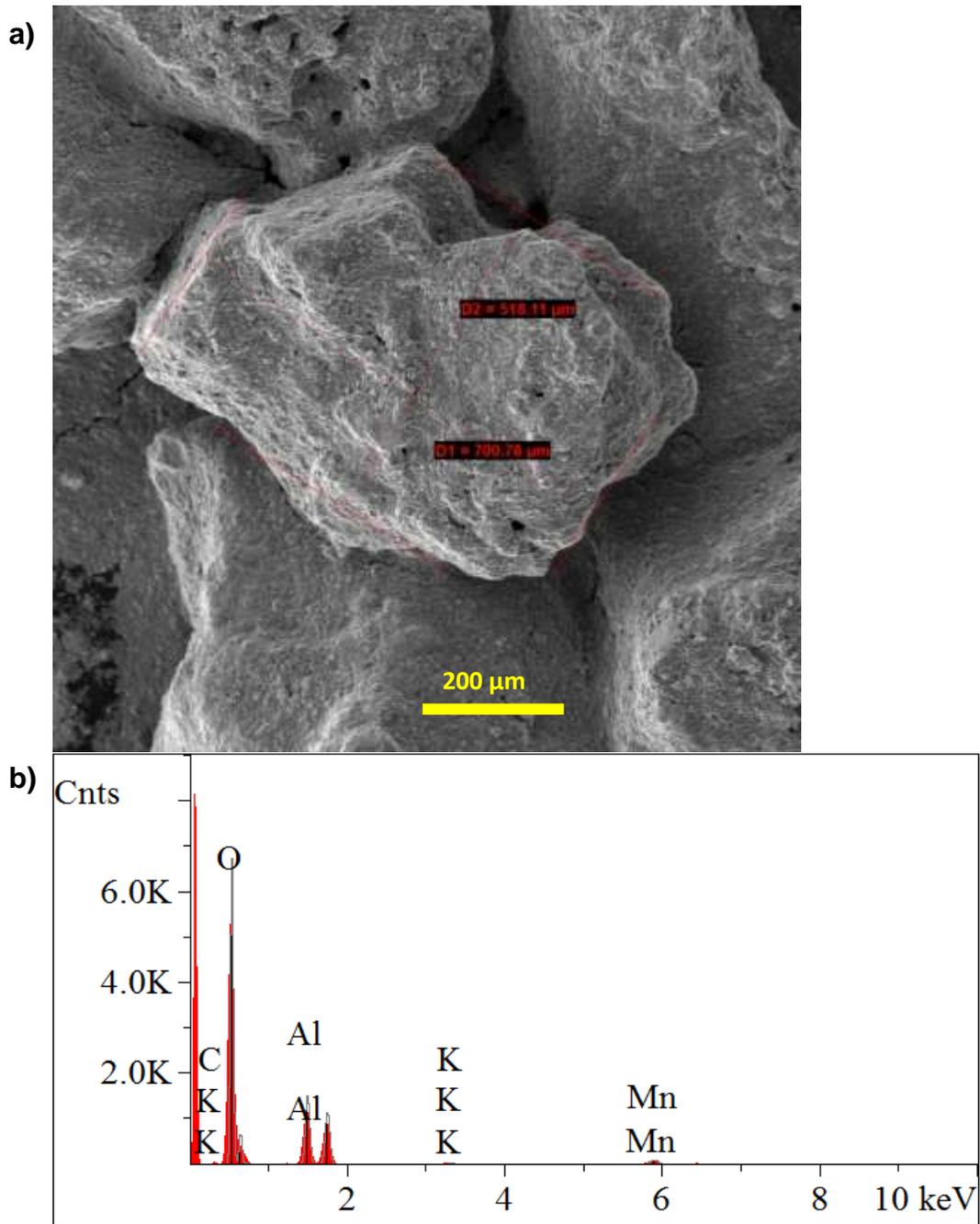


Figure S6. a) Scanning electron microscopy (SEM) imaging of reacted $\text{MnO}_x(\text{s})$; **b)** Energy dispersive X-ray spectroscopy (EDX) spectrum for reacted $\text{MnO}_x(\text{s})$ media.

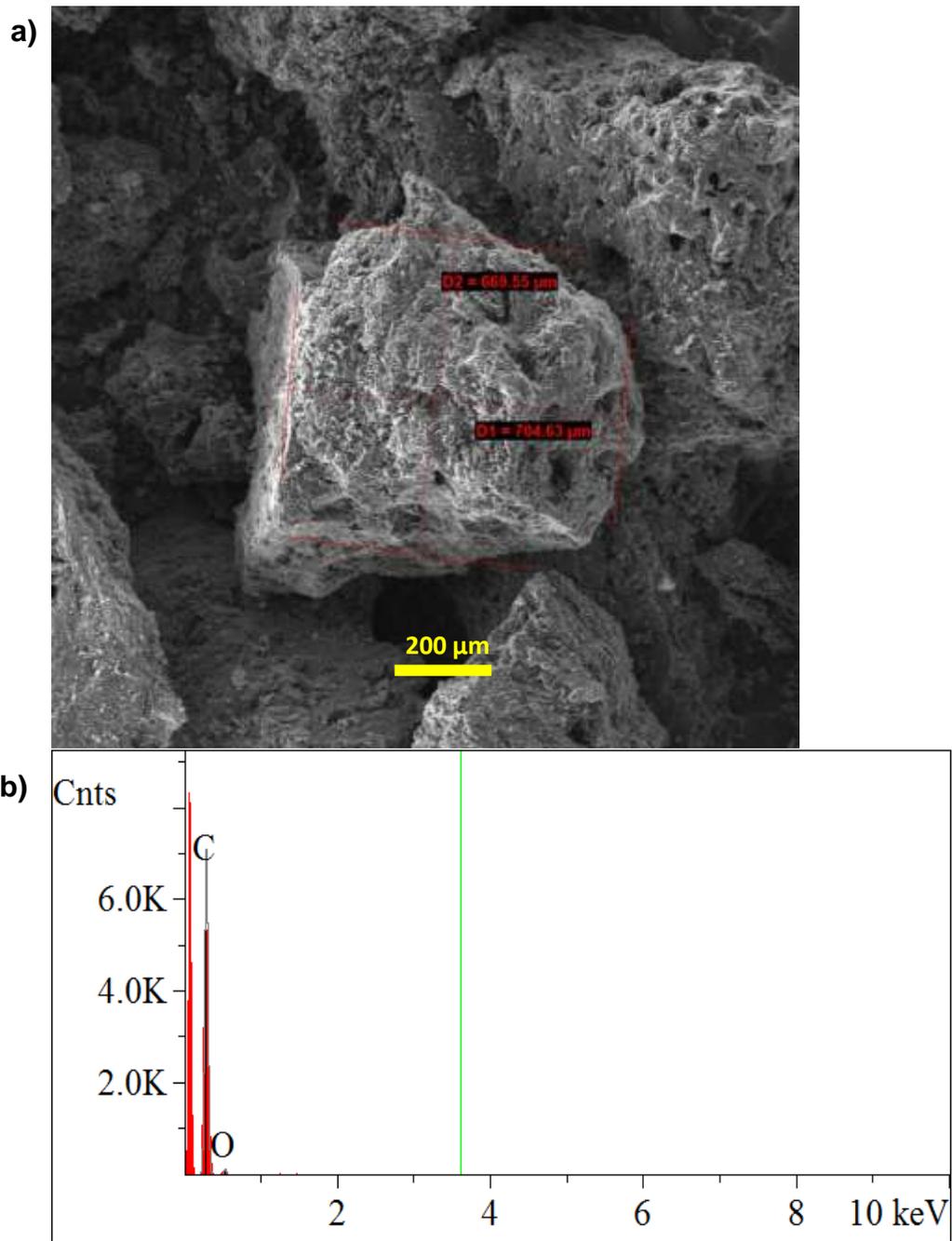


Figure S7. a) Scanning electron microscopy (SEM) imaging of unreacted GAC; b) Energy dispersive X-ray spectroscopy (EDX) spectrum for unreacted GAC media.

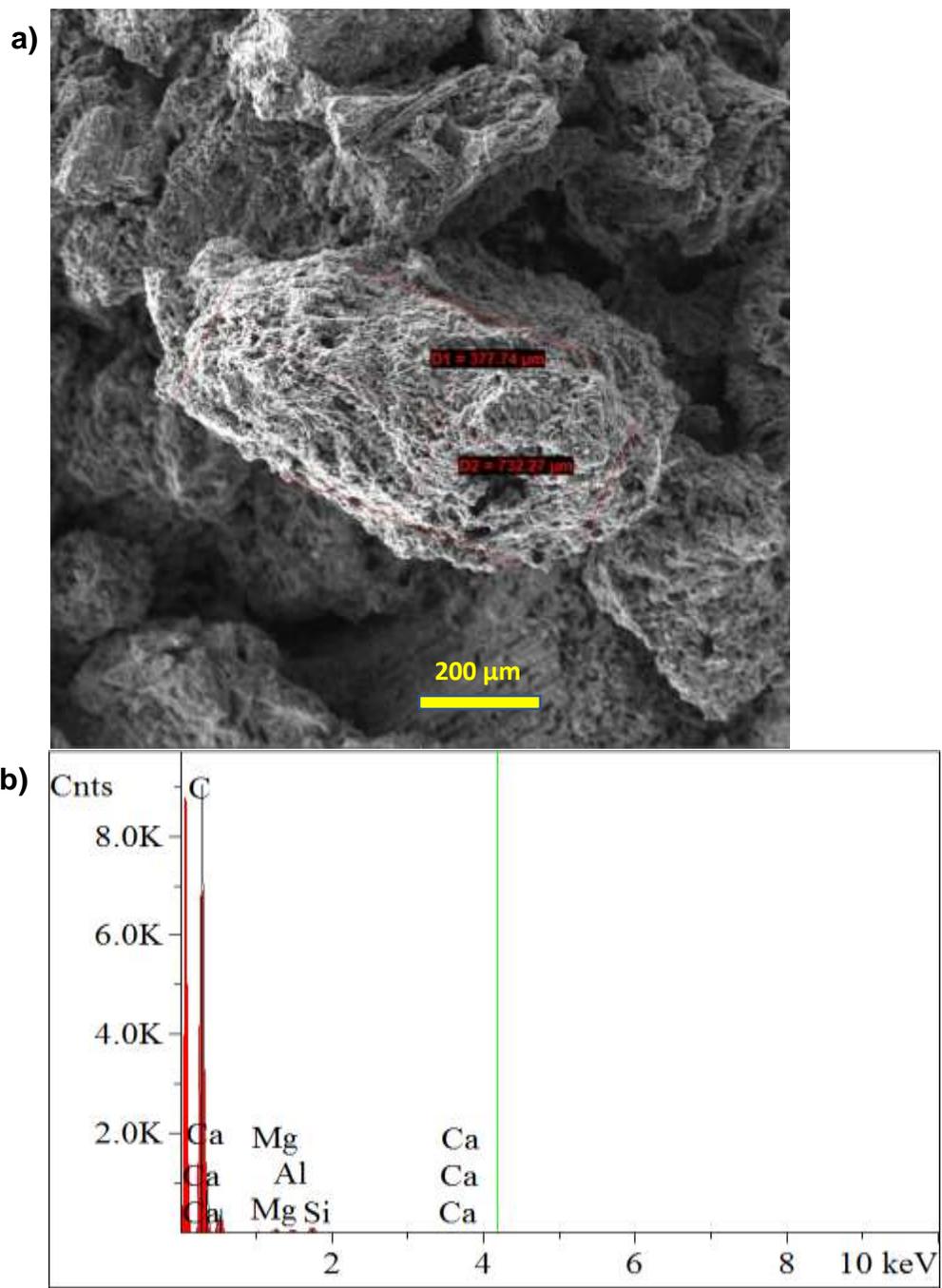


Figure S8. a) Scanning electron microscopy (SEM) image of reacted GAC; b) Energy dispersive X-ray spectroscopy (EDX) for reacted GAC media.