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Supplementary Information

Impacts of nitrogen-containing coagulants on the nitritation/denitrification of anaerobic digester centrate

Authors

Zhiyue Wang[a,b], Yinuo Yao[a,b], Nick Steiner[c], Hai-Hsuan Cheng[d], Yi-ju Wu[d], Sung-Geun Woo[a,b], Craig S. Criddle[a,b*]

a. Department of Civil and Environmental Engineering, Stanford University, Stanford, CA, USA.

b. Engineering Research Center (ERC) for Re-inventing the Nation's Urban Water Infrastructure (ReNUWIt), USA

c. Delta Diablo Sanitation District, Antioch, CA, USA

d. Department of Environmental Engineering, National Cheng Kung University, Tainan, Taiwan.

* Corresponding author. Present address: Jerry Yang & Akiko Yamazaki Building, 473 Via Ortega, Room 161, Stanford, CA 94305.

Email address: criddle@stanford.edu (C.S. Criddle)

Table S1. Delta Diablo nitritation pilot reactor: centrate and effluent composition

Parameter	Centrate feed concentration (sample week 1)	Effluent concentration (sample week 1)	Centrate feed concentration (sample week 2)	Effluent concentration (sample week 2)
Ammonia-N (mg-N/L)	1,320 ± 20	127 ± 27	1,396 ± 47	71 ± 48
Total Kjeldahl N (mg-N/L)	1,661±99	195 ± 91	1,475 ± 71	14 ± 4
Nitrite-N (mg-N/L)	-	837 ± 39	-	867 ± 45
Nitrate-N (mg-N/L)	-	13 ± 2	-	15 ± 6
Total COD (mg/L)	3,892 ± 725	1,903 ± 409	885 ± 64	1557 ± 120
Soluble COD (mg/L)	508 ± 23	227 ± 16	338 ± 32	134 ± 21
Total Suspended Solids (mg/L)	4,350 ± 624	1,900 ± 409	226 ± 19	492 ± 485
Volatile Suspended Solids (mg/L)	2,813 ± 421	1,345 ± 508	212 ± 13	194 ± 205
Alkalinity (mg/L as $CaCO_3$)	5,000–5,300	140–570	4,600–5,600	170–380
Temperature (°C)	30–35	30-35	30–35	30–35

Table S2. Delta Diablo nitritation pilot reactor: performance at steady state

Specific/volumetric ammonia loading rate (kg-N/m^3-reactor/day)	0.62-0.70
Ammonia removal efficiency (%)	90-95
Inorganic Nitrogen removal efficiency (%)	26-32
Total Nitrogen removal efficiency (%)	37-40
Chemical additions (kg$CaCO_3$/m^3-reactor/day)	~0.4

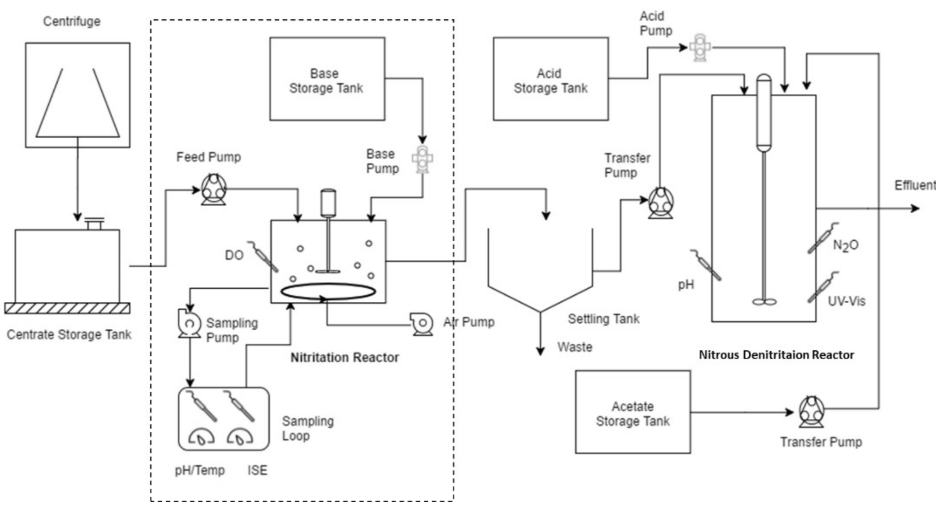

Figure S1. Flow diagram for the CANDO pilot test system at Delta Diablo. Boxed area is the nitritation reactor. Performance of the downstream nitrous denitritation reactor is the subject of Wang et al., 2020.

Figure S2. Pilot-scale nitritation reactor at the Delta Diablo wastewater treatment plant.

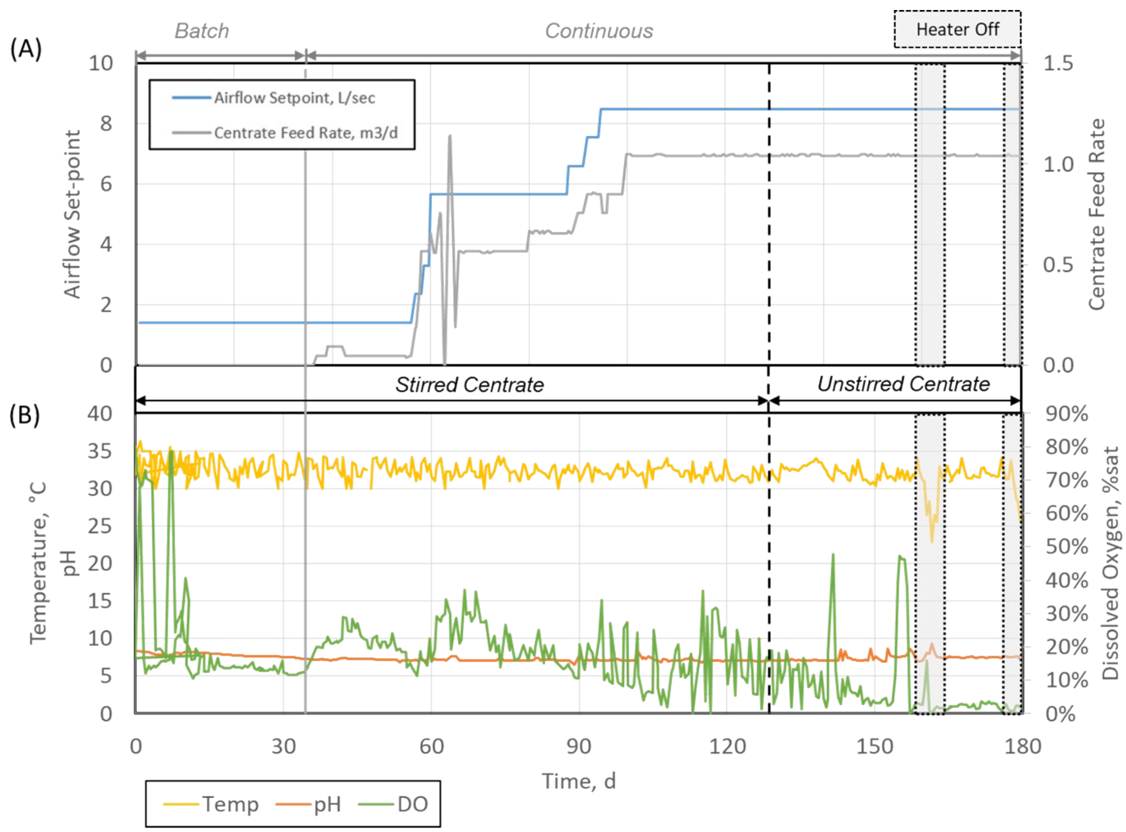

Figure S3. (A) Operational conditions and (B) in-situ measurements of temperature, dissolved oxygen and pH of the pilot-scale nitritation reactor

Preparation of a coagulant-adapted inoculum

Two nitrifying cultures with different histories of exposure to coagulants (Clarifloc™ WE-223, Polydyne Inc., CA) were mixed together in equal volumes to create a coagulant-adapted inoculum for rapid start-up of the bench-scale SBRs. Both cultures were initiated with nitrifying activated sludge from the Palo Alto Regional Water Quality Control Plant (Palo Alto, CA), and both were fed centrate from the Delta Diablo Wastewater Treatment Plant continuously for 80 days. One culture received a one-time spike of 300 mg/L of nitrogen-containing coagulants after 10 days of operation.

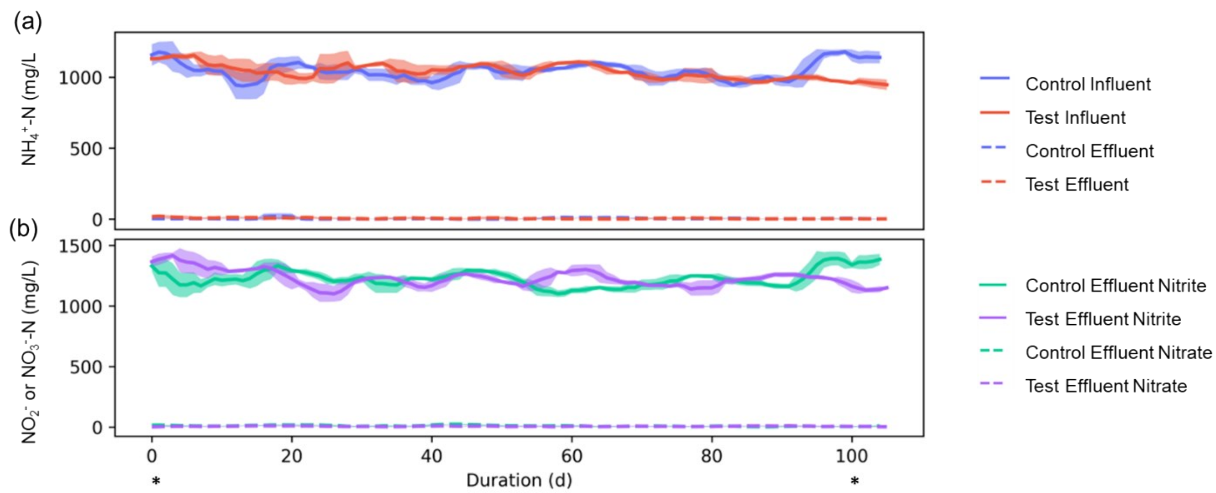

Figure S4. Long-term performance of bench-scale nitritation SBR fed with centrate (Control) and SBR fed with centrate with additional coagulants (Test). Changes in influent and effluent concentrations of ammonia (a) and nitrite/nitrate (b) are plotted over time. The curves represent the moving averages (n=5) of daily grabbed water samples with shadings indicating the standard deviations from corresponding average. Asterisks represent the dates when biomass samples were collected for community analysis.