

Supplementary Information

Calculation of pseudo-first order rate constants

Pseudo-first order rate constants were calculated for U(VI), NO_3^- , G2P, and Fe(III) removal after integration and linearization of Eq. 1 in the form of Eq. 2. Fe(III) oxides removal was calculated from the total production of Fe(II) as a function of time and the maximum Fe(II) produced during the incubations as equivalent for the initial concentration of reducible Fe(III) oxides.

$$\frac{dC}{dt} = -k_{obs}C \quad (1)$$

$$\ln\left(\frac{C}{C_0}\right) = -k_{obs}t \quad (2)$$

Data was transformed and graphically represented as $\ln(C/C_0)$ vs. time, where C represents concentration of each species at time x, and C_0 represents the initial concentration of each species. An unweighted linear regression was used to fit the data of each species of interest in each reactor, and the slope of the regression was reported as the pseudo-first order rate constant (Figure 2B and S1). The error on the pseudo-first order rate constants was propagated to include the standard deviation of the slope of the linear regression in each incubation and the variation between duplicate incubations.

For reactor treatments where no change in species concentration was observed for the duration of the experiment, the rate constant was reported as zero. For uranium removal in pH 5.5 reactors, two separate removal phases were fitted with linear regressions (Figure 2B). The initial removal phase occurred between days 0 and 4, and the secondary removal phase occurred between days 7 and 39. For pH 7.0 reactors, only one uranium removal phase was observed (Figure 2B). A single removal phase was also observed for NO_3^- , Fe(III), and G2P at both pHs (Figure S1).

Supplementary Tables

Table S1. Composition of trace elements solution as reported in Widdel and Bak (1992).

<i>Species</i>	<i>Concentration (mM)</i>
HCl	100
FeSO ₄ • 7H ₂ O	7.5
H ₃ BO ₃	0.5
MnCl ₄ • 4H ₂ O	0.5
CoCl ₂ • 6H ₂ O	0.8
NiCl ₂ • 6H ₂ O	0.1
CuCl ₂ • 2H ₂ O	0.01
ZnSO ₄ • 7H ₂ O	0.5
Na ₂ MoO ₄ • 2H ₂ O	0.15

Supplementary Figures

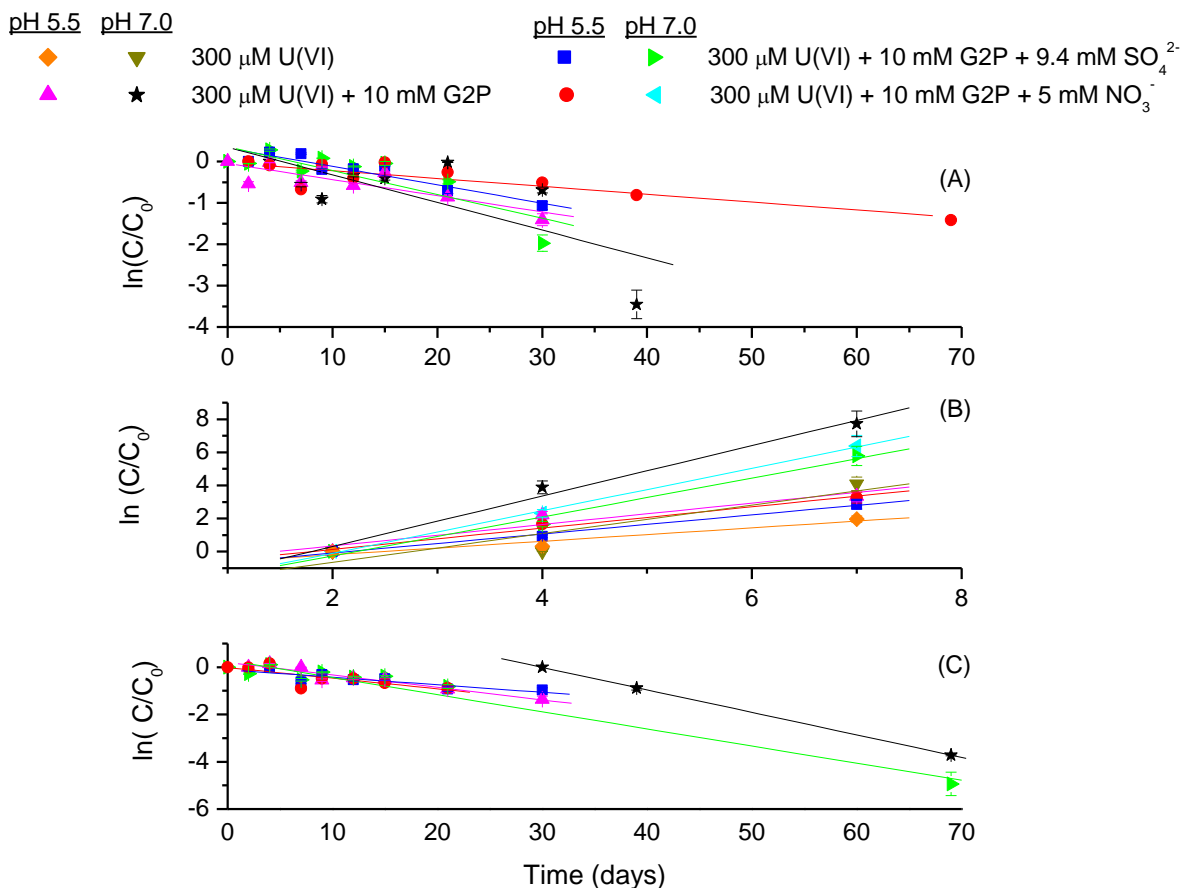


Figure S1. Linearization of static microcosm data for A) NO_3^- , B) Fe(II), and C) G2P for pH 5.5 and 7.0 reactors amended with 300 μM UO_2^{2+} only; 300 μM UO_2^{2+} and 7 mM NO_3^- (pH 7.0 only); 300 μM UO_2^{2+} and 5 mM G2P; 300 μM UO_2^{2+} , 5 mM G2P, and 7 mM NO_3^- (pH 5.5 only); or 300 μM UO_2^{2+} , 5 mM G2P, and 9.4 mM SO_4^{2-} . The slope and standard error of the slope of these linear regressions was used to determine pseudo-first order rate constants and their variation in each incubation. For each chemical species, treatments not shown exhibited no discernable change in concentrations of that species for the duration of the experiment, and rate constants for these reactors were reported as zero.

References

Bak, W.a., 1992. Gram-negative mesophilic sulfate-reducing bacteria, in: A. Balows, H.G.T., M. Dworkin, W. Harder, and K.-H. Schleifer (Ed.), *The Prokaryotes*, 2 ed. Springer, New York, pp. 3352-3378.