Supplementary Material

Batch Studies of Phosphonate and Phosphate Adsorption on Granular Ferric Hydroxide (GFH) with Membrane Concentrate and Its Synthetic Replicas

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1. Standard Deviations

Experiment 3 was carried out in a duplicate approach. Tables S1 and S2 show the sample standard deviations of the results. The sample standard deviation was calculated according to Equation S.1, where N is the number of observations on the sample, x_i the observed sample value, and $\bar{x}$ the mean value of these observations.

$$s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(x_i - \bar{x})^2}, \tag{S.1}$$

Table S1: Removal of NTMP by precipitation at different calcium concentrations and pH values with standard deviations (T = 20 °C; t_c = 7 d; no GFH added).

	NTMP [mg/L]							
	3.22	**16.1**	**32.2**	**80.5**	**3.22**	**16.1**	**32.2**	**80.5**
	Removal at pH 8 [%]				Removal at pH 9 [%]			
Ca:NTMP 0:1	0.6±1.1	-0.1±0.5	1.1±0.0	0.0±0.4	2.6±0.3	0.2±0.2	0.7±0.7	2.4±1.0
Ca:NTMP 1:1	2.6±1.8	0.3±0.1	1.5±0.1	1.1±0.2	-1.2±0.1	0.2±0.3	0.8±0.2	2.2±0.3
Ca:NTMP 2:1	0.9±0.5	0.2±0.5	1.4±0.1	0.8±0.2	-0.3±0.4	1.4±0.6	1.9±0.2	91.3±0.2
Ca:NTMP 5:1	1.5±0.2	1.2±0.2	1.7±0.1	98.7±0.6	4.3±0.8	1.6±1.3	78.2±1.9	99.4±0.3
Ca:NTMP 10:1	0.7±0.2	2.6±2.2	95.4±2.1	99.5±0.5	3.6±1.1	63.7±0.4	99.6±0.2	99.5±0.1
Ca:NTMP 25:1	1.1±2.4	94.0±0.2	99.0±0.0	99.7±0.1	2.7±0.6	97.0±1.9	100.1±0.2	100.1±0.3
Ca:NTMP 60:1	0.3±0.4	96.6±2.2	99.4±0.0	99.6±0.0	2.0±0.4	98.6±0.7	100.4±0.0	100.1±0.0

Table S2: Removal of DTPMP by precipitation at different calcium concentrations and pH values with standard deviations (T = 20 °C; t_c = 7 d; no GFH added).

	DTPMP [mg/L]							
	3.22	**16.1**	**32.2**	**80.5**	**3.22**	**16.1**	**32.2**	**80.5**
	Removal at pH 8 [%]				Removal at pH 9 [%]			
Ca:DTPMP 0:1	-1.5±0.6	-1.1±1.3	-1.2±1.0	-0.6±0.4	-1.6±0.1	0.1±0.1	1.8±2.3	-0.6±0.2
Ca:DTPMP 1:1	-1.4±0.4	1.4±1.5	-4.0±1.1	-1.3±0.7	1.7±4.8	-0.3±0.3	3.7±3.3	-.03±0.1
Ca:DTPMP 2:1	-0.1±0.6	-0.8±1.5	-3.9±0.3	-0.8±0.4	-1.5±0.0	0.2±0.3	-1.5±0.0	-0.3±0.5
Ca:DTPMP 5:1	0.0±1.2	1.0±1.4	0.5±1.5	0.0±0.3	-1.4±0.1	-0.3±0.5	-1.5±1.3	61.9±1.9
Ca:DTPMP 10:1	0.3±0.4	0.0±0.7	-0.1±0.0	73.8±0.3	-4.5±3.0	0.3±0.3	47.0±0.3	91.2±0.3
Ca:DTPMP 25:1	-1.2±0.7	-0.6±3.6	55.6±1.4	90.3±0.1	-1.2±1.6	0.3±0.3	87.7±0.6	94.3±0.1
Ca:DTPMP 60:1	0.0±0.4	54.2±0.2	83.7±0.3	93.3±0.6	-6.2±2.4	84.7±0.2	92.2±0.1	95.6±0.1