

Supporting Information

Effects of Phosphate on the Transport of *Escherichia coli* O157:H7 in Saturated Quartz Sand

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The calculated collision efficiency (α)

According to the colloid filtration theory, the deposition rate coefficients is a function of the collector efficiency (η) and collision efficiency (α) [S1,S2]. The collector efficiency (η) can be estimated from correlation equation reported in the literature (Table S1) [S2]. The collision efficiency (α) can then be estimated from the experimentally determined deposition rate coefficient and collector efficiency [S2]:

$$\alpha = \frac{2}{3} k_d \frac{d_c \varepsilon}{U \eta (1 - \varepsilon)}$$

where d_c is the minimum of the grain size weight distribution, ε is the porosity of the sand, U is the specific discharge. The calculated values of α for the *E. coli* O157:H7 cells under various chemistry conditions are listed in Table S1.

Table S1. Values of collision efficiency (α) for the *E. coli* O157:H7 cells under various chemistry conditions.

Phosphate concentration	η		α	
	10 mM	100 mM	10 mM	100 mM
0 mM	0.4541	0.4771	0.314	0.139
0.1 mM	0.4434	0.4818	0.150	0.110
1 mM	0.4742	0.4597	0.104	0.029

Literature Cited:

- S1. Yao, K.M., M.M. Habibian, and C.R. Omelia, *Water and waste water filtration - concepts and applications*. Environmental Science & Technology, 1971. **5**(11): p. 1105-1112.
- S2. Tufenkji, N. and M. Elimelech, *Correlation equation for predicting single-collector efficiency in physicochemical filtration in saturated porous media*. Environmental Science & Technology, 2004. **38**(2): p. 529-536.