Supporting Information

Accumulation on and Extraction of Lead from Point-of-use Filter for Evaluating Lead Exposure from Drinking Water

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Table of contents

Table S1. St. Louis typical tap water quality information

Parameter	**Average or Range**	**Comments**
pH	9.4 – 10.2	pH is the measure of the acid/base properties of water
Total hardness (as $CaCO_3$)	67 – 217 mg/L	Natural occurring
Chloramines (disinfectant)	0.5 – 3.7 mg/L	Water additive to control microbes
Total Dissolved Solids	152 – 236 mg/L	Naturally occurring
Calcium	15 – 26 mg/L	Naturally occurring
Total Organic Carbon	1.1 – 4.0 mg/L	Naturally present in the environment

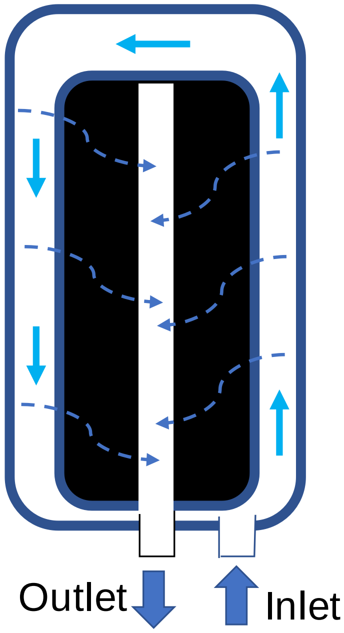

Figure S1. Structure of the NSF-53 certified Brita faucet filter.

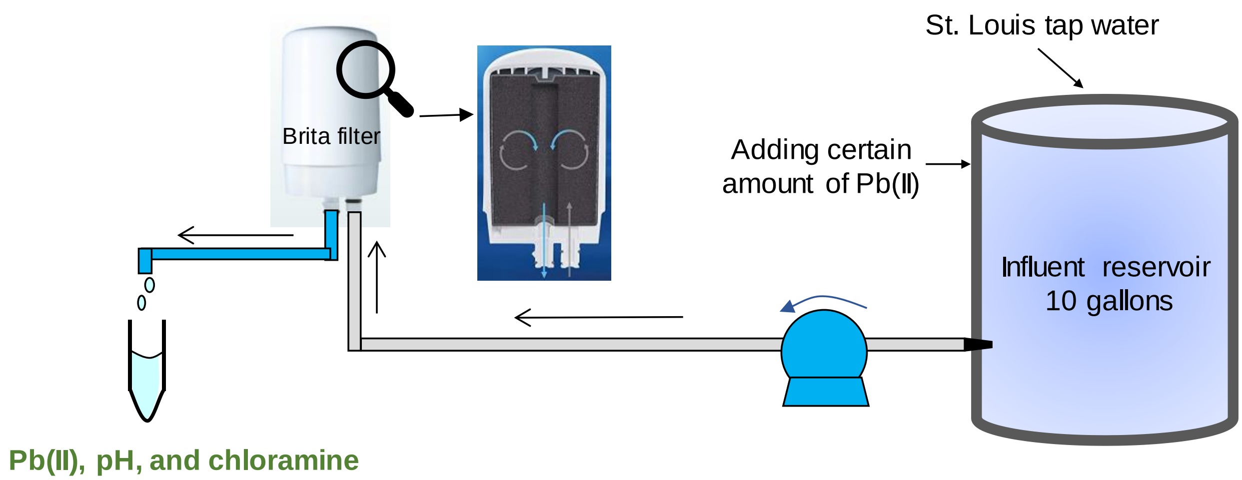

Figure S2. Experimental system for loading Pb onto point-of-use filter with Pb-spiked St. Louis tap water.

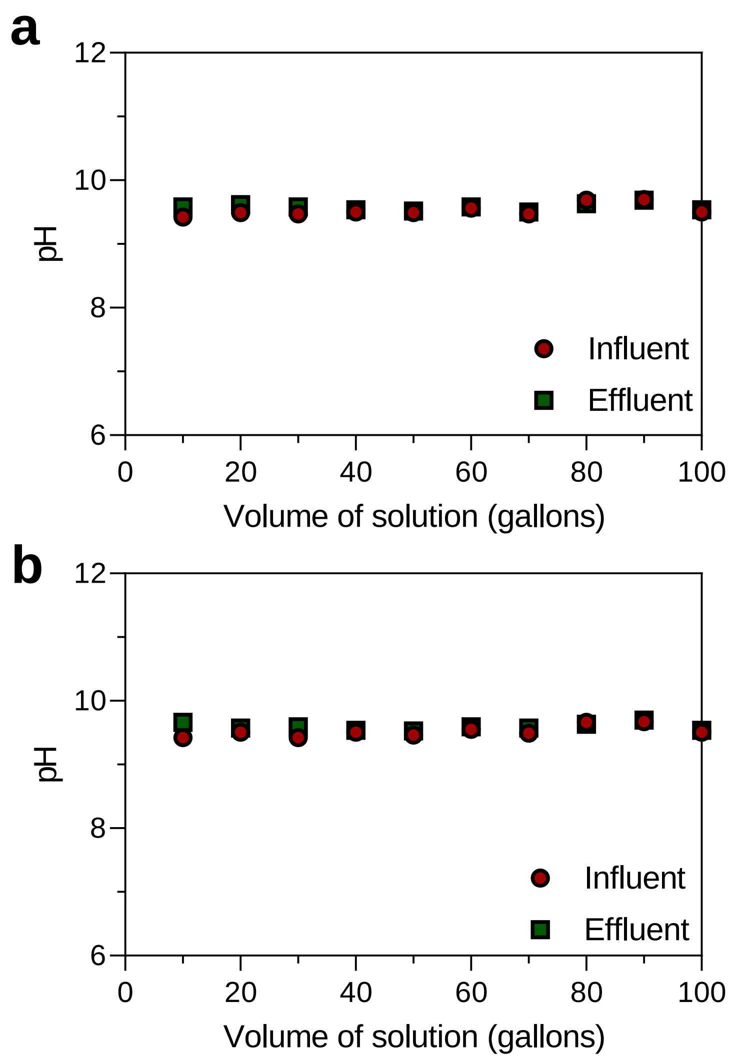

Figure S3. The pH values of influent and effluent from loading Pb onto POU filter with 100 gallons of Pb-spiked St. Louis tap water. The (a) T1 and (b) T2 are two independent experiments. The influent and effluent represent Pb spiked St. Louis tap water in the influent tank and Pb spiked St. Louis tap water after pumped through POU filters, respectively. The flow rate was maintained at 1.5 L/min. Error bars represent the standard deviations from duplicate experiments.

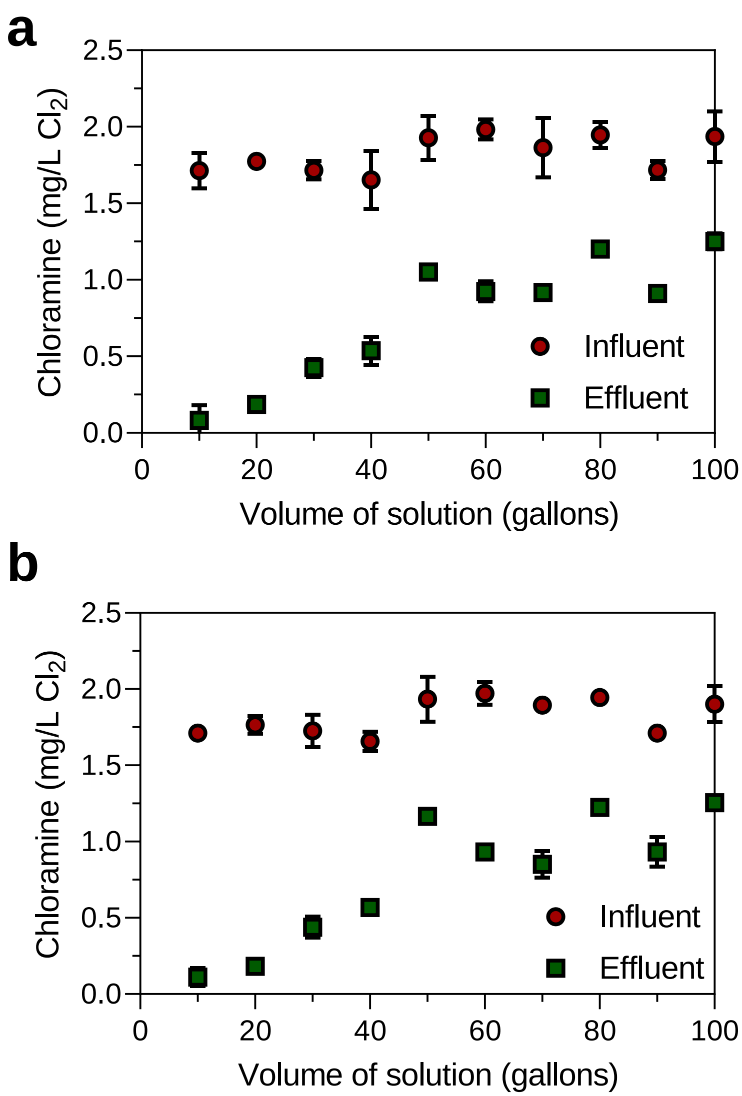

Figure S4. The chloramine concentrations of influent and effluent from loading Pb onto POU filter with 100 gallons of Pb-spiked St. Louis tap water. The (a) T1 and (b) T2 are two independent experiments. The influent and effluent represent Pb spiked St. Louis tap water in the influent tank and Pb spiked St. Louis tap water after pumped through POU filters, respectively. The flow rate was maintained at 1.5 L/min. Error bars represent the standard deviations from duplicate experiments.

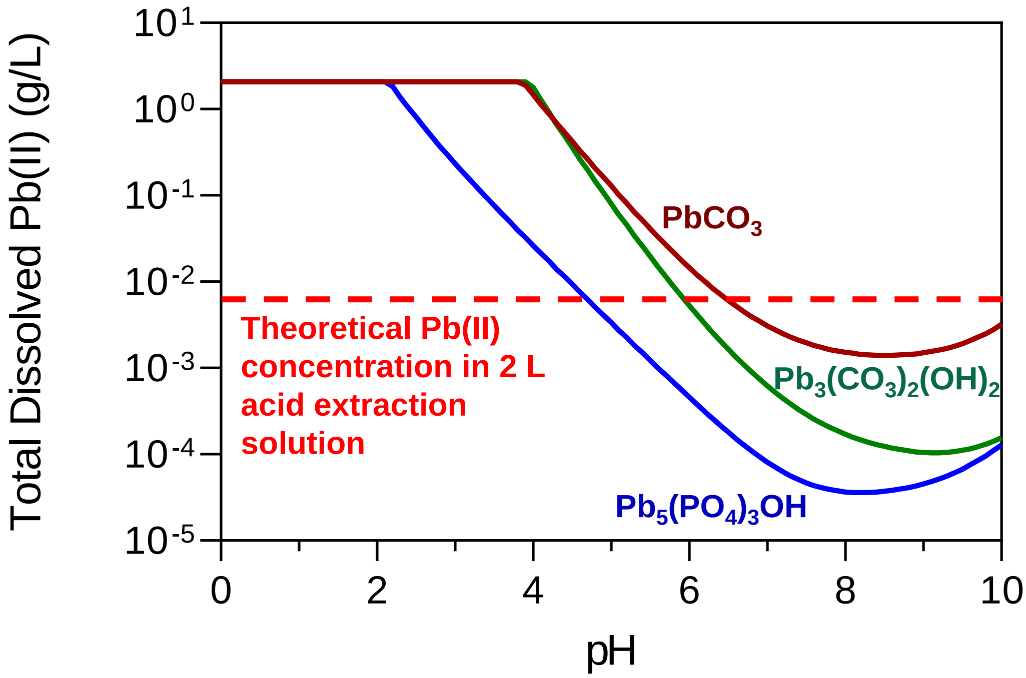

Figure S5. Theoretical solubility of cerussite ($PbCO_3$), hydrocerussite ($Pb_3(CO_3)_2(OH)_2$), and hydroxylpyromorphite ($Pb_5(PO_4)_3OH$) under different pH conditions. The initial concentrations of $PbCO_3$, $Pb_3(CO_3)_2(OH)_2$, and $Pb_5(PO_4)_3OH$) are 10.0 mM, 3.3 mM, and 2.0 mM, respectively. These solid concentrations give 10 mM total Pb (2.07 g/L as Pb) loadings to each system. Other than the components needed to provide the total lead, carbonate, and phosphate to provide these amounts of solids, no additional inputs were provided. The red dashed line indicates the Pb(II) concentration that would be in 2 L of acid if that volume contained all of the Pb(II) that had accumulated from 100 gallons St Louis tap water with 50 µg/L Pb(II). Calculations were conducted in Visual MINTEQ.[1]

The solubilities of typical Pb-containing solids are shown in Figure S5. Since the pH of the extraction solution is around 0, at least 4 g (as Pb) of Pb-containing solids are extractable with 2 L of 1 M HNO3, and this extractable amount is much higher than the amount of Pb-containing solids that could have accumulated in a POU filter harvested from realistic conditions. As a result, the acid extraction method should also be applicable for mobilizing Pb-containing solids that had accumulated on POU filters.

Reference

1 J. P. Gustaffson, Visual MINTEQ – a free equilibrium speciation model, https://vminteq.lwr.kth.se/.