Supplemental material

Use of silicate minerals for pH control during reductive dechlorination of chloroethenes in batch cultures of different microbial consortia†

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FIG S1 Impact of ionic strength on cis-DCE dechlorination for consortia SL2-PCEa and AQ-1. The consortia were cultivated at three different ionic strength (I) (8 mmol l$^{-1}$, 36 mmol l$^{-1}$ and 92 mmol l$^{-1}$) with the low buffered medium described in the Materials and Methods section. The ionic strength was adjusted by increasing the concentration of NaCl. The microcosms were amended with cis-DCE with a nominal concentration of 0.6 mmol l$^{-1}$. 
### TABLE S1
First order kinetic rate constant to model microbial kinetics used in the geochemical model for the three consortia. These values were obtained by fitting the experimental data (culture in standard growth medium) with the model.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SL2-PCEa</th>
<th>SL2-PCEb</th>
</tr>
</thead>
<tbody>
<tr>
<td>$k_{\text{PCE}}$ (s$^{-1}$)</td>
<td>$1 \times 10^{-2}$</td>
<td>$1 \times 10^{-2}$</td>
</tr>
<tr>
<td>$k_{\text{TCE}}$ (s$^{-1}$)</td>
<td>$3 \times 10^{-3}$</td>
<td>$3 \times 10^{-3}$</td>
</tr>
<tr>
<td>$k_{\text{cis-DCE}}$ (s$^{-1}$)</td>
<td>$8 \times 10^{-4}$</td>
<td></td>
</tr>
<tr>
<td>$k_{\text{VC}}$ (s$^{-1}$)</td>
<td>$1 \times 10^{-5}$</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE S2
Water-hexadecane partition coefficient and dimensionless Henry’s law constants ($C_{\text{gas}}/C_{\text{aq}}$) of PCE, TCE, $\text{cis}$-DCE, vinyl chloride and ethene used in this model.

<table>
<thead>
<tr>
<th>Compound</th>
<th>$H_{cc}$ (T= 30°C) (1)</th>
<th>$K_{h-w}$ (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCE</td>
<td>0.93</td>
<td>4466</td>
</tr>
<tr>
<td>TCE</td>
<td>0.5</td>
<td>478</td>
</tr>
<tr>
<td>cis-DCE</td>
<td>0.19</td>
<td>87</td>
</tr>
<tr>
<td>VC</td>
<td>1.28</td>
<td>23</td>
</tr>
<tr>
<td>Ethene</td>
<td>6.52</td>
<td>15</td>
</tr>
</tbody>
</table>

(1) Data from (1) for PCE, TCE, $\text{cis}$-DCE and ethene and from (2) for VC
(2) Data from (3) for PCE, TCE, $\text{cis}$-DCE and ethene. For VC, the water-hexadecane partition coefficient has not been found in literature and the octanol-water partition coefficient was used instead (4).

### TABLE S3
List of parameters used for modeling mineral dissolution.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Andradite</th>
<th>Diopside</th>
<th>Fayalite</th>
<th>Forsterite</th>
</tr>
</thead>
<tbody>
<tr>
<td>$K_{\text{eq T=25°C}}$</td>
<td>16</td>
<td>16.5$^{(1)}$</td>
<td>16.6</td>
<td>18$^{(1)}$</td>
</tr>
<tr>
<td>$k_{\text{H+ T=25°C}}$</td>
<td>-5.25</td>
<td>-8.7</td>
<td>-5.5</td>
<td>-6.8</td>
</tr>
<tr>
<td>$k_{\text{W T=25°C}}$</td>
<td>-11.25</td>
<td>-11.8</td>
<td>-11.8</td>
<td>-11.8</td>
</tr>
<tr>
<td>$n_{\text{H+ T=25°C}}$</td>
<td>0.9</td>
<td>0.38</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>$E_{\text{w}}$ $^{(2)}$</td>
<td>103.8</td>
<td>40.6</td>
<td>94.4</td>
<td>79</td>
</tr>
<tr>
<td>$E_{\text{H+}}$ $^{(2)}$</td>
<td>94.41</td>
<td>96.1</td>
<td>94.4</td>
<td>67.2</td>
</tr>
</tbody>
</table>

(1) These parameters were modified to fit the data. All the other parameters were from the results of abiotic batch experiment performed with the same mineral samples from Lacroix (2014)(5).
**TABLE S4** Concentration of dissolved heavy metals (total elements) in solution in µg l⁻¹ at the end of the SL2-PCEa experiment.

<table>
<thead>
<tr>
<th>Element</th>
<th>Zn</th>
<th>Cu</th>
<th>Mn</th>
<th>Cd</th>
<th>Co</th>
<th>Cr</th>
<th>Ni</th>
<th>Pb</th>
<th>As</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive control</td>
<td>0.0</td>
<td>14.7</td>
<td>4.8</td>
<td>0.0</td>
<td>2.8</td>
<td>59.2</td>
<td>28.9</td>
<td>0.2</td>
<td>0.8</td>
</tr>
<tr>
<td>Negative control</td>
<td>6.8</td>
<td>11.7</td>
<td>40.7</td>
<td>0.0</td>
<td>9.3</td>
<td>5.6</td>
<td>6.1</td>
<td>0.4</td>
<td>4.3</td>
</tr>
<tr>
<td>Andradite</td>
<td>81.1</td>
<td>10.5</td>
<td>70.7</td>
<td>0.0</td>
<td>1.0</td>
<td>5.5</td>
<td>2.7</td>
<td>1.8</td>
<td>75.2</td>
</tr>
<tr>
<td>Diopside</td>
<td>1.1</td>
<td>9.7</td>
<td>8.7</td>
<td>0.0</td>
<td>0.2</td>
<td>9.3</td>
<td>12.5</td>
<td>0.1</td>
<td>5.1</td>
</tr>
<tr>
<td>Fayalite</td>
<td>0.3</td>
<td>11.5</td>
<td>1075.5</td>
<td>0.0</td>
<td>0.4</td>
<td>2.8</td>
<td>1.6</td>
<td>0.1</td>
<td>29.6</td>
</tr>
<tr>
<td>Forsterite</td>
<td>0.8</td>
<td>10.7</td>
<td>486.3</td>
<td>0.0</td>
<td>0.5</td>
<td>4.5</td>
<td>4.7</td>
<td>0.1</td>
<td>5.9</td>
</tr>
</tbody>
</table>

**References**