



Inhibition of perchlorate-reducing bacteria by iron

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Perchlorate (ClO_4^-) is an inorganic anion which inhibits iodine absorption and disturbs metabolism. In Israel, a high concentration of perchlorate was found in deep unsaturated soil and groundwater of Ramat Hasharon. For remediation of the soil, contaminated groundwater was pumped and then supplemented with ethanol (electron donor and carbon) and reintroduced in the active topsoil by subsurface drip irrigation for treatment. The result showed a significant decrease in perchlorate concentration in shallow soil (0-13m) because of the surface soil high degradation potential. With time high ferrous iron concentration (2mM) was found in the soil solution, and the perchlorate reduction was slowed. We tested the ferrous iron inhibition for perchlorate-reducing bacteria. First, we found that ferrous iron cannot be an electron donor for the perchlorate degradation process. Second, perchlorate-reducing bacteria treated iron showed a lag time. According to the kinetic experiment, the highest perchlorate-reducing rate with presence of ferrous iron was found in 30.0 ($\text{mg}\cdot\text{l}^{-1}\cdot\text{h}\cdot\text{OD}_{600}^{-1}$). But the highest rate without ferrous iron was 68.1 ($\text{mg}\cdot\text{l}^{-1}\cdot\text{h}\cdot\text{OD}_{600}^{-1}$).