

Response to "Comment on 'Competition for Hydrogen within a Chlorinated Solvent Dehalogenating Anaerobic Mixed Culture'"

SIR: We greatly appreciate Dolfig's comments on our recent paper (1), raising the issue of the source of reducing equivalents for dehalogenation of *cis*-1,2-dichloroethene (*cis*-DCE) and vinyl chloride (VC) that occurred after the added electron donor, benzoate, had been consumed. Dolfig suggested that the only plausible source of reducing equivalents at this stage in our batch cultures was acetate, which we agree was present. Dolfig suggested several possible mechanisms by which acetate could serve as a source of reducing equivalents, mechanisms that we ourselves had considered. We too had puzzled over the continued dehalogenation effected in our cultures and conducted experiments to determine whether acetate provided the reducing equivalents for this, or whether some other source might have been involved. We take this opportunity to share our experimental results.

In our batch experiments (1), 20 mg/L yeast extract was added to serve as a necessary nutrient for dehalogenating organisms as well as 0.3 mM benzoate. In order to determine whether yeast extract or acetate was the likely source of post-benzoate dehalogenation, we prepared similar 100-mL batch experiments without benzoate but with 20 mg/L yeast extract, 1.0 mM acetate, and their combination. Figure 1 illustrates typical results from these experiments in which 8 μ mol *cis*-DCE was initially added. Without yeast extract, no ethene production was detected, even when acetate was present. With 20 mg/L yeast extract, dehalogenation resulted, producing a very similar ethene production profile in the presence or absence of acetate. Ethene production rate continued after about 40 days but slower than initially. We conclude from these studies that acetate was not a significant source of reducing equivalents in our culture but that yeast extract was.

The overall degradation pathway for yeast extract is difficult to follow because of its complex composition. There are thus many possible explanations for the slower dehalogenation rate after 40 days. One possible additional source of reducing power that may contribute to the continued

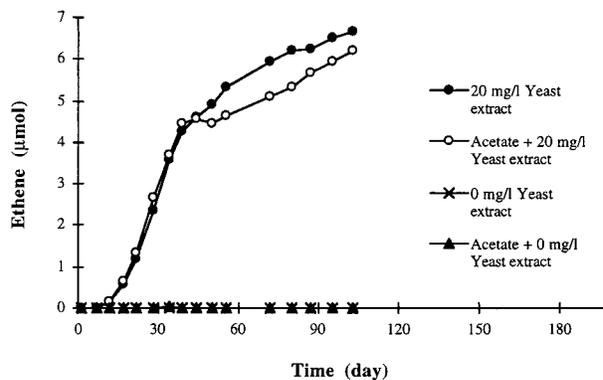


FIGURE 1. Ethene production from *cis*-1,2-dichloroethene dehalogenation.

dehalogenation observed is the decay of biomass produced from yeast extract fermentation. Its slow decay could provide a continued source of hydrogen for dehalogenation. We have confirmed the potential significance of cell decay in reductive dehalogenation in other studies that will be reported in a separate article. We thus conclude that yeast extract and possibly bacterial cell decay, not acetate, were the likely active sources of reducing power in our cultures following benzoate consumption. As a correction to Dolfig's last statement, our dehalogenating culture was derived from a PCE-contaminated groundwater site, not from digested sludge.

Literature Cited

- (1) Yang, Y.; McCarty, P. L. *Environ. Sci. Technol.* **1998**, *32*, 3591–3597.

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