ASSOCIATED CONTENT

SUPPORTING INFORMATION FOR

Substrate hydrophobicity and cell composition influence the extent of rate limitation and masking of isotope fractionation during microbial reductive dehalogenation of chlorinated ethenes

Julian Renpenning[1], Insa Rapp[1,2] and Ivonne Nijenhuis[1]*

[1]Department for Isotope Biogeochemistry, Helmholtz-Centre for Environmental Research – UFZ, Permoserstrasse 15, D-04318 Leipzig, Germany

[2]Department of Chemistry, Universität Duisburg-Essen, Universitätsstraße 2, 45141 Essen, Germany

SUMMARY

8 pages, 6 figures

CONTENT

Figure S1: Sorption of PCE per cellular biomass of *S. multivorans* and *D. hafniense* strain PCE-S. Both cultures were cultivated using fumarate as electron acceptor and pyruvate as electron donor.

Figure S2: Sorption of PCE per cellular biomass of *S. multivorans*. The culture was cultivated using fumarate or PCE as electron acceptor and pyruvate as electron donor.

Figure S3: Fatty acid composition according to different growth conditions of *Sulfurospirillum multivorans* and *Desulfitobacterium hafniense* strain PCE-S. Strains were cultivated with fumarate or PCE as electron acceptor and pyruvate as electron donor.

Figure S4: Concept figure for dehalogenation experiments with resting cells. (A) The effect of *S. multivorans* outer-membrane on isotope fractionation was investigated with cells previously cultivated with fumarate or PCE as EA. Subsequent dehalogenation experiments were conducted with reduced MV as EA, addressing only the periplasmic located PceA, and PCE or TCE. (B) The effect PCE transport over the *S. multivorans* cytoplasmic-membrane on isotope fractionation was investigated with cells previously cultivated with fumarate only. To assess the periplasmic or cytoplasmic + periplasmic RDase either reduced MV or H_2 was used as ED, respectively.

Figure S5: Effect of the outer-membrane properties on isotope masking. Carbon isotope fractionation of PCE (left) or TCE (right) during dehalogenation with resting cells of *S. multivorans* grown with either pyruvate/fumarate (Pyr/Fum), pyruvate/PCE (Pyr/PCE) or formiate/PCE (Form/PCE) as electron donor/acceptor couples.

Figure S6: Western blot for RDase of *S. multivorans* grown with different substrates. The 56 kDa RDase is localized in cytoplasm, whereas 53 kDa is membrane bound facing the periplasmic space. Lane 1: molecular mass marker (10 - 170 kDa); 2: formate/PCE, 3: pyruvate/PCE, 4: pyruvate/fumarate for seven subcultivations, 5-7: pyruvate/fumarate for 15 subcultivations (three different cultures).

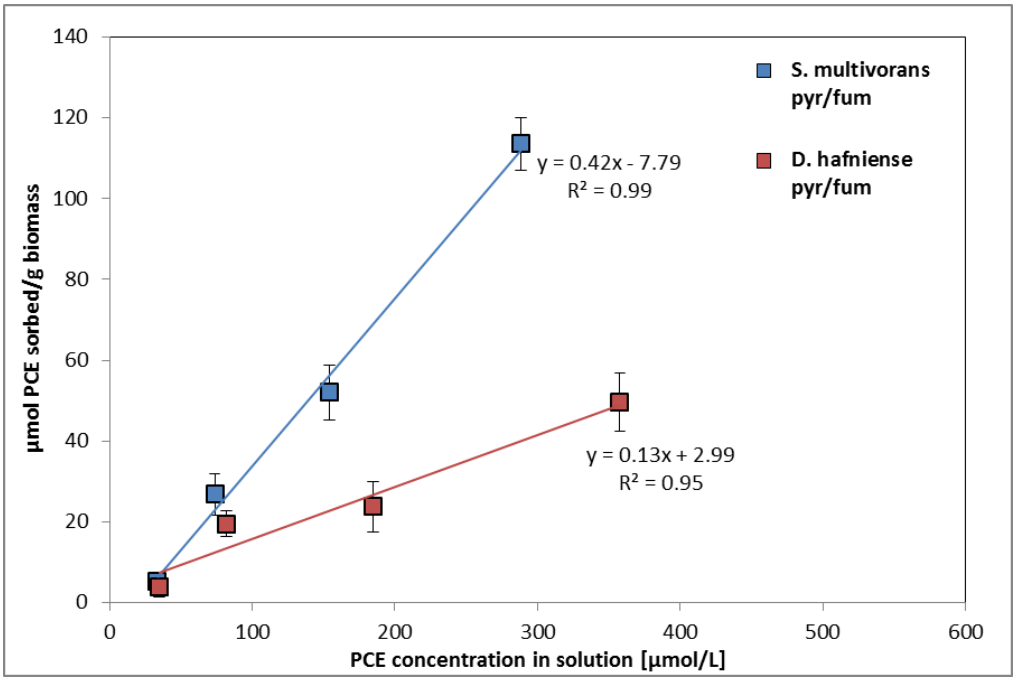

Figure S1: Sorption of PCE per cellular biomass of *S. multivorans* and *D. hafniense* strain PCE-S. Both cultures were cultivated using fumarate as electron acceptor and pyruvate as electron donor.

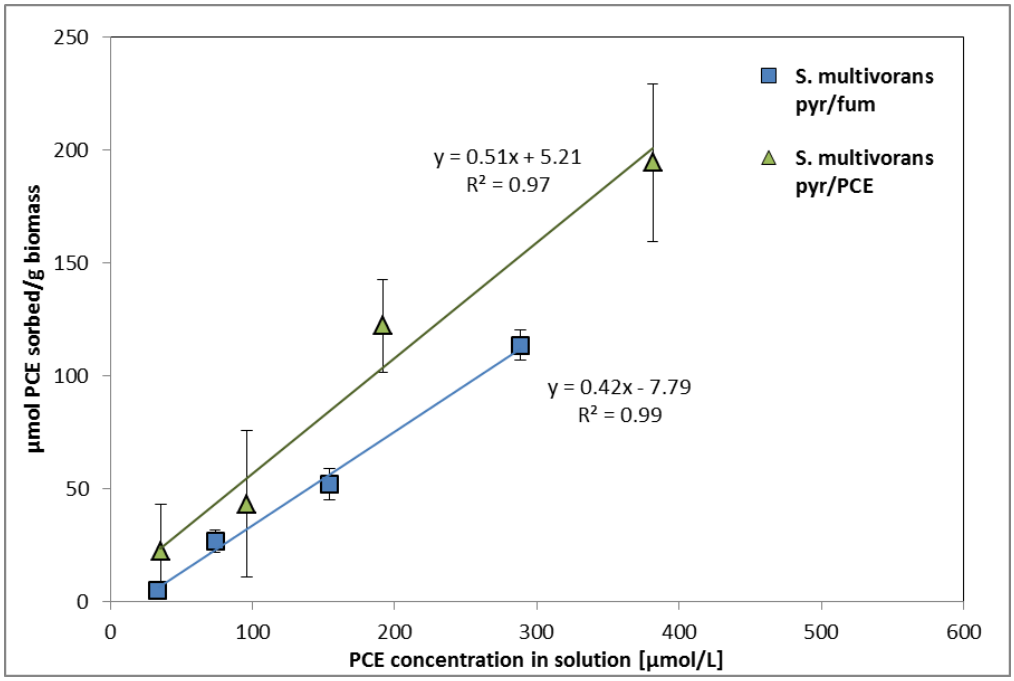

Figure S2: Sorption of PCE per cellular biomass of *S. multivorans*. The culture was cultivated using fumarate or PCE as electron acceptor and pyruvate as electron donor.

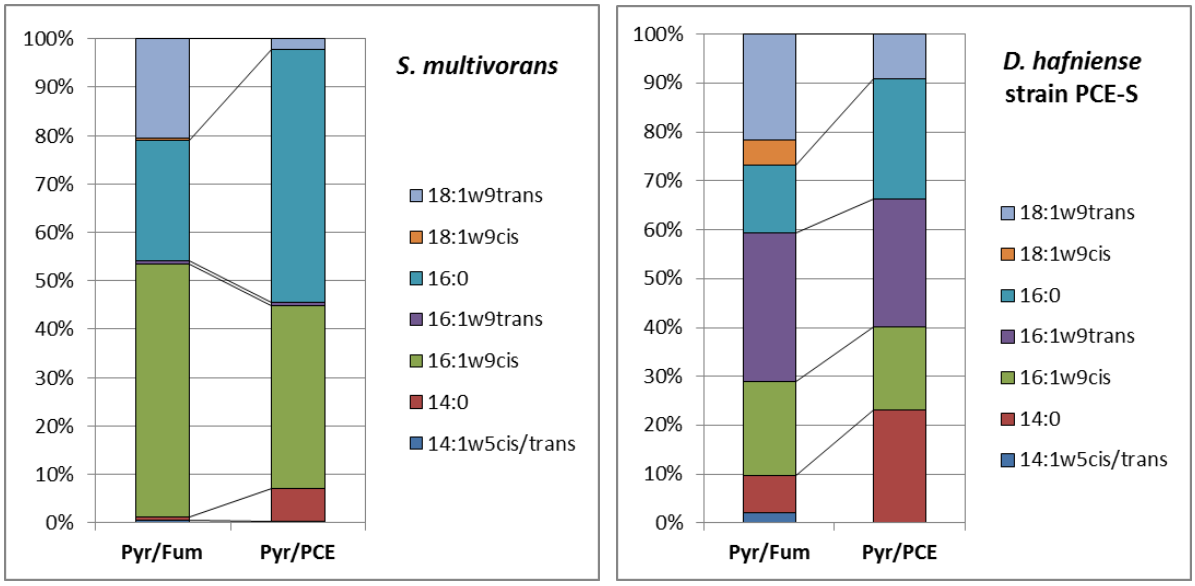

Figure S3: Fatty acid composition according to different growth conditions of *Sulfurospirillum multivorans* and *Desulfitobacterium hafniense* strain PCE-S. Strains were cultivated with fumarate or PCE as electron acceptor and pyruvate as electron donor.

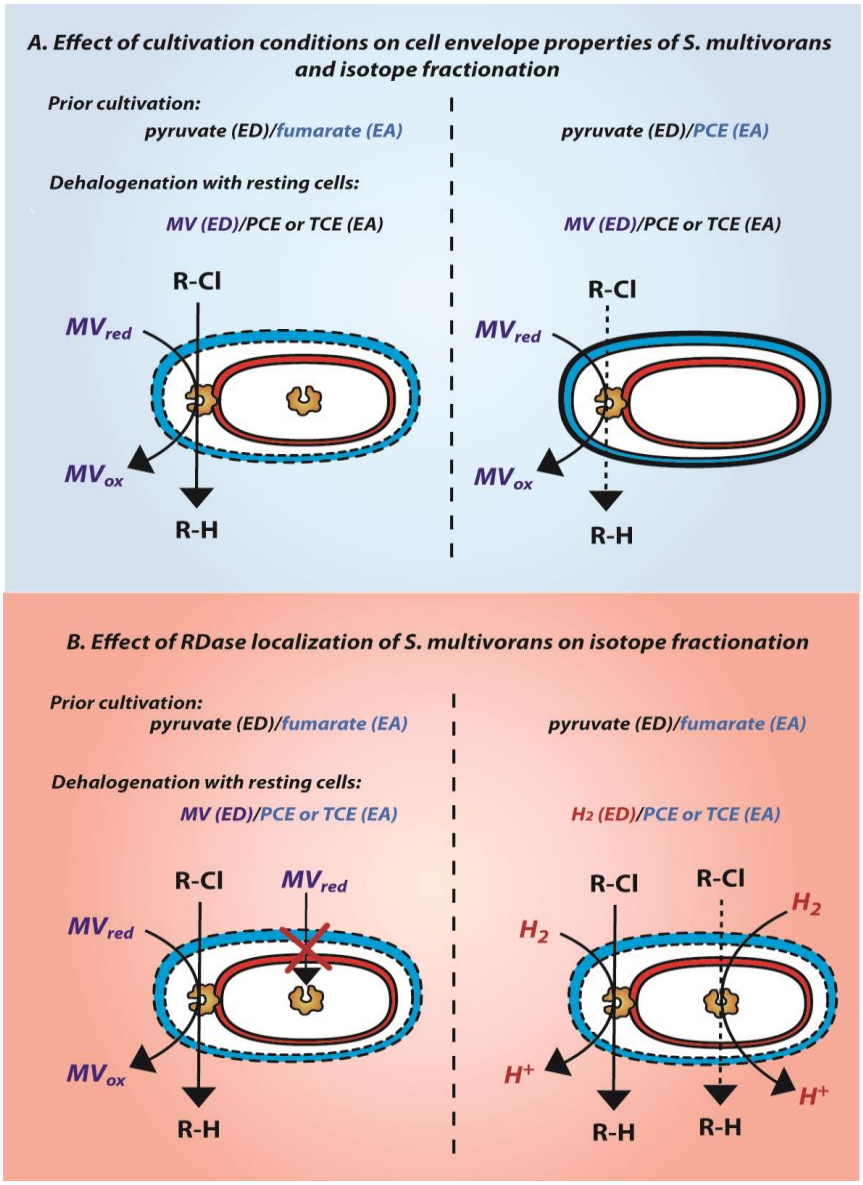

Figure S4: Concept figure for dehalogenation experiments with resting cells. (A) The effect of *S. multivorans* outer-membrane on isotope fractionation was investigated with cells previously cultivated with fumarate or PCE as EA. Subsequent dehalogenation experiments were conducted with reduced MV as EA, addressing only the periplasmic located PceA, and PCE or TCE. (B) The effect PCE transport over the *S. multivorans* cytoplasmic-membrane on isotope fractionation was investigated with cells previously cultivated with fumarate only. To assess the periplasmic or cytoplasmic + periplasmic RDase either reduced MV or H_2 was used as ED, respectively.

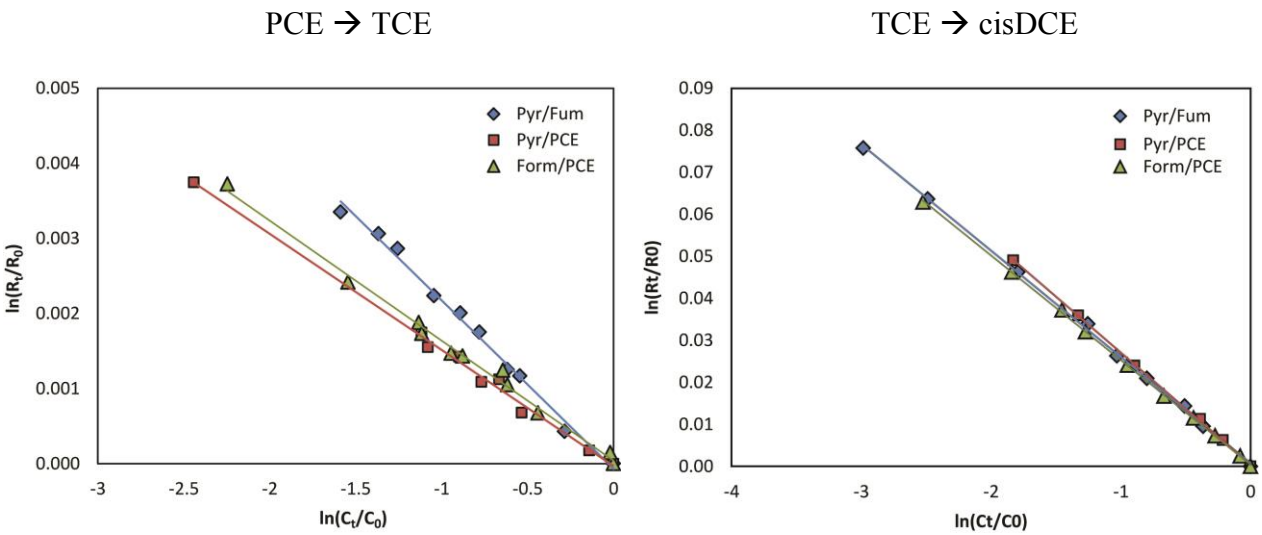

Figure S5: Effect of the outer-membrane properties on isotope masking. Carbon isotope fractionation of PCE (left) or TCE (right) during dehalogenation with resting cells of *S. multivorans* grown with either pyruvate/fumarate (Pyr/Fum), pyruvate/PCE (Pyr/PCE) or formiate/PCE (Form/PCE) as electron donor/acceptor couples.

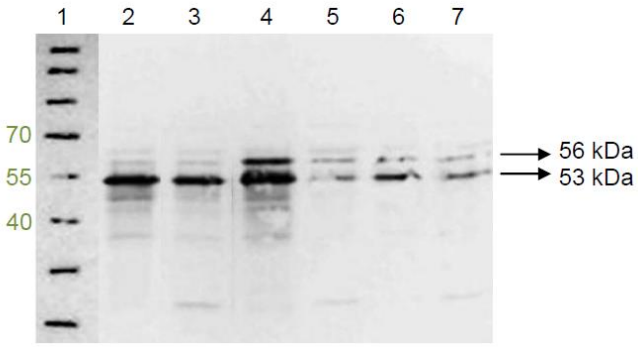

Figure S6: Western blot for RDase of *S. multivorans* grown with different substrates. The 56 kDa RDase is localized in cytoplasm, whereas 53 kDa is membrane bound facing the periplasmic space. Lane 1: molecular mass marker (10 - 170 kDa); 2: formate/PCE, 3: pyruvate/PCE, 4: pyruvate/fumarate for seven subcultivations, 5-7: pyruvate/fumarate for 15 subcultivations (three different cultures).