Elevated pressure of carbon dioxide affects growth of thermophilic *Petrotoga* sp.

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Carbon capture and storage (CCS) is considered a promising new technology which reduces carbon dioxide emissions into the atmosphere and thereby decelerates global warming. However, with CCS being a very young technology, there are yet a number of factors that need to be investigated before declaring CCS as being safe. Our research investigates the effect of high carbon dioxide concentrations and pressures on an indigenous microorganism that colonises a potential storage site.

Growth experiments were conducted in liquid culture using the thermophilic thiosulphate-reducing bacterium *Petrotoga sp*., isolated from formation water of the gas reservoir Schneeren (Lower Saxony, Northern German Plain). Growth (OD_{600}) was monitored over 10 days at different carbon dioxide concentrations (50%, 100%, and 150% in the gas phase), and was compared to cultures grown with 20% carbon dioxide. An additional growth experiment was performed over a period of 145 days with repeated subcultivation steps to detect long-term effects of carbon dioxide. Short-term cultivation at 50% and 100% carbon dioxide slightly reduced cell growth. In contrast, long-term cultivation at 150% carbon dioxide reduced cell growth and finally led to cell death. This suggested a more pronounced effect of carbon dioxide at prolonged cultivation and stresses the need for closer consideration of long-term effects.

Experiments with supercritical carbon dioxide at 100 bar completely inhibited both growth of a freshly inoculated culture and a pre-grown culture demonstrating the lethal effect of supercritical carbon dioxide. This effect was not observed in control cultures with 100 bar of hydrostatic pressure.

Evaluating the Role Mafic Crustal Assimilation in the Generation of Western US Continental Basalts

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Western US continental basalts are generally thought to reflect pristine geochemical and isotopic signatures inherited from heterogeneous mantle sources. Such thoughts rely on a lack of magmatic interactions with crustal sources. Assessments for the role of potential crustal interactions typically focus on modifications expected for Si-rich materials such as increased SiO2 or highly elevated trace elements such as Ba. In contrast, mafic crustal assimilation may impart only limited SiO_2 and trace element variations depending on the exact nature of the mafic crust and the degree to which the mafic materials are melted. Tholeiites and alkalic basalts erupted along and the Colorado Plateau-Rio Grande rift transition zone and within the Rio Grande rift itself retain geochemical and isotopic variations that are similar to those expected to result from mafic crustal assimilation. Results allow for the possibility that asthenospherically derived magmas assimilated variable amounts of mafic crust resulting in a range of isotopic and geochemical characteristics that are similar to those expected for trace element enriched heterogeneous subcontinental lithospheric mantle sources. Whole rock isotope signatures in a few of the younger flows (e.g., Bandera and McCartys flows, Zuni Bandera volcanic field, and the Carrizozo flow, Rio Grande rfit) vary extensively (e.g., 87Sr/86Sr of 0.7028 to 0.7035 for the Bandera flow, 0.7037 to 0.7084 for the McCartys flow, and 0.7044 to 0.7052 for the Carrizozo flow) and are consistent with more complicated petrogenetic histories involving a range of potential mantle and crustal sources. Here, we present phenocryst and melt inclusion major and trace element compositions to identify and track chemical variations retained in whole rocks and melt inclusions and integrate isotopic signatures of these components imposed during crystallization. Additional mineral signatures of plagioclase and xenocrystic materials will be discussed and the petrogenetic histories of selected young alkalic and tholeiitic basaltic from the Rio Grande rift and Zuni-Bandera volcanic field will be assessed to evaluate the potential role of mafic crustal assimilation in the genesis of respective trace element and isotopic signatures of these continental basalts.

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