

Abstract

Since the average global temperature has risen past the point of irreversible change, decided by the 2015 Paris Agreement, climate change has begun causing permanent damage to our planet. Humans and wildlife alike are at risk for losing their homes and are not able to adapt quick enough. The primary cause of this issue is releasing greenhouse gas, like carbon dioxide, into the atmosphere from burning coals and fossil fuels. Many innovations have been made towards developing greener alternative energy sources, but this technology is not perfect. Some industries, namely the healthcare industry, require a reliable source of energy to sustain patients in critical condition, and fossil fuels fulfill that need. To combat this, the J. Craig Venter Institute (JCVI) has been applying the POAP carbon sequestration cycle that uses four enzymes to store atmospheric carbon dioxide as an organic product to their minimal Syn3.0 cell. Analyzing these cells' behavior requires measuring the amount of metabolites they are producing, which is accomplished through gas chromatography-mass spectrometry (GC-MS). In this study, the conditions for running GC-MS were optimized using pure compounds of acetate, lactate, oxalate, oxaloacetate, and pyruvate, which will be used to analyze cultures of Syn3.0 cells engineered to express the POAP cycle enzymes.