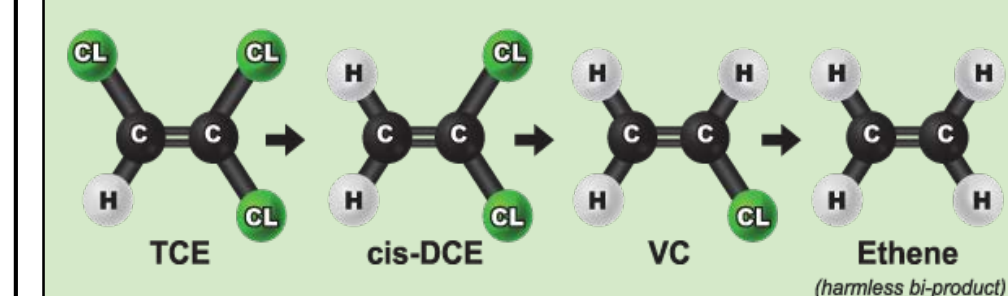


Background

TCE (Trichloroethylene) is a chemical that was widely used in the 60s and 70s by dry-cleaning businesses and the government as a solvent to remove grease from metal. There were no regulation measures to properly dispose of it. Research in the 80s revealed that TCE is a **carcinogen** and its use was banned, however TCE still pollutes many underground aquifers and groundwater sources.

Through **bioremediation, anaerobic** microorganisms (VS5) transform TCE into different toxic daughter products until it is finally completely converted into harmless **Ethene**.

TCE Degradation Pathway



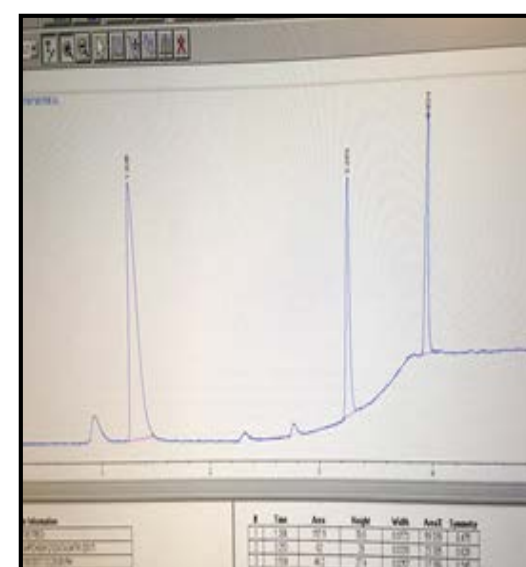
Procedure



1. GC system calibrated by injecting abiotic batch reactors of known TCE concentrations and finding the corresponding peak areas.



2. 50 mL of VS5 culture transferred from chemostats to anaerobic bottles from the gas chamber.



3. Bottles purged with nitrogen & CO2 under the fume hood for 15 minutes to keep them sterile and anaerobic.



4. 0.5 mL of saturated TCE and 0.1 mL of sodium formate were added to each bottle and shaken for several minutes.



5. The GC system was used to monitor the process of TCE converting to ethane and a rate test was performed every 5 minutes for each bottle.

Experimental Results

07/18/17 - VS5 - Baseline - Bottle1

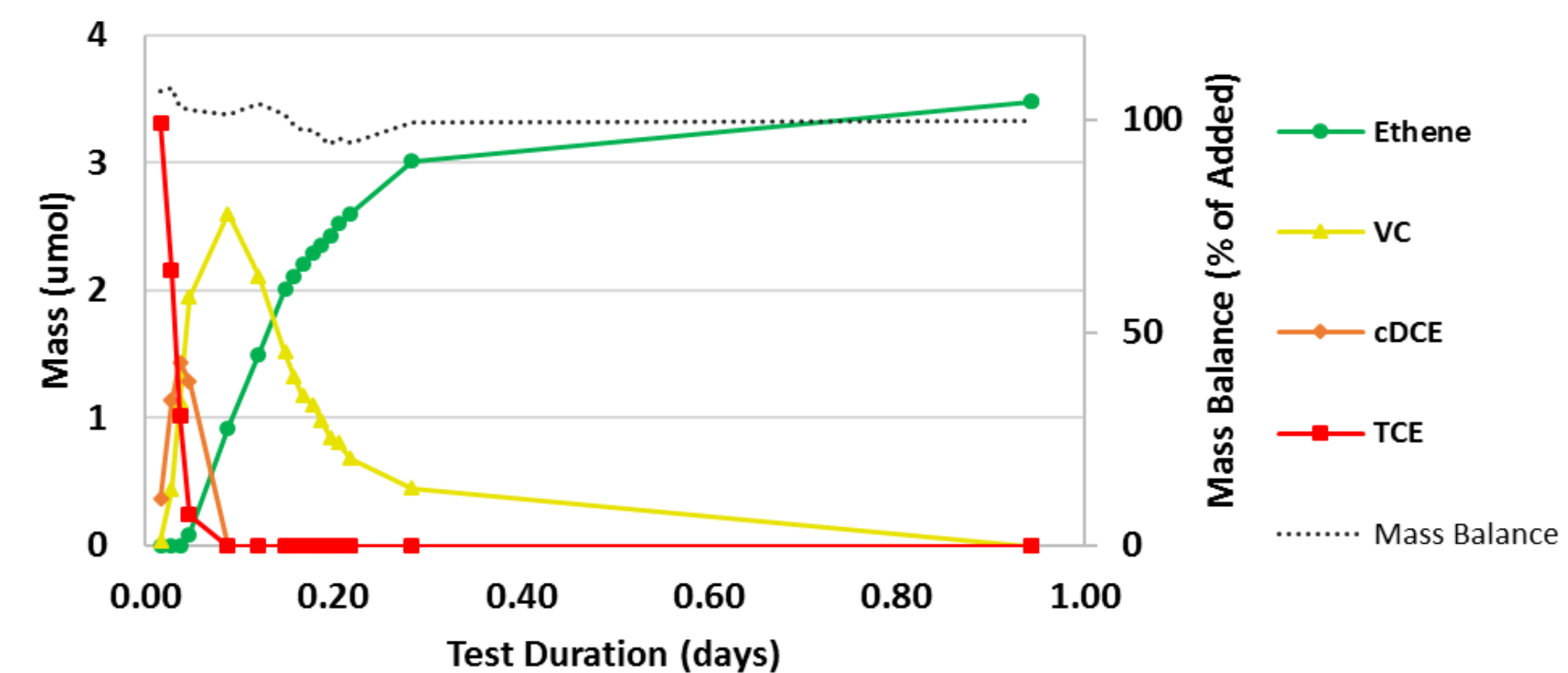
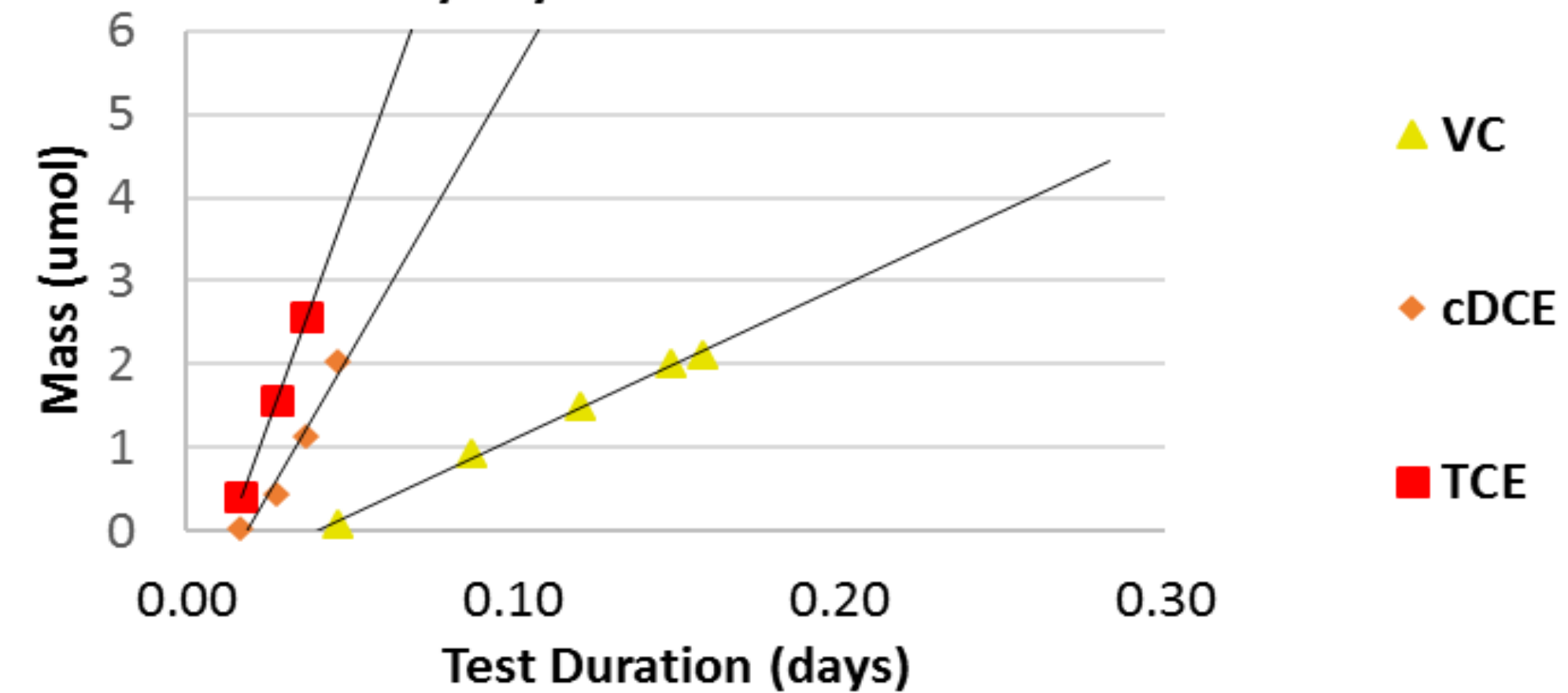


Fig. 1 Transformation of TCE into daughter products cis-Dichloroethylene, Vinyl-chloride, and Ethene.

07/18/17 - VS5 - Baseline - Bottle1



Bottle 1 Linear Rates			
	VC	cDCE	TCE
R Squared	0.9973	0.9600	0.9999
Linear Rate (umol/day)	18.2262	69.9244	107.5342

Fig. 2 The rate of transformation measured in micromoles per day.

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Analysis

- The VS% culture converted 100% of the TCE into Ethene in approximately 24 hours.
- Anaerobic bacteria could be a feasible and eco-friendly way to remove toxins from contaminated water sources.

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