Methanogens on Mars: Can Methanogens Use Insoluble Carbonates As Their Energy Source?

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Introduction

-Methanogens may have lived on Mars in the past and may still live on the planet today.
-The organism needs CO_2 to survive, but it may not be able to reach underneath the surface.
-Experiment done to see if the mutant and parent strand can survive on insoluble carbonates.
-Methanogens are a part of the Archae family and are chemoautotroph's.
-They take in hydrogen as their food source and they release methane as their waste, which gives them the name Methanogens.
-They can be found here on earth in animal and human intestines, swamps, wetlands and permafrost.
- For the organisms to grow all they need is a water source, a carbon source, hydrogen and a few other nutrients.

Materials and Methods

-The *Methanothermobacter wolfeii* species was placed in stoppered anaerobic culture tubes and were grown in MM medium in a 55 degree Celsius incubator. In some tubes an insoluble carbonate, calcium or magnesium, were placed in certain tubes plus other required nutrients.
-Another set of tubes were also created using the same species of Methanogens but in this case the pH was changed. The pH was manipulated to see if it had any effects on the growth pattern of the mutant and parent strand of the *Methanthermobacter wolfeii.* In order to change the pH a small amount of hydrochloric acid was added to two small amounts of solution that contained either magnesium or calcium carbonate. From those two solutions four sets of pH tubes were made: $CaCO_3$+CO_2, $CaCO_3$-CO_2, $MgCO_3$+CO_2 and $MgCO_3$-CO_2.

Conclusions

-Methanogens grow better with CO_2 than without CO_2. It still needs to be taken into consideration that even though the parent strand grew better on CO_2, it still grew at lower levels without CO_2. The mutant species of *Methanothermobacter wolfeii* didn't grow as expected during this experiment, it may have been as a result of the gas equilibrium being off or the mutant species may have needed more time to grow than what was allowed with this experiment.

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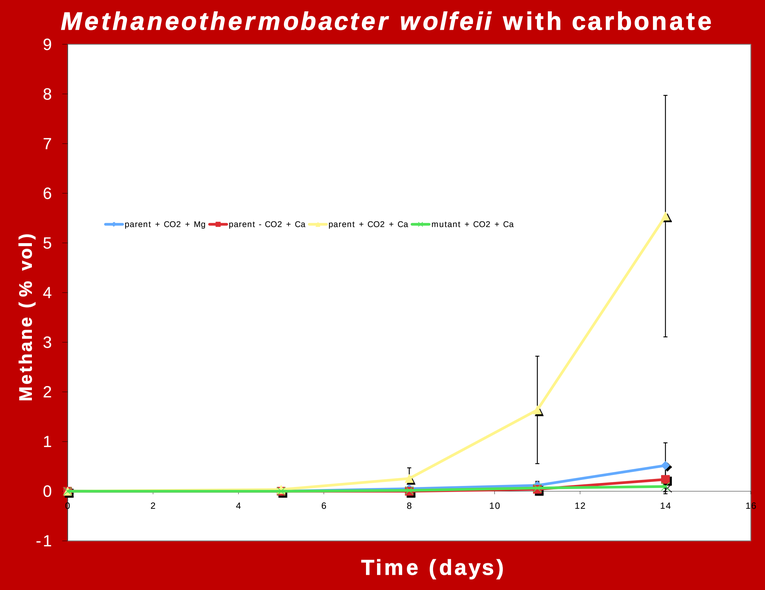

Figure 1.1 : This chart shows the methane growth of the *Methanothermobacter wolfeii* parent and mutant species after about two weeks.

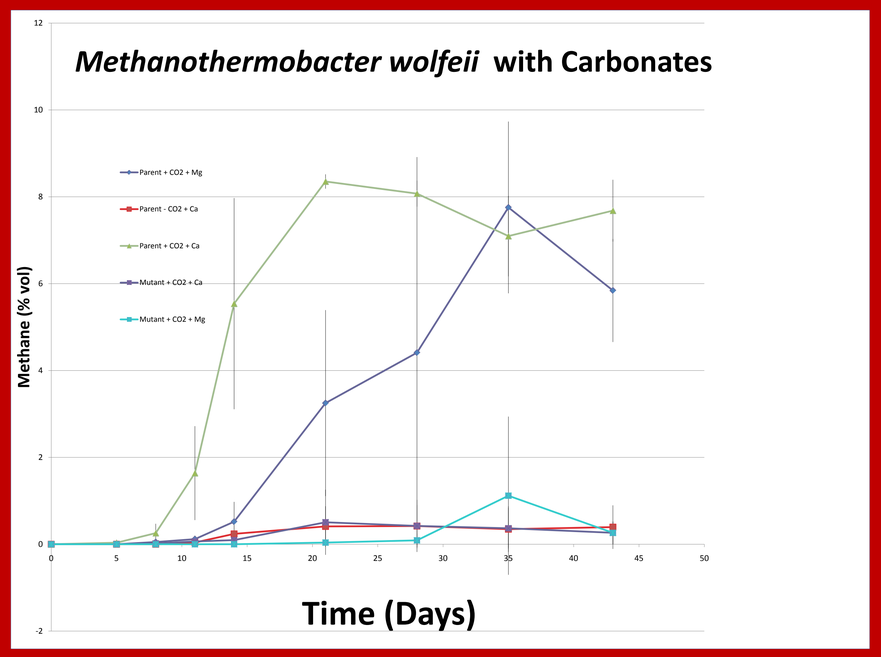

Figure 1.2: This chart shows the methane growth of the parent and the mutant after approximately eight weeks of incubation.

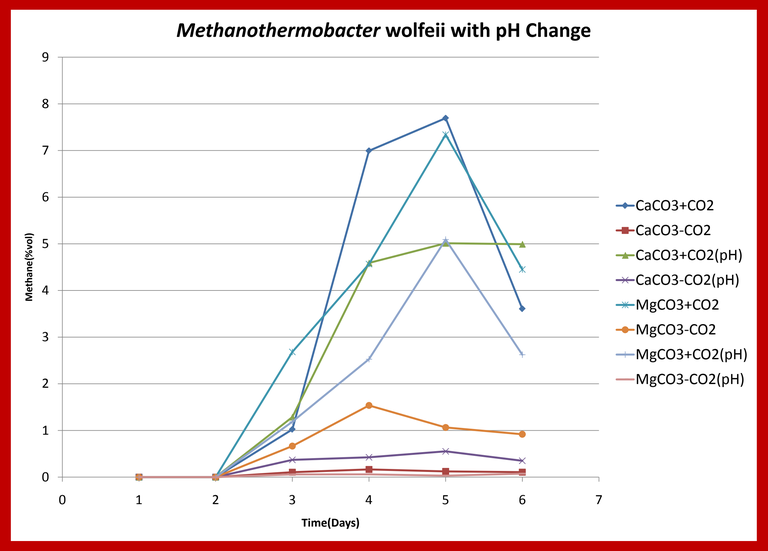

Figure 1.3: This chart shows the growth of the parent strand of the species *Methanothermobacter wolfeii* with the pH change.