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Poster Session Day 3

Intramolecular ^{13}C distribution of microbial acetate from CO and CO_2

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Position-Specific Isotope Analysis (PSIA) has been utilized in a wide range of fields to tracing the sources and sink processes of molecules in environment [1-3]. We focus on intramolecular carbon isotope distribution of acetic acid, produced by microbial acetogenesis. The acetate was extracted by SPME and measured by GC-Py-GC-C-IRMS technique [4]. We have incubated acetogenic bacteria and methanogenic archaea, both of which can convert both CO_2 and CO into acetic acid [5]. The results showed that the acetate exhibited significant differences between carboxyl and methyl positions in acetic acid ($\Delta_{car\text{-}met}$ >30‰) when the carbon source was CO, whereas $\Delta_{car\text{-}met}$ value was much smaller (< 9‰) when the acetic acid was produced from CO_2 as well as just one previous study. Based on the experimental results, we provide a new interpretation of the carbon flows in the metabolism (i.e., Wood-Ljungdal pathway). The observed large $\Delta_{car\text{-}met}$ can be explained by a shortage of energy and CO_2 pool under CO condition. The results also demonstrated the possibility that the PSIA of acetic acid could be utilized for distinguishing carbon sources for microbial acetogenesis in the environment.

References

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