

Novel biochemicals production from organic residues – The isobutyrate platform

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Motivation

There is an increasing demand for sustainable solutions to quench our thirst for oil-derived carbon compounds. Anaerobic treatment provides the means to efficiently produce renewable chemicals from organic residues. The recent discovery of controllable isobutyrate production during mixed culture fermentation opens the possibility to develop new biorecovery technologies.

Isobutyrate is a platform chemical that can be used for a wide range of products, including: flavors, fragrances, animal feed additives, emulsifiers and organic solvents. Classical synthesis of isobutyrate uses fossil fuels and involves hazardous polluting chemicals. The new technology will help to close the carbon cycle and contribute to a healthier environment.

Technological principle

Anaerobic treatment is a widespread method to produce biochemicals. A mayor advantage of this methods is that the energy-content of organic residue streams is largely maintained in the product, allowing for high yields and low costs during production of biochemicals. The most important factor that defines the anaerobic process is the applied selective pressure.

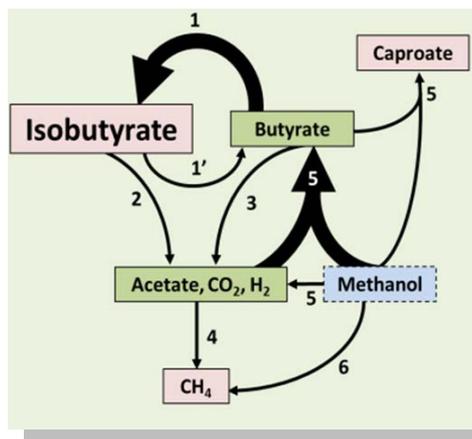


Up-flow anaerobic filters with continuous production of MCFAs



Acidification and chain elongation pilot reactors at ChainCraft B.V. in Amsterdam

In this research an isobutyrate biorefinery is developed and evaluated on potential applications.



Overview of potential conversion routes in iso-chain elongation system (Chen et al.)

Research challenges

- ❖ Pinpoint control mechanisms of selection pressure on microbiomes which lead to effective bioreactor operation
- ❖ Clarify the bioformation pathway(s) of isobutyrate formation.
- ❖ Identify the key microbes and use their characteristics to optimize the process.



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