

Biosyngas production and its advanced chemical and biochemical use: II. Microbial production of platform chemicals from syngas

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Acetogenic bacteria are able to ferment syngas to a variety of organic acids and alcohols. In contrast to the chemical catalysts, these biological catalysts can process a broad range of syngas compositions and deal with impurities like sulphur or nitrogen compounds or CO₂. To assess industrial large scale applicability of these strains it will be necessary to determine their performances with crude syngas, as each purification step will decrease the economy of the process. Another major challenge of this so called syngas fermentation is the poor solubility of CO and H₂ in the fermentation broth. To overcome this limitation one could increase the *k_{la}*-value for better mass transfer into the broth or increase the pressure in the bioreactor to obtain better solubility of the gases. On the other hand, almost complete substrate usage is enabled by recycling the off gas. This also leads to enrichment of not utilized compounds of the crude syngas in the fermentation broth. To evaluate the impact of major impurities of crude syngas and the impact of high *k_{la}*-values a setup of multiple 2 L bioreactors with product analysis and online gas measurement was developed in our lab. With this setup it is possible to investigate *k_{la}*-values and substrate usage of different stirrer set-ups and aeration modes. Also the impact of the nitrogen impurities of syngas, NH₃ and HCN, on growth and product formation was evaluated.