

High efficient ethanol and VFA production from gas fermentation: effect of acetate, gas and inoculum microbial composition - DTU Orbit (09/11/2017)

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In bioindustry, syngas fermentation is a promising technology for biofuel production without the use of plant biomass as sugar-based feedstock. The aim of this study was to identify optimal conditions for high efficient ethanol and volatile fatty acids (VFA) production from synthetic gas fermentation. Therefore, the effect of different gases (pure CO, H₂, and a synthetic syngas mixture), media (acetate medium and acetate-free medium), and biocatalyst (pure and mixed culture) were studied. Acetate was the most dominant product independent on inoculum type. The maximum concentration of volatile fatty acids and ethanol was achieved by the pure culture (*Clostridium ragsdalei*). Depending on the headspace gas composition, VFA concentrations were up to 300% higher after fermentation with *Clostridium ragsdalei* compared to fermentation with mixed culture. The preferred gas composition with respect to highest VFA concentration was pure CO (100%) regardless of microbial composition of the inoculum and media composition. The addition of acetate had a negative impact on the VFA formation which was depending on the initial gas composition in head space.

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