

# Process for the production of alcohols

Reference No: B77074

## CHALLENGE

The increased consumption of finite fossil raw materials raises the necessity to find alternatives for the production of basic chemicals and fuels. A sustainable procedure is the gas fermentation, where a synthesis gas (e.g. CO, CO<sub>2</sub>, H<sub>2</sub>) is converted by microorganisms in a bioreactor. The synthesis gas is available as a by-product of the agriculture, iron-, oil- and chemical industry and can thereby be recycled. Gas fermentation is a relatively new field in the cultivation of bacteria. In this respect *Clostridium carboxidivorans* is of special interest since it is one of the few acetogenic bacteria which is able to produce longer chained carbon compounds like butanol and hexanol directly from synthesis gas, besides acetic acid and ethanol.

## INNOVATION

This technology provides an opportunity for product formation where different cell-regulated phases are present by using a cascade of two serially connected stirred-tank reactors. Both reactors are constantly supplied with synthesis gas (CO : CO<sub>2</sub> = 60 : 40). The first reactor is controlled at a pH value of 6 and thereby provides optimal conditions for anaerobic growth of biomass as well as production of acetat and ethanol. A part of the medium containing the bacteria and their products is constantly transferred to the second reactor, where a pH value of 5 is adjusted. In reactor two, cells do not grow anymore and convert acetat in ethanol, butanol and hexanol. This technology provides a de novo synthesis for long-chain alcohols.

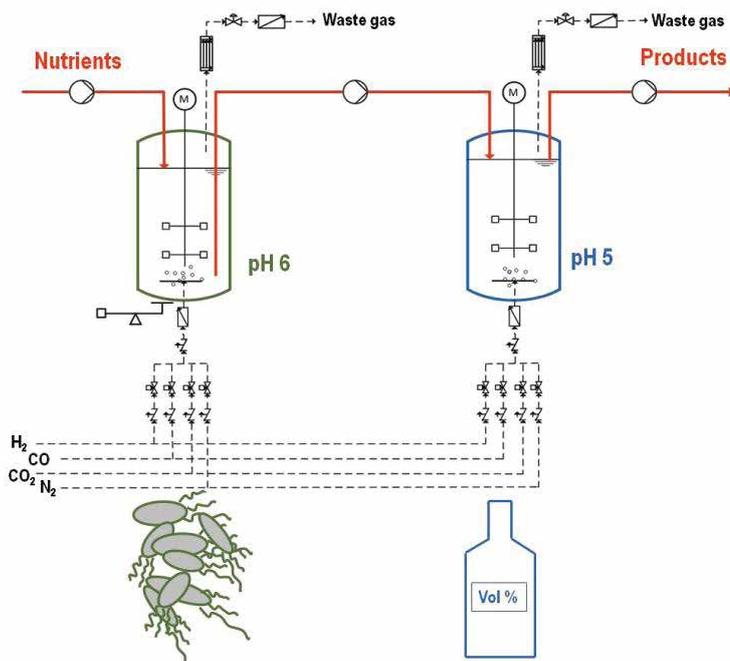


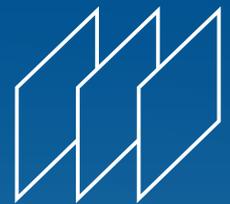
Figure: Schematic representation of two serially connected stirred-tank reactors (reactor 1 with a pH 6 and reactor 2 with pH 5)

## COMMERCIAL OPPORTUNITIES

- Utilization for small application as well as for industrial scale up
- Possible adaptation for the production of other bacteria & chemicals

## DEVELOPMENT STATUS

Prototype



BayPAT



Technology from  
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