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FRAUNHOFER CENTER FOR CHEMICAL-BIOTECHNOLOGICAL PROCESSES CBP

BIOTECHNOLOGICAL PROCESSES

RANGE OF SERVICES AND EQUIPMENT

COMPETENCES

The working group "Biotechnological Processes" has a broad range of bioprocess engineering know-how for the scale-up and intensification of processes. The processes developed at laboratory scale are evaluated beforehand with regard to their transferability to an industry-relevant scale and optimized iteratively during scale-up. This includes, for example, the adaptation of process control strategies (batch, fed-batch, continuous) and an integrated product recovery and purification to reduce process steps or the recycling of biocatalysts (e.g. by immobilization on carrier materials).

We offer

- Performance of fermentations, enzyme catalysis and downstream processes
- Evaluation, development and optimization of processes
- Scale-up to pilot and demonstration scale
- Preparation of sample quantities (along the kilogram to ton scale)

Product portfolio

- Carboxylic acids (C4, C5, C6)
- Enzymes/proteins
- Organic solvents

FERMENTATION

- Bioreactor cascade
  - 10/100/300 liters, 1/10 m³ (gross volume)
  - Geometrically similar and fully automated
  - Measuring/control technology for speed, temperature, headspace pressure, pH value, dissolved oxygen concentration, methanol concentration and exhaust gas analysis (CO_2/O_2)
  - *In situ* sterilization (SIP) and cleaning (CIP)
  - Stainless steel tanks for acid, base, antifoam and feed
  - Automated methanol dosing
  - pH control by supply of gaseous ammonia in the 10 m³ bioreactor possible
- 75-liter bioreactor in ATEX-design
- Ultra-high temperature system (UHT) for continuous media sterilization (1–2 m³/h, 60–134°C, 120–240 s holding time)

- Batch and fed-batch cultivation (up to 10 m³)
- Continuous cultivation with cell retention (up to 75 liters)
- Aerobic and anaerobic process management possible
- Designed for biosafety level 1 microorganisms (BSL1)
- Biosafety level 2 microorganisms (BSL2) with special permission possible

DOWNSTREAM PROCESSING

Storage tanks

- 2 × 500 liters (mobile), 2 × 2 m³, 2 × 5 m³, 2 × 10 m³ (gross volume), temperature and pH controlled, stirred

Separation technology

- Disc stack separators
  - 0.5 – 1 m³/h (12,000 × g) and 1 – 2 m³/h (7500 × g)
- Chamber press
  - 10 filter plates each with 0.4 m² filter area and 5 liters working volume
- Vacuum drum filter
  - 0.5 m² filter area
- Vacuum filter dryer
  - 0.5 m² filter area (cut-off: 1 and 10 µm)
  - 400 liters working volume, in ATEX

Cell disruption

- High-pressure homogenizer
  - 400 L/h, 1000 bar (flow cooling possible)

Purification technology

- Microfiltration
  - 20 m² (0.2 µm) and 3 m² (0.2 µm, sterilizable)
- Ultrafiltration
  - 17 m² (10 kDa) and 5 m² (10 kDa, sterilizable)

- Low-pressure liquid chromatography
  - Column volume: max. 35 liters, pump power: up to 180 L/h
- Crystallizer (batch)
  - 180 liters (mobile) and 800 liters (in ATEX), tempered

Finishing

- Spray dryer
  - Up to 7 kg/h (60–250°C)
- Freeze dryer
  - 0.9 m² (15 liters working volume)

ANALYTICS

- Photometric analysis (e.g. optical density, enzyme activity)
- Determination of organic dry matter
- YSI 2950 (biochemical analyzer for e.g. sugar determination)
- HPLC linked with DAD, RID, VWD or SEC (e.g. sugar, organic acids, phenolic compounds)
- Headspace-GC, GC linked with MS, FID or TCD
- Thin-layer chromatography
- Protein analysis (e.g. SDS-PAGE, Bradford, Lowry)
- UV/VIS spectrophotometer for microtiter plates and cuvettes
- Infrared spectrometer

CONTACT

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