Karlsruhe Institute of Technology

Institute of Process Engineering in Life Sciences
Section II: Technical Biology

Production of Surfactin with *Bacillus subtilis*

Fermentation Process with Integrated Foam Fractionation

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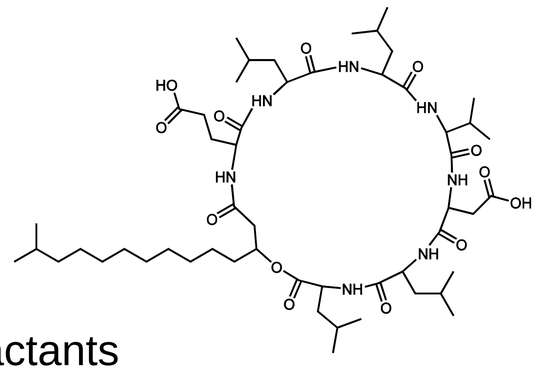


Sustainable Cleaning: Biosurfactants → Surfactin: Safe and Simple

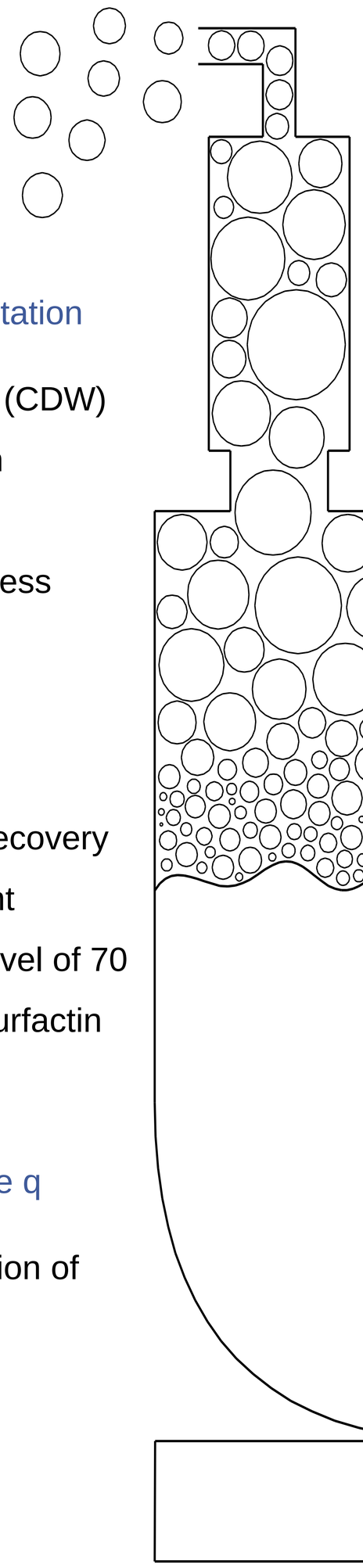
- Biodegradable
- Based on renewable resources

- One of the most powerful biosurfactants
- Produced by GRAS-organism *Bacillus subtilis*

Conventional Fermentation Processes: → Fermentation with Integrated Foam Fractionation:

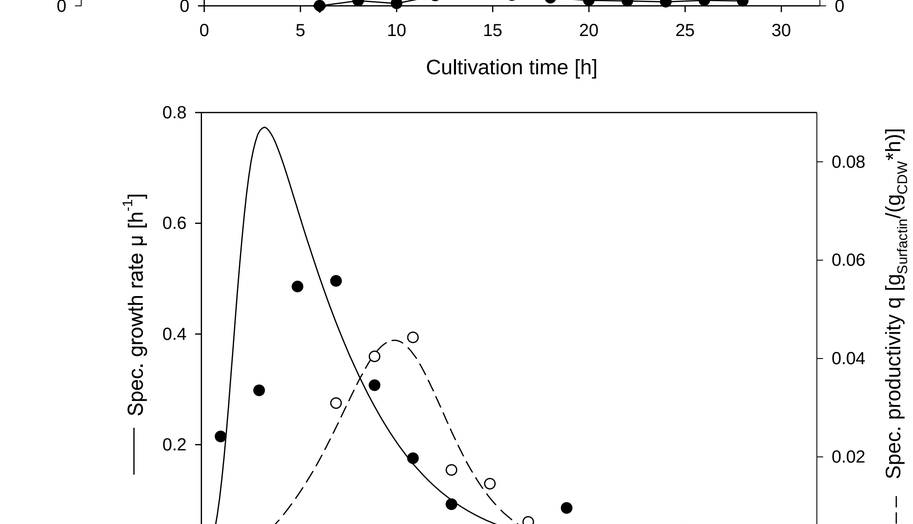
- High quantity of foam, due to surfactant
- Application of antifoam agents
- High expense in downstream processing

- No antifoam
- Product enrichment
- *In situ* product recovery



Production of Surfactin with *B. subtilis* DSM 1090 (Willenbacher *et al*., 2014)

A

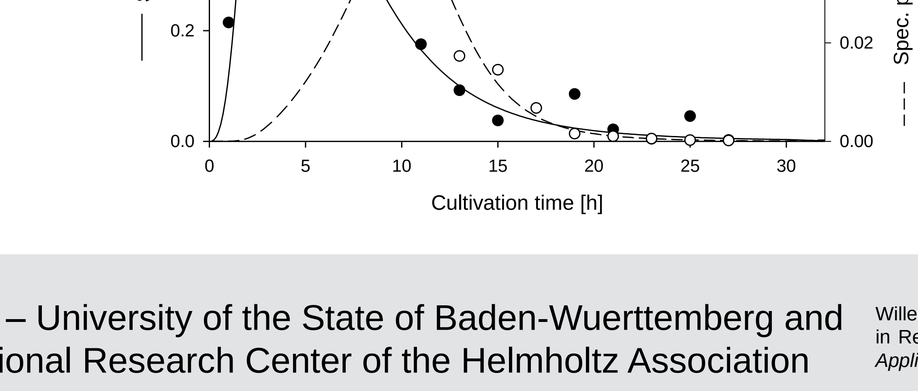


A Time Course of DSM 1090 Fermentation

- Logistic increase of cell dry weight (CDW)
- Simultaneous increase of Surfactin
- Depletion of glucose

→ Quick and reproducable process

B



B Analysis of Foam Traps

- Continuous increase of Surfactin recovery
- Constantly low bacterial enrichment
- Surfactin enrichment settles to a level of 70

→ Total yield of 0.78 ± 0.05 g Surfactin

C

C Growth Rate μ and Production Rate q

- Cell growth behaviour and production of Surfactin are shifted
- Max. $\mu = 0.77\ h^{-1}$
- Max. $q = 0.04\ g/(g \cdot h)$

Willenbacher J., Zwick M., Mohr T., Schmid F., Syldatk C., Hausmann R. (2014) Evaluation of Different *Bacillus* Strains in Respect of their Ability to Produce Surfactin in a Model Fermentation Process with Integrated Foam Fractionation *Applied Microbiology and Biotechnology* DOI:10.1007/s00253-014-6010-2