

## Recovery of bio-based butanol

**PhD-student:** Arjan Oudshoorn  
**Promotor:** Prof.Dr.Ir. Luuk A.M. van der Wielen  
**Supervisor:** Dr.Ir. Adrie J.J. Straathof  
**Institute:** Delft University of Technology, Department of Biotechnology, Bioseparation Technology  
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### Description

Product recovery is crucial for fermentative butanol production. In-situ product recovery can be applied to minimize the impact of butanol inhibiting during fermentation. This study addresses product recovery methods applicable to butanol recovery. Two techniques were investigated in more detail, namely liquid demixing based-recovery and, in particular, adsorptive recovery. 1-Butanol was adsorbed efficiently by hydrophobic high-silica zeolites. These were heated to desorb the butanol. This work further provides a basis for process optimization for integrated product recovery and finally determines the economic potential of butanol production systems.

*Zeolite pellet and powder used for butanol adsorption*



### Dissertation

A. Oudshoorn, Recovery of bio-based butanol, PhD thesis, Delft University of Technology, 2012. <http://resolver.tudelft.nl/uuid:e95e5738-6b73-4d59-a4f6-225211b27958>

### Publications from the dissertation

1. A. Oudshoorn, L.A.M. van der Wielen, A.J.J. Straathof, Assessment of Options for Selective 1-Butanol Recovery from Aqueous Solution, [Ind. Eng. Chem. Res. 48 \(2009\) 7325-7336](#)
2. A. Oudshoorn, L.A.M. van der Wielen, A.J.J. Straathof, Adsorption equilibria of bio-based butanol solutions using zeolite, [Biochem. Eng. J. 48 \(2009\) 99-103](#)
3. A. Oudshoorn, C. van der Berg, M. Roelands, A.J.J. Straathof and L.A.M. van der Wielen, Short-cut calculations for integrated product recovery options in fermentative production of bio-bulk chemicals, [Process Biochem. 45 \(2010\) 1605-1615](#)
4. A. Oudshoorn, M.C.F.M. Peters, L.A.M. van der Wielen and A.J.J. Straathof, Exploring the potential of recovering of 1-butanol from aqueous solution by liquid demixing upon addition of carbohydrate or salt, [J. Chem. Technol. Biotechnol. 86 \(2011\) 714-718](#).
5. A. Oudshoorn, L.A.M. van der Wielen, A.J.J. Straathof, Desorption of butanol from zeolite material, [Biochem. Eng. J. 67 \(2012\) 167-172](#).

1. C. van den Berg, A.S. Heeres, L.A.M. van der Wielen, A.J.J. Straathof, Simultaneous clostridial fermentation, lipase-catalyzed esterification, and ester extraction to enrich diesel with butyl butyrate, [Biotechnol. Bioeng. 110 \(2012\) 137- 142](#).
  2. A. Oudshoorn, C. van der Berg, M. Roelands, A.J.J. Straathof and L.A.M. van der Wielen, Short-cut calculations for integrated product recovery options in fermentative production of bio-bulk chemicals, [Process Biochem. 45 \(2010\) 1605-1615](#)
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