



PERP Report 2017-4: 1,4-Butanediol/Tetrahydrofuran (BDO/THF)

1,4-Butanediol/Tetrahydrofuran (BDO/THF)™ is one in a series of reports published as part of the 2017 Process Evaluation/Research Planning (PERP) Program.

Report Overview

Back in 2012, the production of BDO was on the verge of transitioning from conventional methods to bio-based routes, the industry being pressured to develop more sustainable processes with both direct and indirect fermentation methods. About 150 000 tons of bio-based capacity was expected to come onstream by 2017. However, the fall in oil prices has hindered the penetration of bio-routes that were at the crucial stage of demonstrating their commercial viability. At the same time, there has been an unprecedented wave of new acetylene-based BDO plants, particularly in China, driven by applications for textile polymers and the abundance of coal feedstock in that country. The acetylene process has grown at 14 percent per year over the last five years, and now accounts for over 56 percent of global installed BDO capacity. There has also been a resurgence of the allyl alcohol route, with significant capacity being built in Taiwan,

This PERP report provides an updated overview of technological, economic and market aspects of BDO and THF. The following issues are addressed in the report:

- What are the major technologies used for BDO/THF production and how do they differ?
- Who are the major licensors and what technologies do they offer?
- How do the process economics compare across different geographic regions and processes? What are the key drivers of production cost for each technology?
- What is the current market environment for BDO and THF? Where is new capacity going to be added?

Production Technologies

There are many commercial routes to butanediol based on fossil fuel derivatives such as acetylene, butadiene, and propylene. This report presents the BDO chemistry and process descriptions for the following technologies:

- Acetylene route as practiced by INVISTA, BASF and Ashland
- Maleic anhydride route by Johnson Matthey Davy
- Propylene via allyl alcohol route by Dairen
- Geminox® route from n-Butane via Maleic Acid by Ashland
- Propylene oxide (via allyl alcohol) route by LyondellBasell
- Butadiene route by Mitsubishi

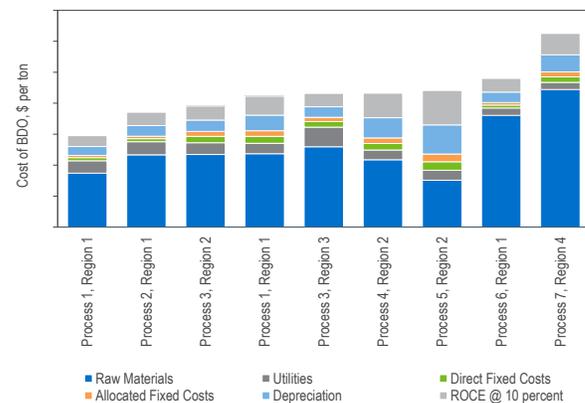
On-purpose production of THF is also examined, including conventional BDO dehydration route as practiced by most producers including INVISTA and Ashland, as well as the butadiene acetoxylation route by Mitsubishi.

The report also covers a high level review of technology developments in the BDO/THF industry, including bio-based processes.

Process Economics

Detailed cost of production estimates are presented for all the major commercial BDO/THF technologies. A comparative analysis of the economics of plants located in different regions, including the United States, Western Europe, China and Taiwan, is also provided.

COST OF PRODUCTION COMPARISONS



Commercial Market Review

The global BDO market has seen low utilization rates and low prices in the past few years due to overcapacity in Asia. The beginning of 2017 has seen improved market sentiment compared with the same period a year ago. World BDO demand reached an estimated 2.1 million tons in 2016 with THF being the largest end-use segment. This PERP report provides an overview of the supply, demand, and trade of BDO and THF on both a global and regional basis.

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