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PERP 2017-6: Acetic Acid

"Acetic Acid" is one in a series of reports published as part of the 2017 Process Evaluation/Research Planning (PERP) Program.

Report Overview

The process technologies that can be used for the production of acetic acid are varied, with a commercial slate of potential feedstocks that include virtually every known source of carbon. Most of the acetic acid produced in the United States and Western Europe was derived from acetaldehyde in the 1970s. The landscape has since changed dramatically, with methanol being the most widely used feedstock globally. However, manufacturers continue to research and develop processes that utilize alternative feedstocks. BP has made the most recent breakthrough in acetic acid manufacturing technology, having developed a new process (SaaBre™) that produces acetic acid from syngas and eliminates the need for methanol feedstock.

The global acetic acid market is currently in a position of oversupply. Most of the acetic acid capacity that has been commissioned over the past five years has been located in China and the United States, all of which is based on methanol carbonylation processes. Some capacity rationalization also occurred during this period, although a few of these plants used processes that required ethylene feedstock. Today, Asia accounts for about 75 percent of global acetic acid capacity, as well as 71 percent of global acetic acid consumption.

This PERP report provides an overview of various methods of producing acetic acid. Although methanol carbonylation technologies are currently most prevalent around the world, alternative processes could become more economical, depending on alternative feedstock availability and respective market conditions. Bio-based routes to acetic acid continue to be pursued, but these efforts have encountered technical and financial challenges in moving toward commercial scale operation.

The following issues are addressed in the report:

- What are the major technologies for acetic acid production, and how do these technologies differ?
- How do the process economics compare across different technologies and geographic regions?
- What are the key drivers of production cost for each technology and how do they impact production costs?
- Which technology offerings provide the lowest cost of production, and which regions in the world provide attractive investment opportunities?

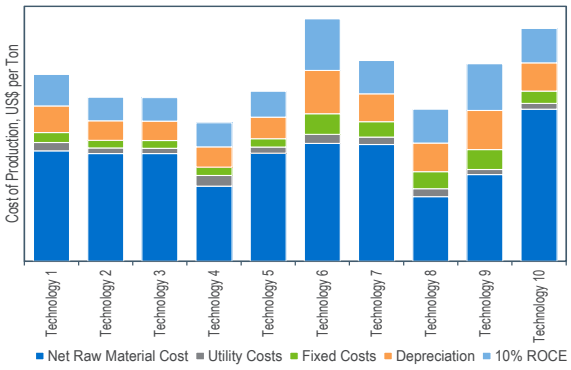
Commercial Technologies

Major technologies covered in this report include those developed by Celanese, BP, LyondellBasell, SABIC, Chiyoda, and Showa Denko. Most of these technology holders have developed variations of methanol carbonylation. The exceptions, which include SABIC and Wacker Chemie, have developed alternative processes that, for various reasons, have yet to make major inroads into the acetic acid market.

Process Economics

Detailed cost of production estimates for ten different production routes to acetic acid are presented for a world-scale acetic acid plant. The processes studied include various methods of methanol carbonylation, as well as ethane oxidation and ethanol oxidation. Comparisons of production costs are presented for China, the Middle East, United States, and Western Europe.

COST OF PRODUCTION COMPARISON



Commercial Market Review

Global acetic acid demand exceeded 13 million tons in 2016, versus an installed global capacity of 21 million tons. Acetic acid capacity growth has been modest in recent years, growing at an average of 4.7 percent per year since 2010, with the greatest changes in China and the United States. The PERP report provides an overview of the supply, demand, and trade of acetic acid on both a global and a regional basis.

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