

When the change is upstream

How to succeed in manufacturing bio-based platform chemicals

Thanks to the latest technological and scientific advances, companies interested in utilizing bio-based, renewable materials in their manufacturing processes can tap into the highly profitable market for platform chemicals. Key to successfully entering into this attractive sector is the ability to deliver large volumes of high-quality products at competitive prices for conversion into widely used products, such as biopolymers and specialty chemicals. At the heart of this are state-of-the-art processing know-how, equipment and facilities.

Platform chemicals, also known as chemical building blocks, are substances that serve as starting materials for the manufacture of various value-added, useful products for a wide range of applications. In particular, these chemicals are the key ingredients for a large number of fine and specialty chemicals as well as polymers used in several sectors. As a result, platform chemicals are able to create great commercial value.

Common examples of platform chemicals include ethylene, propylene, butadiene and benzene, which still come from fossil fuel-based feedstocks. In effect, it is estimated that over 90% of organic chemical products are derived from oil and gas¹. Consumer demand for environmentally friendly and sustainable products, government mandates and incentives have been driving the development of innovative solutions to produce platform chemicals and their derivatives from renewable resources.

The U.S. Department of Energy (DoE) identified the most promising bio-based product opportunities from carbohydrates in the early 2000's and has updated this list over the years. Based on recent technology advances and commercial partnerships, plant-based ethanol, furans and organic acids like lactic acid are key examples of compounds that stand at the apex of a cascade of transformations that can generate a number of high-value, widely adopted materials, such as plastics and fuels.²

Multiple benefits await businesses interested in entering this new sector by developing innovative, sustainable building block substances. In particular, the global market for bio-based platform chemicals is expected to grow substantially over the next few years at an estimated compound annual growth rate (CAGR) around 11%^{3 4}.

Successfully entering the bio-based platform chemical market

When embarking on a journey to produce bio-based platform chemicals, it is important to keep in mind that these are intermediates in the value chain. In order for businesses to actually create value from these building blocks and generate profit, these materials need to have high purity to be properly transformed into end products. These, in turn, must be largely adopted by end users. Price competitiveness and quality is therefore fundamental and the most crucial feature of successful manufacturers is their ability to serve the market with sufficient volumes of economical on-spec materials.

The main enabler to address these challenges is the separation process know-how and product purification equipment used. In effect, the bio-based feedstocks, such as crops and lignocellulosic biomass, are generally highly heterogeneous. In effect, sugars produced from them are very diluted and thermally sensitive. In addition, they are often mixed with multiple impurities that share similar physicochemical properties with the main products. As a result, the purification of platform chemicals substantially influences production costs, product yield and feasibility of the entire manufacturing process.

To overcome these issues, businesses should therefore consider a number of aspects when selecting the most suitable separation solutions. In particular, while conventional separation units for platform chemicals tend to share a common structure, the variability of bio-based feeds demands bespoke, flexible systems. These should also be able to effectively operate at low temperatures in order to avoid the thermal degradation of key products, as well as minimizing energy usage and operational expenses (OPEX).

Finding the right partner

New players in the bio-based platform chemical market should partner with a separation technology specialist with experience in developing suitable industrial scale, turn-key systems for this emerging industry. By doing so, they can make sure that all key aspects for a successful separation process – and consequently, manufacturing – are being considered.

An expert with such capabilities is Sulzer, the leader in separation and mixing technology. Able to combine advanced technical experience, necessary to develop highly effective solutions, with a broad industry experience to bridge the gaps between development and commercial production, the company has been supporting a large number of innovative ventures. Sulzer's teams have been actively involved in a multitude of green and circular-economy initiatives around the world.

In addition to a proven track record of supporting bio-refineries for ethanol production, the company has been a pioneer in the industrialization of poly-lactic acid (PLA) from plant-based sugar and starches by developing its state-of-the-art polymerization process and delivering turnkey production equipment and plants. Moreover, the company is involved in a number of projects focused on the production of bio-organic acids, bio-alcohols, bio-furans and derivatives, such as polyethylene furanoate (PEF) for sustainable plastic materials.

By collaborating with a business-oriented separation specialist like Sulzer, new manufacturers of bio-based platform chemicals can benefit from optimized separation units. As a result, they can truly maximize their chances of success in this fiercely competitive market with high-quality, cost- and resource-effective products

Image Captions:

Image 1: Manufacturers can utilize bio-based, renewable materials in their processes to produce high-quality platform chemicals that are key to obtain widely used products, such as biopolymers and specialty chemicals.

Image 2: By collaborating with a business-oriented separation specialist like Sulzer, manufacturers can benefit from optimized separation units to produce polyethylene furanoate (PEF) for sustainable plastic materials.

1 - Bennett, S. J., & Page, H. A. (2012). Implications of climate change for the petrochemical industry: Mitigation measures and feedstock transitions. *Handbook of Climate Change Mitigation*, 319-57.

2 - Bozell, J. J., & Petersen, G. R. (2010). Technology development for the production of biobased products from biorefinery carbohydrates—the US Department of Energy's "Top 10" revisited. *Green Chemistry*, 12(4), 539-554.

3 - 360iResearch. (2020). *Bio-Based Platform Chemical Market Research Report by Type, by Application - Global Forecast to 2025 - Cumulative Impact of COVID-19*, 148 pp.

4 - Technavio. (2020). *Bio-based Platform Chemicals Market by Type and Geography - Forecast and Analysis 2020-2024*, 120 pp.

About Sulzer

The Chemtech division is the global market leader in innovative mass transfer, static mixing and polymer solutions for petrochemicals, refining and LNG. Chemtech is also leading the way in ecological solutions such as biopolymers as well as textile and plastic recycling, contributing to a circular economy. Our product offering ranges from technology licensing to process components all the way to complete separation process plants. Customer support ranges from engineering and field services to tray and packing installation, tower maintenance, welding and plant turnaround projects – ensuring minimal downtime.

www.sulzer.com

The image(s) distributed with this press release may only be used to accompany this copy, and are subject to copyright. Please contact DMA Europa if you wish to license the image for further use.

Editor Contact

DMA Europa Ltd : Philip Howe

Tel: +44 (0)1562 751436

Fax: +44 (0)1562 748315

Web: www.dmaeuropa.com

Email: philip@dmaeuropa.com

Company Contact

Sulzer Chemtech Ltd. : Dorota Zoldosova, Head of Marketing and Communications

Tel: +41 52 262 37 22

Web: www.sulzer.com

Email: dorota.zoldosova@sulzer.com