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Technology and Costs

TECH 2020S2: Alkoxylation Technologies

Alkoxylation Technologies is one in a series of reports published as part of NexantECA's 2020 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

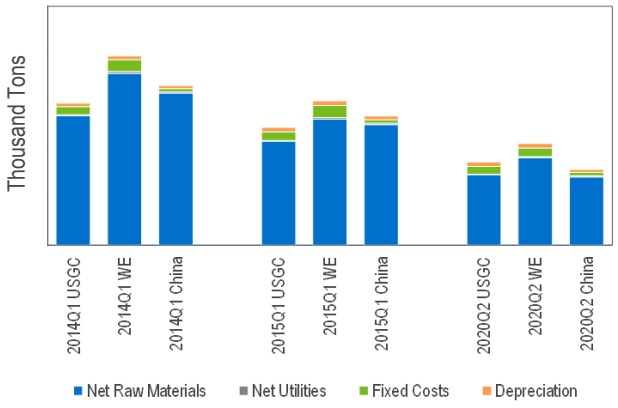
Alkoxylation is the chemical reaction between an alkylene oxide (i.e. ethylene oxide, propylene oxide or butylene oxide) with another compound. Within the surfactant industry, alkoxylation commonly refers to ethoxylation, and is typically used to increase the solubility of surfactants in water. Non-ionics such as alcohol ethoxylate (AE), nonylphenol ethoxylates (NPE) and fatty acid ethoxylates are used as is, and AE is commonly sulfonated to produce alcohol ether sulfates (AES).

The importance of surfactants was made very clear in 2020 as a critical weapon to fight the COVID19 pandemic

This report provides a comprehensive analysis of the alkoxylation technology used to produce surfactants, including the economics and markets for the production of ethoxylates. The following issues are addressed:

- What differentiates the available technology used to produce alkoxylates?
- How do alkoxylates fit into the surfactants value chain and how are producers affected by upstream and downstream developments?
- What are the key end-uses and market drivers for alkoxylated surfactants currently?

Cost of Production of C_{12}-C_{14} ethoxylate (9EO) in Different Cost Scenarios (Jet loop reactor, US Gulf Coast)



Commercial Technologies

Nexant has evaluated the process technologies used to produce alkoxylates include licensed technology from Desmet Ballestra, Buss ChemTech, HH Technology Corp and Thyssenkrupp. This includes an assessment of both conventional stirred reactor and jet/spray loop reactor technology, including commentary on process safety.

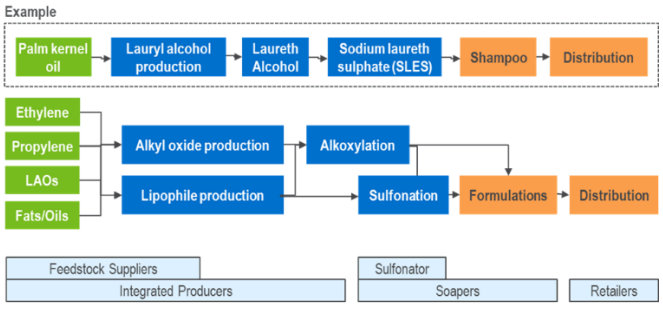
Process Economics

The economic analysis provides an overview of production costs for conventional, spray and loop technology in the United States, Western Europe and China in 2Q 2020 for different degrees of ethoxylation (9, 7 and 3 moles of ethylene oxide). The production cost for ethoxylation of both detergent alcohols and nonylphenol is evaluated. Production cost under different price environments is assessed.

Commercial Overview

Alkoxylates are predominantly used as non-ionic surfactants (or converted into anionic ethoxysulfate derivatives) in three end-uses sectors: household (e.g., detergents for laundry, dishwashing and surface cleaning), personal care (e.g., shampoos, body cleansers and cosmetics) and industries such as textiles, paints and coatings. The supply, demand and trade for ethoxylates are analyzed on a global and regional basis from 2017 to 2024, including commentary on the impact of COVID19 and other market drivers and constraints.

Alkoxylation Value Chain and Key Players



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TECH's comprehensive studies include detailed technology analyses, process economics, as well as commercial overviews and industry trends. Reports typically cover:

- Trends in chemical technology
- Strategic/business overviews
- Process Technology:
- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Overview of product applications and markets for new as well as established products
- Regional supply and demand balances for product, including capacity tables of plants in each region
- Regulatory and environmental issues where relevant

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- PDF reports including detailed technology analyses, process economics, as well as commercial overviews and industry trends
- Cost of production tables in spreadsheet format
- Consultation time with the project team

An annual subscription to TECH includes twenty reports published in a given program year. Reports can also be purchased on an individual basis, including reports from previous program years.

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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program, the Biorenewable Insights program (BI), and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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