



TECH 2018S6: Polyvinyl Alcohol

Polyvinyl Alcohol is one in a series of reports published as part of Nexant’s 2018 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Polyvinyl alcohol (PVOH) is a water-soluble synthetic polymer with excellent film-forming, emulsifying, and adhesive properties. This versatile polymer offers outstanding resistance to oil, grease, and solvents, plus high tensile strength, flexibility, and high oxygen barrier. Polyvinyl alcohol is a key raw material for a broad range of applications, ranging from paper, construction, and packaging to adhesives, cosmetics, electronics, and textiles.

Suitable applications for polyvinyl alcohol are largely determined by its properties, which depend on its degree of polymerization, degree of hydrolysis, and distribution of hydroxyl groups. Polyvinyl alcohol is used mainly in aqueous solution. Polyvinyl alcohol is one of the few truly biodegradable synthetic polymers; the degradation products are water and carbon dioxide.

This TECH report provides an updated overview of the technological, economic, and market aspects of polyvinyl alcohol. The following issues are addressed in this report:

- What are the major technologies for polyvinyl alcohol production? Who are the major technology holders? Which technologies are available for license?
- How do the process economics compare across different geographic regions?
- Who are the leading producers of polyvinyl alcohol? Where is supply centered?
- What are the major applications for polyvinyl alcohol? How does growth compare in different regions? Which region will drive future growth?

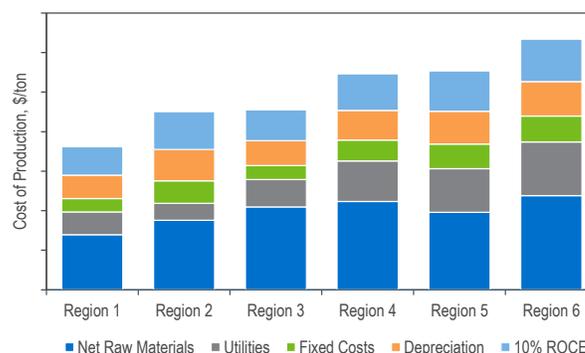
Commercial Technologies

Production of polyvinyl alcohol is by the controlled transesterification or hydrolysis of polyvinyl acetate, using either a belt or slurry hydrolysis process. Polyvinyl acetate, in turn, is produced by free-radical polymerization of vinyl acetate monomer. Vinyl acetate is derived primarily from ethylene and acetic acid feedstocks, although acetylene-based processes dominate in China. For the final product properties, the degree of polymerization is controlled during the polymerization of vinyl acetate, while the degree of hydrolysis is controlled during the hydrolysis/transesterification process.

Process Economics

Detailed cost of production estimates are presented for USGC, China, Japan, Taiwan, and Western Europe locations. Economics were also developed for the key raw material, vinyl acetate, using an ethylene-based route for all regions and an acetylene-based route for China. Sensitivity analyses were developed for capital cost, plant capacity, and vinyl acetate price.

Global Cost of Production of Polyvinyl Alcohol



Commercial Overview

Global polyvinyl alcohol consumption was approximately 2.5 million tons in 2017. Production of polyvinyl butyral (PVB) is the main application of polyvinyl alcohol. Demand will grow in-line with the global economy, driven by demand for PVB and adhesives. An overview of the supply, demand, and trade of polyvinyl alcohol on a global and regional (North America, Europe, and Asia Pacific) basis is provided in this TECH report.



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- 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
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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, 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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