



TECH 2022-6: Polyvinyl Chloride

Polyvinyl Chloride is one in a series of reports published as part of NexantECA's 2022 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Polyvinyl chloride (PVC) is a commodity thermoplastic resin that is produced by the polymerization of vinyl chloride monomer (VCM). PVC's properties and ability to be compounded makes it very versatile with applications ranging from rigid pipe used in construction to thin, clear film used in packaging.

This TECH report covers:

- Polymerization processes: suspension, emulsion, mass, microemulsion
- Major licensors: INEOS/INOVYN, JNC/KBR, KEM ONE, Westlake Vinnolit
- Process economics: VCM feedstock (ethylene and acetylene-based), major PVC polymerization processes
- Commercial applications: resins and compounds, fabrication methods, major markets, end use applications
- Market analysis: capacity, consumption, supply/demand/trade for global, North America, Western Europe, and Asia Pacific

PVC market dynamics are governed by the construction industry, with the major application being in piping. Some PVC is being replaced by other materials; however, its competitive cost position in many end use markets allows it to continue to grow. The PVC business must deal with environmental issues as a result of its use of chlorine, carcinogenic VCM, and the use of additives (especially plasticizers). The following issues are addressed in this report:

- What is the effect of environmental and legislative regulations on the PVC industry? What is the progress in carbon reduction and PVC recycling?
- What are the major technologies for PVC production? How do the technologies differ? What technologies are available for license?
- How do the process economics compare across different geographic regions?
- What does the patent filing trend by industry players reveal?
- What is the current market environment for PVC?

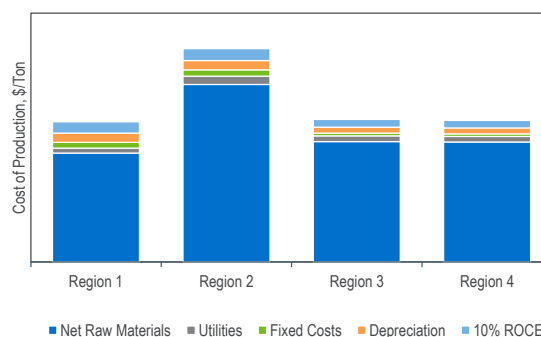
Commercial Technologies

The commercial routes to PVC are based on the batch polymerization of VCM. The most widely used process is the suspension polymerization process. The other major commercial processes are emulsion, mass, and microemulsion. Suspension processes licensed by major licensors are described, along with emulsion, mass, and microemulsion processes that are not licensed. There are a number of major PVC producers who have their own process technologies that are not licensed to third parties.

Process Economics

Detailed cost of production estimates for all four polymerization PVC process are presented for USGC, Western Europe, coastal China, and inland China locations. Estimates for the VCM feedstock are also included, with market-priced ethylene used for balanced oxychlorination in USGC, Western Europe, and coastal China, and mine-mouth-priced coal for the acetylene-based process in inland China.

Regional Cost of Production Comparison for Suspension Polymerization



Commercial Overview

Global PVC consumption was more than 48 million tons in 2021 with pipe and fittings the major end use, followed by profile and siding. Film and sheet applications are also significant, along with wire and cable. Demand growth is mainly driven by the Asia Pacific region. An overview of the supply, demand, and trade of PVC on both a global and regional basis is provided in this TECH report.

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- Chemistry
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- 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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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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