Abstract

Process Economics Program Report 5D
Vinyl Chloride
(March 2000)

This supplemental report presents the status of the ethylene dichloride/vinyl chloride industry, reviews recent developments in ethylene dichloride and vinyl chloride manufacturing technologies, and evaluates major commercial and potentially commercial processes. Technoeconomic evaluations are presented for ethylene-based ethylene dichloride and vinyl chloride processes based on our interpretation of those licensed by Oxy Vinlys (a joint venture of Oxychem and Geon), Inovyl (a subsidiary of European Vinyls Corporation), Mitsui Chemicals, and Vinnolit (a joint venture of Hoechst and Wacker Chemie).

In the ethylene-based route, vinyl chloride is manufactured by the pyrolysis of ethylene dichloride. Ethylene dichloride is in turn produced by direct chlorination or oxychlorination of ethylene. For direct chlorination, we evaluate and compare liquid-phase high-temperature and low-temperature chlorination processes as well as a gas-phase process. For oxychlorination, we evaluate and compare oxygen-based and air-based processes using fluidized-bed or fixed-bed reactors. For ethylene dichloride pyrolysis, we evaluate and compare various heat-integration schemes used by different licensors. Furthermore, we present technoeconomic evaluations of our interpretation of major balanced processes with and without heat and hydrogen chloride recovery.

We also review ethane-based technologies for vinyl chloride production, evaluate Inovyl’s ethane-to-vinyl chloride process, and compare that with the ethylene-based process. The ethane-based process is economically competitive against the ethylene-based route but could be limited to locations with abundant ethane.

In addition, we update the economics of the acetylene-based process and review other processes for ethylene dichloride/vinyl chloride production.

Overall, this report encompasses the latest technologies and process economics, and it provides a basis for insight into technology trends, the selection of technologies, and possible improvements in profit margins with new technology.
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