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PERP Report 2016S4: Specialty LDPE Copolymers

"Specialty LDPE Copolymers" is one in a series of reports published as part of the 2016 Process Evaluation/Research Planning (PERP) Program.

Report Overview

Specialty LDPE copolymers provide some of the highest added value polyolefin applications, and in the quest to differentiate in an increasingly commoditized polyolefin market, are of considerable interest to LDPE producers.

With few exceptions, specialty LDPEs can be considered mature products produced from well-known and understood chemistries. Inter-material competition has dampened supplier interest in investing even modest resources in developing new products or grades. However, suppliers have continued to focus on incremental projects to better tailor their products to the changing needs of the marketplace.

This PERP report provides an overview of the production, market, and economics of ethylene copolymers, including ethylene vinyl acetate, acid copolymers, acrylate copolymers, ionomers, grafted LDPE copolymers, and other specialty LDPE copolymers. The following issues are addressed in the report:

- What are the major specialty LDPE copolymer production routes and how do they differ?
- How do different comonomers compare? What advantages and disadvantages do varying comonomer levels offer?
- What is the current market environment for specialty LDPE copolymers?
- What advantages do specialty LDPE copolymers offer in regards to end use applications, material properties, and from an economic standpoint?

Commercial and Developing Technologies

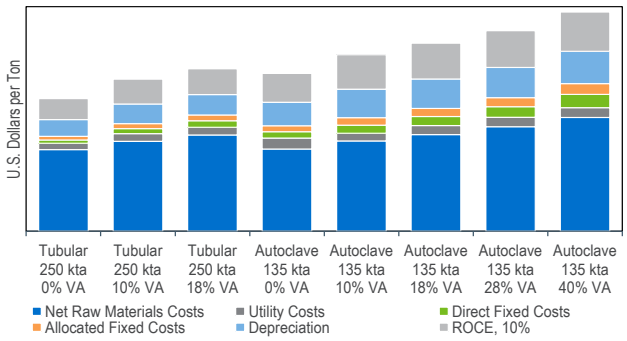
Autoclave and tubular reactors are the two basic processes used for the manufacturing of LDPE copolymers. The original autoclave process was developed by ICI; however, there are now several variants of this process with developments by Dow, DuPont, LyondellBasell, ExxonMobil, Sumitomo and others. The other LDPE process, the tubular reactor process, was originally developed by BASF, and is actively licensed by LyondellBasell, ExxonMobil and others.

Over the past decade, there has been significant development in the grafting of maleic anhydride onto thermoplastic polymers by reactive extruder systems. There are two prominent methods for the grafting of maleic anhydride on LDPE: through a batch reactor or via a twin-screw extruder. This PERP report details the technology and economic aspects for the grafting of maleic anhydride on molten LDPE via the twin-screw extruder method.

Process Economics

Detailed cost of production estimates for conventional and developing LDPE technologies are presented. Various copolymers with varying comonomer content, produced by both the autoclave and tubular processes, are compared to homopolymer LDPE, thus providing insight into the advantages and disadvantages of each technology and comonomer content.

COMPARATIVE COST OF PRODUCTION OF HOMOPOLYMER LDPE AND EVA COPOLYMERS



Commercial Market Review

Global consumption for ethylene copolymers in 2015 was nearly 3 million tons with EVA production accounting for nearly 90 percent of the market, driven by foam and film applications. This PERP report provides an overview of the supply and demand of EVA and other copolymers on both a global and regional basis, and includes a capacity listing for each region.

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