PEP Report 19G

Bimodal HDPE

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Abstract

With a worldwide demand of 40.1 million tpy, or 45% of the total demand for polyethylene in 2015, high-density polyethylene (HDPE) is the most widely used polyethylene. HDPE demand is expected to grow at an annual rate of 4.5% from 2015 to 2020. HDPE can be divided into three major types: (1) monomodal HDPE produced with Ziegler catalysts; (2) monomodal, broad molecular distribution HDPE produced with chrome catalysts; and (3) bimodal HDPE produced with Ziegler catalysts. Bimodal HDPE resins were pioneered in the 1980s by Oxychem (Nissan), Dow (Asahi), and Hoechst Celanese (Hoechst). ExxonMobil subsequently licensed bimodal slurry technology from Mitsui. These resins combine high-molecular-weight (HMW) and low-molecular-weight (LMW) resins to improve the balance of processability and mechanical properties. A large portion of the demand growth for HDPE has been in bimodal HDPE products. Two major markets for HDPE are pressure pipes (e.g., PE100) and blow molding. Bimodal HDPE products are most often used for these two markets.

In this report, we will discuss current bimodal HDPE production processes, including LyondellBasell’s Hostalen™ Advanced Cascade Process (ACP), Mitsui Chemical’s CX process, INEOS’ Innovene™ S, Univation’s UNIPOL™ PE process, Chevron Phillips Chemical’s MarTECH™ advanced dual loop (ADL) process, Borealis’ Borstar™ PE process, and LyondellBasell’s Hyperzone™ process. Features and differences among the processes are summarized. The status of HDPE process licensors and what they offer are compared. A brief market overview summarizes the global supply and demand and end use markets and demand drivers. The report presents the production economics for producing bimodal HDPE by:

- Cascade slurry CSTR—LyondellBasell’s Hostalen™ Advanced Cascade Process (ACP) and Mitsui Chemical’s CX process
- Cascade slurry loop reactors—INEOS’ Innovene™ S process
- Single reactor dual catalyst—Univation’s UNIPOL™ PE process with PRODIGY™ Bimodal Catalyst system
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Introduction

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Section 200—Finishing section

Process discussion

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Catalyst system

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Cost estimates

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