



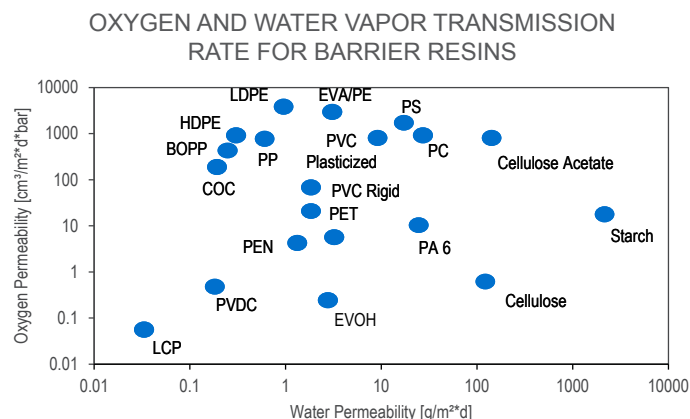
PERP Report 2017S3: Barrier Resins

“Barrier Resins” is one in a series of reports published as part of the 2017 Process Evaluation/Research Planning (PERP) Program.

Report Overview

The invention of high gas barrier polymers, coupled with the evolution of coextrusion, coinjection, and coating techniques to combine polymers with dissimilar barrier properties, has allowed multilayer plastic compositions to imitate the superior barrier properties of metal and glass in high performance barrier packaging for snack foods, beverages, and other edibles. By layering inexpensive moisture layers, such as from PE or PP, with more expensive barrier polymers, an economically attractive packaging material may be derived offering extended shelf life.

Today, nearly all materials used in packaging food products, beverages, and chemicals provide some type of barrier to the environment, be it resistance to moisture permeation, carbon dioxide or oxygen inclusion or exclusion, grease resistance, or flavor and odor retention.



This PERP report provides an overview of the common barrier resins including EVOH, PVDC, selected nylons, and PEN - one of several barrier polyesters. The following issues are addressed in the report:

- What are the key properties of barrier resins? What are some of the fabrication techniques used for preparing barrier resin structures?
- What is the chemistry behind the manufacture of barrier resins? What is the process technology to make each barrier resin?
- What are some of the recent development trends of the use of barrier resins?

- Who are the main producers of the barrier resins? What are their trade names?
- How do the process economics for different barrier resins compare across several different global locations?
- What is the estimated global consumption of barrier resins in barrier packaging in 2016?

Commercial Analysis

Plastics have successfully penetrated flexible packaging applications because of their low cost, flexibility and tear resistance, but were excluded from a variety of rigid packaging applications until plastics' permeability to oxygen or carbon dioxide were improved through barrier techniques.

This PERP report offers an overview of barrier resins used in beverage packaging (e.g., CSDs, beer, wine and liquor, and water), food packaging (i.e., flexible and rigid), and noncomestibles packaging such as automotive fuel tanks or chemical containers.

Process Economics

Detailed cost of production estimates of polymer resins for different locations are presented for:

- VDC-VC copolymer via a batch emulsion polymerization process
- EVOH via a polymerization process
- Amorphous nylon via a laminar blending process
- Nylon 6 via a batch polymerization process
- PEN via a continuous melt-phase and solid state polymerization process

Commercial Market Review

PVDC represented 56 percent of global barrier resin demand in 2016. This PERP report highlights the global barrier resins demand by type and region. This report also provides an overview of global supply and capacities for the selected barrier resins.

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Corporate Headquarters

Tel: +1 415 369 1000
101 2nd St Suite 1000
San Francisco
CA 94105-3651
USA

Americas

Tel: +1 914 609 0300
44 S Broadway, 4th Floor
White Plains
NY 10601-4425
USA

Europe, Middle East & Africa

Tel: +44 20 7950 1600
1 King's Arms Yard
London EC2R 7AF
United Kingdom

Asia Pacific

Tel: +662 793 4600
22nd Floor, Rasa Tower I
555 Phahonyothin Road
Kwaeng Chatuchak
Khet Chatuchak
Bangkok 10900
Thailand

