

By Chaz Miller

High-Density Polyethylene

Two million tons of high-density polyethylene (HDPE) are generated yearly.

HIGH-DENSITY polyethylene (HDPE) resin is produced from the chemical compound ethylene. HDPE bottles are blow-molded and are used for milk and other liquid products, detergents, shampoos, motor oil, drugs and cosmetic products. Most milk and water bottles use a natural-colored HDPE resin. Bottles used for other products often have colorants added to the resin. Injection-molded HDPE containers are used for products such as margarine and yogurt. Bottles have 90 percent of the HDPE “rigid package” market, while containers have the remainder.

HDPE resin also can be used to make bottle and container caps, and flexible packaging such as sacks and trash bags. Bottles and containers represent 53 percent of HDPE packaging products. HDPE also is used for non-packaging products. Bottles and containers represent 39 percent of all HDPE products manufactured. HDPE bottles and containers began displacing heavier metal, glass and paper packages in the 1970s. Although the amount of HDPE used in bottles and containers has tripled since 1980, its garbage market share is still less than 1 percent.

This profile only covers HDPE bottles and containers.

Chaz Miller is state programs director for the National Solid Wastes Management Association, Washington. E-mail the author at: cmiller@envasns.org.

HDPE Municipal Solid Waste (MSW) Facts:

Generated:

- 2 million tons, or 0.85 percent by weight.*
- 0.72 million tons of milk and water bottles.*
- 1.28 million tons of other containers.
- 13.75 pounds (lbs.) per person.*

Recycled:

- 420,000 tons, or a 21 percent recycling rate.*
- 230,000 tons of milk and water bottles, or a 31.9 percent recycling rate.*
- 170,000 tons of other bottles, or a 13.7 percent recycling rate.*
- 411,600 tons, or a 25 percent recycling rate in 2003 (industry data).
- No. 2 in the plastic resin code.

Recycled Content:

- Some non-food bottles have small amounts of recycled HDPE.

Composted:

- HDPE does not compost.

Incinerated or Landfilled:

- 1.58 million tons, or 0.96 percent of discarded MSW by weight.*
- Highly combustible, with 18,690 Btus/lb., which is more than three times that of MSW.
- Not biodegradable in landfills.

Landfill Volume:

- 6.3 million cubic yards (cu. yds.) in 1997, which was 1.5 percent of land-filled MSW that year.

Density:

- Landfilled milk jugs weigh 355 pounds per cubic yard (lbs./cu. yd.).
- Loose milk jugs weigh 24 lbs./cu. yd.
- Flattened jugs weigh 65 lbs./cu. yd.
- Loose, colored HDPE bottles weigh 45 lbs./cu. yd.
- Bales of HDPE weigh 500 to 800 lbs.

Source Reduction:

- An empty 1-gallon milk jug weighs less than 60 grams. In 1970, it weighed 95 grams.

Recycling Markets:

- Packaging, drainage pipe, film, pallets, and plastic lumber and exports.

End-Market Specifications:

- Baled Recycled Plastic Standard P-200 (HDPE Mixed), P-201 (HDPE Natural) or P-202 (HDPE Pigmented) for bottles only.
- The specs allow 2 percent contamination, no free liquids and ultra-violet protection.
- Injection-molded containers often are incompatible with blow-molded bottles in reprocessing operations.

HDPE MSW Percentage and Recycling Rate



Sources:
American Plastics Council, Washington, D.C., www.plastics-resource.org

*“Municipal Solid Waste Recycling, Generation and Disposal in the United States: Facts and Figures for 2003,” EPA, Office of Solid Waste, 2005, www.epa.gov/osw

“Design for Recycling, A Plastic Bottle Recyclers Perspective,” Society of Plastics Industries, February 1992
National Recycling Coalition, Measurement Standards and Reporting Guidelines, www.nrc-recycle.org

*Scrap Specifications Circular 2005, *Institute of Scrap Recycling Industries, Washington, www.isri.org
*2003 EPA estimates.