Abstract  
Process Economics Program Report 199B  
PLASTICS RECYCLING TO LIQUIDS  
(May 1996)

In industrialized countries, the business of collecting and processing postconsumer plastics continues to grow; increased amounts of plastics are being handled, and an ever greater variety of plastics are targeted for recycling. New methods have been introduced for identifying certain individual plastics and efficiently separating them from other materials.

Mixed plastics waste are often landfilled or incinerated. They are beginning to be used in steelmaking as a source of hydrogen and carbon monoxide reducing gas. Mixed plastics waste constitute a large stock of hydrocarbon raw materials that can instead be processed into new polymer products, chemicals, and fuels.

This report examines several processes for converting 110 million lb/yr (50,000 t/yr) of mixed plastics waste into liquid products. Our evaluation of the economics of these processes shows that if the liquid products are sold at market prices, a subsidy needs to be paid along with the delivery of the plastics waste feed. This subsidy-or tipping fee-takes the place of the avoided landfill disposal fee.

The processes that we describe and evaluate include a fluidized-bed pyrolysis process, a two-stage thermal/catalytic cracking process, and a hydrogenation process. In our evaluation, each of the first two processes includes a granulation and dehydrochlorination step (to deal with polyvinyl chloride in the feed), and the third process includes a granulation and depolymerization step. These additional steps increase the capital and operating costs. The processes could be more competitive with other recycling processes if simpler ways to pretreat the feed could be devised.

The three processes that produce a liquid are compared with a partial oxidation process to produce synthesis gas that we evaluated in PEP Report 199A: Plastics Reclamation and Recycling. The tipping fee required for the syngas process was lower than that for any of the processes evaluated in this report.

Intended to help companies assess the impact of these developments on their own operations, this report will be especially useful to companies that are seeking a niche that complements their own plastics operations. Companies already engaged in various segments of the plastics recycling business will find it useful for assessing competitive operations and expansion opportunities.
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