Abstract

Process Economics Program Report 19F

SUPERCRITICAL LOOP REACTOR SLURRY PROCESS FOR PRODUCING POLYETHYLENE AND POLYPROPYLENE

(June 1996)

Supercritical polymerization in the slurry loop process provides potential advantages (e.g., higher productivity, improved product properties, no cavitation, absence of pressure shock) over subcritical polymerization. This report evaluates these potential benefits. For polyethylene, supercritical operation requires switching the diluent from isobutane to propane. For polypropylene, new catalysts that can perform at the high temperatures required in the supercritical range must be employed.

In addition to the technical and economical evaluations customarily included in PEP reports, we have developed physical property relationships for the complex mixtures involved in polyethylene polymerization. By estimating the properties resulting from these relationships, we have arrived in turn at the heat transfer calculations needed for technical-economical comparison. In the literature, this information is available only as isolated literature data points and is often incomplete. The physical property relationships developed here should thus prove valuable for those without proprietary data.
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