Abstract
Process Economics Program Report 153D
NON-METALLOocene SINGLE SITE CATALYSTS
(June 2002)

Until fairly recently, industry seemed less than enthusiastic about linear low-density polyethylene (LLDPE) and other polymer products from metallocene single site catalysts. Polymerization reactor stability problems, high costs of the metallocene cocatalysts, and difficulties experienced by film manufacturers in processing the metallocene derived polyethylene were factors discouraging initial market acceptance and widespread commercialization.

Recent advances in metallocene and non-metallocene single site catalysts appear to have overcome such problems however. While polymer productivity of the metallocenes appears to have improved considerably, improved catalyst support techniques appear to have solved stability problems initially experienced by gas phase fluid bed LLDPE production reactors. New generations of metallocene derived polyethylenes which are claimed to be easier to process are now being offered to film producers and other manufacturers.

Some of the new generations of non-metallocene catalysts such as those under development by Equistar may eliminate the need for expensive aluminoxane cocatalysts typically required by the metallocenes. Other new non-metallocene catalysts such as those under development by DuPont may eliminate the need for alpha-olefin comonomers typically needed for LLDPE production. Such advances increase the odds for further reductions in LLDPE production costs as well as further improvements in polymer product properties and production flexibility. Because of such advances, current market prospects for metallocenes and other single site catalysts appear to be booming with long-term growth rate projections of 20-30% per year.

In this report, we compare the production economics of two non-metallocene single site catalysts under development by Equistar and DuPont with that of a metallocene catalyst believed to be in widespread commercial use by Exxon. The comparative evaluation is performed from the standpoint of LLDPE production via gas phase fluid bed polymerization reactor technology, which currently appears to be the biggest single potential market for single site catalysts. The scope of our evaluation includes the costs of catalyst support preparation, cocatalyst and additive requirements, as well as an assessment of polymer product productivities as gleaned from the recent patent literature.
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