
DESCRIPTION OF THE STUDY

As the polyolefin market has undergone a major transformation over the last few years, due to several key factors, the comonomer market has been reshaped.

Metallocene and other advanced catalysts have created new products, new grades, new intercompetition in polymer markets, and new cost structures. Octene-based LLDPE, plastomers and elastomers have been especially successful, luring a new octene supplier, Sasol, into the comonomer market.

Acquisitions, mergers, collaborative agreements, and the settling of important patent disputes have created a new market structure for polyethylene. Polyolefin producers are forming joint ventures and strategic alliances that strengthen their technical and marketing positions, as well as enhancing their production capabilities, thus creating formidable new competition, and in some cases, new comonomer supplier/customer relationships.

Polyolefin production capacity is rapidly increasing in South America, the Middle East and Asia (in spite of its recent economic crisis), as well as in the large, developed markets of North America and Europe, forever altering traditional trade patterns, and creating new comonomer customers.

POLYOLEFIN COMONOMERS - WORLD MARKETS, 1995-2005 investigates these and other technical, competitive, and market developments and analyzes their impact on comonomer consumption and production.

CHAPTER I - POLYOLEFIN TECHNOLOGY

This chapter details polyolefin process and catalyst technologies and their implications for comonomer consumption.

CHAPTER II - POLYOLEFIN INTERCOMPETITION

The intercompetition of conventional and new polyolefin copolymers with each other and with other polymer products is the focus of this chapter. It includes a comparison of performance characteristics and an assessment of prospects for the success of new products in specific end use applications.

CHAPTER III - POLYOLEFIN MARKETS BY REGION

This chapter provides an analysis of the demand for HDPE and LLDPE by end use for each region, with detailed consumption data and forecasts for each major country. It also quantifies and forecasts production by country.

CHAPTER IV - POLYOLEFIN PRODUCERS

Details of 257 individual polyolefin plants are provided in this chapter. It includes sets of tables for each region detailing individual plant locations, capacities, processes, product types, and comonomers used. A discussion of each producer includes information such as ownership, alliances, ethylene supply, etc.

CHAPTER V - POLYOLEFIN COMONOMER DEMAND

This chapter summarizes the factors affecting comonomer use and quantifies the consumption of individual comonomers by polyolefin type and by region for 1995, 1996, 2000 and 2005. It provides data for both conventional and metallo-cene HDPE and LLDPE, as well as VLDPE, plastomers, and elastomers, and provides two scenarios for polyolefin production and comonomer consumption. It reports on the status of copolymers, terpolymers and quatropolymers that incorporate alpha-olefins and propylene, and forecasts the consumption of comonomers in PP multipolymers by type and by region. All consumption tables detail comonomers by individual chain length.

CHAPTER VI - PRODUCERS OF POLYOLEFIN COMONOMERS

This chapter begins with a summary of alpha-olefin capacities by type and by region, including a complete listing of producers of refinery stream butene-1. It then provides in-depth profiles of the alpha-olefins operations of BP Amoco, Chevron, Idemitsu, Mitsubishi, Nizhnekamsk, Sasol, Shell and Spolana, as well as Phillips, who will begin producing hexene-1 in 2002. It also details potential producers and new production technologies, including those of UOP and IFP.

CHAPTER VII - POLYOLEFIN COMONOMER SUPPLY/DEMAND SUMMARY

This chapter includes a forecast of comonomer production by chain length for each producer. It then compares this data with the comonomer demand forecast in Chapter V, to provide an analysis of the supply and demand outlook for butene-1, hexene-1 and octene-1 for 2000 and 2005.

Research for this study was conducted over the course of three years, during which time a complete database of worldwide producers of polyolefin copolymers was developed, constantly updated, and crosschecked; numerous literature searches were conducted, both of printed material and commercial, online databases; published statistical data was obtained from trade associations and governments around the world; and personal and telephone interviews were carried out with producers and consumers of comonomers as well as other market participants.

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WORLD - CONSUMPTION OF COMONOMERS BY POLYOLEFIN TYPE, 1995-2005 BASE CASE (thousand tons)					
	1995	1996	2000	2005	AAGR % 1995-2005
HDPE					
LLDPE					
VLDPE/Plastomers					
Elastomers					
PP Multipolymers					
TOTAL					

Table 2					
WORLD - COMONOMER CONSUMPTION BY REGION, 1995-2005 BASE CASE (thousand tons)					
	1995	1996	2000	2005	AAGR % 1995-2005
North America					
Latin America					
West Europe					
Asia					
Other					
TOTAL					

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ARGENTINA - HDPE CONSUMPTION BY END USE, 1995-2005 (thousand tons)					
End Use Category	1995	1996	2000	2005	AAGR % 1995-2005
Packaging					
Consumer products					
Building/construction					
Other					
TOTAL					

Table III-39					
ITALY - LLDPE CONSUMPTION BY END USE, 1995-2005 (thousand tons)					
End Use Category	1995	1996	2000	2005	AAGR % 1995-2005
FLEXIBLE PACKAGING					
Consumer bags					
Stretch film					
Shrink film					
Refuse bags					
Ag and construction					
Heavy duty bags					
Form, fill and seal					
Other					
Subtotal					
CONSUMER PRODUCTS					
Housewares					
Caps and closures					
Other					
Subtotal					
ROTOMOLDING					
OTHER					
TOTAL					

Table III-57						
ASIA - LLDPE PRODUCTION, 1995-2005 (thousand tons)						
	1995	1996	2000	2005	AAGR % 1995-2000	AAGR % 2000-2005
China						
India						
Indonesia						
Japan						
Malaysia						
Philippines						
Singapore						
South Korea						
Taiwan						
Thailand						
Subtotal						
OTHERS						
Australia/New Zealand						
TOTAL						

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EAST EUROPE - LLDPE CONSUMPTION, 1995-2005 (thousand tons)					
Country	1995	1996	2000	2005	AAGR % 1995-2005
Czech Republic					
Hungary					
Poland					
Romania					
Slovakia (Slovak Republic)					
Yugoslavia					
CIS					
Other					
TOTAL					

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Company	Location	Process/Catalyst	Capacity	Expansion/ Comments	Comonomer Type Used	
					Current	Future

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ASIA - HDPE COMONOMER CONSUMPTION BY CUT, 1995-2005 BASE CASE (thousand tons)					
	1995	1996	2000	2005	AAGR % 1995-2005
CONVENTIONAL					
C ₄					
C ₆					
C ₈					
TOTAL					
METALLOCENE					
C ₄					
C ₆					
C ₈					
TOTAL					
TOTAL ASIA					
C ₄					
C ₆					
C ₈					
TOTAL					

Table V-40					
WEST EUROPE - LLDPE COMONOMER CONSUMPTION BY CUT, 1995-2005					
ALTERNATIVE CASE					
(thousand tons)					
	1995	1996	2000	2005	AAGR % 1995-2005
CONVENTIONAL					
C ₄					
C ₆ (inc. 4-MP-1)					
C ₈					
TOTAL					
METALLOCENE					
C ₄					
C ₆					
C ₈					
TOTAL					
TOTAL WEST EUROPE					
C ₄					
C ₆					
C ₈					
TOTAL					
TOTAL ALL COMONOMERS					
C ₄					
C ₅					
C ₆					
4-MP-1					
C ₈					
TOTAL					

Table VII-2					
COMONOMER PRODUCTION BY PRODUCER, 1995-2005 (thousand tons)					
Producer	C ₄	C ₆	C ₈	C ₁₀₊	Total
1995					
BP Amoco					
Chevron					
Idemitsu					
Mitsubishi					
Phillips					
Sasol	a				
Shell					
Spolana					
TOTAL					
1996					
BP Amoco					
Chevron					
etc.					
TOTAL					
2000					
BP Amoco					
Chevron					
etc.					
TOTAL					
2005					
BP Amoco					
Chevron					
etc.					
TOTAL					
a Pentene-1					

Table VII-5		
WORLD - HEXENE-1 SUPPLY/DEMAND, 2000 AND 2005 BASE CASE (thousand tons)		
	2000	2005
DEMAND		
Polyolefins		
Other		
TOTAL DEMAND		
SUPPLY		
Ethylene oligomerization		
Other		
TOTAL SUPPLY		
SURPLUS/DEFICIT		

Table VII-8		
WORLD - OCTENE-1 SUPPLY/DEMAND, 2000 AND 2005 ALTERNATIVE CASE (thousand tons)		
	2000	2005
DEMAND		
Polyolefins		
Other		
TOTAL DEMAND		
SUPPLY		
Ethylene oligomerization		
Other		
TOTAL SUPPLY		
SURPLUS/DEFICIT		

QUALIFICATIONS AND PERSONNEL

Colin A. Houston & Associates Inc. was founded in 1971 to provide consulting services to the chemical industry worldwide. The primary area of expertise was and continues to be surfactants: raw materials, intermediates, major surfactants, and the surfactant-consuming industries. Other areas of activity include: a variety of industry studies on such topics as oilfield chemicals, detergent builders, ingredients for personal care products, and bleaching agents; engineering studies such as a worldwide study of glycerine evaporation plants with recommendations for improved efficiency; a world study of the state of the art in spray-drying detergents; contracts with the U.S. Government to develop industry effluent guidelines; and business strategy and acquisition studies.

CAHA has been studying alpha-olefin markets for most of its 25 year history. In 1980, CAHA was commissioned to undertake a major proprietary study of North American and West European alpha-olefin markets. In 1988, CAHA published its first world multiclient study on alpha-olefins. A second comprehensive study was completed in 1994. In addition, since 1989 CAHA has published a monthly alpha-olefin newsletter covering pricing and market developments for alpha-olefins and for polyolefins and other end uses for alpha-olefins.

The project team approach utilized by CAHA includes a core of senior and technical professionals augmented by expert consultant associates. The following brief synopses present the staff and consultants who carried out the study, *POLYOLEFIN COMONOMERS - WORLD MARKETS, 1995-2005*.

Marilyn L. Bradshaw, Vice President,

is the author and editor of CAHA's monthly alpha-olefin newsletter, and provides consultation to clients on alpha-olefins. She was the project leader for *POLYOLEFIN COMONOMERS - WORLD MARKETS, 1995-2005* and *ALPHA-OLEFINS - WORLD MARKETS, 1990-2002*. Other recent multiclient studies she has directed include *U.S. I&I CLEANING PRODUCTS - SURFACTANT SUPPLIERS AND CUSTOMERS*, and *MAJOR INDUSTRIAL APPLICATIONS OF SURFACTANTS - NORTH AMERICAN FORECAST TO 2005*. Since joining CAHA in 1980, she has also been the project leader for numerous proprietary projects. Ms. Bradshaw has a B.A. from Finch College and an economics and management certificate from Manhattanville College. She is a director of CDMA and a member of ECMRA.

Dr. Alan H. Turner, Senior Research Associate,

has contributed to numerous multiclient and proprietary CAHA studies. He authored the producer profiles for POLYOLEFIN COMONOMERS - WORLD MARKETS, 1995-2005 and West Europe portions of ALPHA-OLEFINS - WORLD MARKETS, 1990-2002, and provides consultation on alpha-olefins and other topics. Prior to joining CAHA in 1984, Dr. Turner spent 25 years with Shell Research and Shell International Chemicals in the Netherlands and the U.K., where he worked as a project leader in detergent research and subsequently as manager of development for higher olefins and detergents. He has served on various national and international committees dealing with environmental aspects of detergents. Dr. Turner is a regular lecturer and contributor to international symposia on detergents. He has also been involved in a proprietary study on the developing chemical industry of China. Dr. Turner holds a B.Sc., M.A., and D.Phil in Chemistry from Oxford University. He is a Fellow of the Royal Society of Chemistry.

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