

Colin A. Houston & Associates, Inc. announces
a new multiclient study

ALPHA-OLEFINS - WORLD MARKETS, 2000-2010 and ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE

Consumption of linear alpha-olefins in direct end uses totaled 2.5 million tons in 2000 and is forecast to grow at an average rate of 6.6 percent/year to 2010. However, there are wide variations in growth rates among the various end uses, and the outlook for individual chain lengths ranges from a potentially severe shortage of octene-1 to significant surpluses of certain other chain lengths. There are also major differences in consumption patterns and growth rates from region to region.

Alpha-olefins capacity has increased from 2.4 million tons/year in 1997 to 3.2 million tons/year by year-end 2001, and could reach 4.0 million tons/year by 2005, including both confirmed and potential new plants and expansions.

Colin A. Houston & Associates, Inc. (CAHA) has completed a comprehensive new multiclient study of the global markets for alpha-olefins that analyzes supply and demand for alpha-olefins through 2010. The study profiles producers and quantifies and forecasts production by region and chain length to 2010. It includes a thorough investigation of 18 separate end uses for alpha-olefins, covering derivative producers and production, technology and trends, and it quantifies alpha-olefin consumption in each use by region and chain length annually for 2000 through 2005, and for 2010.

In addition to the print version of the new study, a PDF version of all the key end use and summary tables is available online in an electronic database accessible to clients via an assigned user name and password. Details of this study and database, published in October 2001, are explained on the following pages. Please contact either Joel Houston, President or Marilyn Bradshaw, Vice President to discuss this valuable new program.

CONTENTS

	<u>Page</u>
Description of the Study	2
Table of Contents	5
Sample Tables	17
Qualifications & Personnel	27
Cost and Delivery/How to Subscribe	30
Contract	31

DESCRIPTION OF THE STUDY

For alpha-olefin producers, profitability depends on finding and winning the right mix of customers while optimizing alpha-olefin production and disposition by chain length. A major purpose of CAHA's study is to provide comprehensive data and analysis that will support the development of successful alpha-olefin production, sales and marketing strategies.

For alpha-olefin customers, it is imperative to understand the short-term and long-term availability of individual chain lengths and the competitive position and potential strategies of their suppliers. CAHA's study profiles each producer and comments on expansion plans and new suppliers, and it explains in detail the supply/demand outlook for each chain length by region.

The Alpha-Olefin Market Intelligence Database, containing all the key tables from the study, is available to subscribers on the Internet at www.alpha-olefins.com/ao. A confidential username and password are assigned when the study is purchased.

ALPHA-OLEFIN SUPPLY

CPChem brought a new plant on stream in Texas in 2000; BP started up its new Canadian plant in 2001; and Shell brought a new plant on stream in Louisiana in 2002. All of the other new alpha-olefin plants being built or under consideration will be located in the Middle East, Asia and Africa.

By 2005, several of the existing producers will have added capacity, and there will be two new producers — SABIC, producing a full range of alpha-olefins, and Q-Chem, producing hexene-1. Several additional alpha-olefin plants are under consideration, but have not yet received final approval. These include new hexene-1, octene-1 and multipurpose units planned by Sasol and a joint venture plant proposed by Idemitsu and Formosa Plastics.

CAHA's study profiles each of the current, new and potential producers, providing details of their capacities and expansion plans, production by chain length, technology, product specifications and integration including captive vs merchant use. It also details alpha-olefin technology available for license.

ALPHA-OLEFIN DEMAND

CAHA's comprehensive 690-page study analyzes nineteen individual end use markets and reports alpha-olefin consumption by chain length and by region for each.

Overall growth in demand for alpha-olefins is forecast to average more than 6 percent per year between 2000 and 2010. The largest end use, polyolefin comonomers, accounts for over 50 percent of alpha-olefin consumption, and growth is expected to average 8.6 percent/year through 2010. CAHA's study breaks out alpha-olefin consumption by region, by major polyolefin type and by chain length, and discusses the supply/demand outlook for butene-1, hexene-1 and octene-1.

During the 1990s, the polyalphaolefin (PAO) market was limited by insufficient supplies of decene-1, but the situation has changed. Group III base oils are challenging PAO on a cost performance basis in many lubricant applications. Based on numerous interviews with alpha-olefin and PAO producers, and synlube suppliers and users, CAHA's study quantifies the effect of these developments and forecasts consumption of alpha-olefins by chain length in synthetic lubricants.

The markets for C₁₂ and C₁₄ alpha-olefins have been tight at times in recent years, but longer term, their growth rates are not expected to match those of the lower chain lengths. However, their outlook varies by region, and some producers will be better-positioned than others to take advantage of higher-growth market opportunities. These opportunities are identified in the study.

The phenomenal growth in the use of internal and alpha-olefins in oilfield drilling fluids has tightened the market for C₁₆ and C₁₈ alpha-olefins, but the consumption and outlook for these products varies by region. CAHA's study examines the use of internal and alpha-olefins by chain length in this dynamic market.

METHODOLOGY

CAHA's extensive files, data, knowledge and expertise on alpha-olefins gained through 20 years of consulting experience in alpha-olefins provided a unique foundation for this study. New research undertaken during the period of September 2000 through September 2001 included scores of interviews with knowledgeable contacts at more than 110 companies and organizations at over 160 locations on five continents.

TABLE OF CONTENTS

	<u>Page</u>
PREFACE	ii
EXECUTIVE SUMMARY	iii
TABLE OF CONTENTS	xxvi
List of Tables	xxxix
List of Figures	lii
I. REGIONAL ALPHA-OLEFIN MARKETS	I-1 - I-63
World Overview	I-1
Capacity	I-1
North America	I-5
West Europe	I-5
Asia	I-6
Other Regions	I-6
On-Purpose Butene-1	I-7
Production	I-8
Production by Chain Length	I-9
Consumption	I-10
Polyolefin Comonomers	I-12
Detergent Alcohols	I-15
Linear Alkylbenzene	I-16
Alkyldimethylamines	I-18
Alpha-Olefin Sulfonates	I-19
Plasticizer Alcohols	I-21
Synthetic Lubricants	I-22
Synthetic Acids	I-24
Petroleum Additives	I-25
Alkenyl Succinic Anhydride	I-27
Oilfield Chemicals	I-29
Miscellaneous End Uses	I-32
Potential Market Factors	I-34
New Surfactants Based on Alpha-Olefins	I-34
Production of Alpha-Olefins From Natural Glycerides	I-34
Production of Octene-1 by Butene-1 Dimerization	I-36
New Polyolefin Catalysts That Reduce Comonomer Levels	I-36
North America	I-37
Producers and Capacities	I-37
BP	I-37
Chevron Phillips	I-38
Shell	I-38
Production	I-38
Consumption	I-39
Latin America	I-42

Table of Contents (continued)

	Page
Producers and Capacities	I-42
Production	I-42
Consumption	I-42
West Europe	I-45
Producers and Capacities	I-45
BP	I-45
Shell	I-46
Production	I-46
Consumption	I-47
Asia	I-50
Producers and Capacities	I-50
Idemitsu	I-52
Mitsubishi	I-52
Production	I-52
Consumption	I-53
Other Regions	I-56
Producers and Capacities	I-56
East Europe	I-57
Middle East/Africa	I-58
Production	I-59
Consumption	I-60
II. PRODUCERS OF ALPHA-OLEFINS	II-1 - II-79
Introduction	II-1
Refinery Stream Butene-1	II-6
Technology	II-6
Producers	II-7
BP	II-13
Plant Locations and Capacities	II-13
Historical and Future Expansions	II-13
Production Technology	II-14
Production by Chain Length	II-19
Integration	II-21
Feedstock Situation	II-21
Captive Versus Merchant Usage	II-21
Chevron Phillips Chemical Company	II-23
Plant Locations and Capacities	II-23
Recent and Future Expansions	II-24
Production Technology	II-24
Production by Chain Length	II-28
Integration	II-29
Feedstock Situation	II-29
Captive Versus Merchant Usage	II-29
Idemitsu Petrochemical Co. Ltd.	II-32
Plant Locations and Capacities	II-32
Future Expansion Plans	II-32
Production Technology	II-33
Integration	II-35
Feedstock Situation	II-35
Captive Versus Merchant Usage	II-35

Table of Contents (continued)

	Page
Mitsubishi Chemical Corporation	II-37
Plant Locations and Capacities	II-37
Recent and Future Expansions	II-37
Production Technology	II-37
Integration	II-41
Feedstock Situation	II-41
Captive Versus Merchant Usage	II-41
Nizhnekamskneftekhim	II-43
Plant Locations and Capacity	II-43
Production Technology	II-43
Product Specifications	II-45
Integration	II-46
Feedstock Situation	II-46
Captive Versus Merchant Usage	II-46
Sasol Alpha Olefins	II-47
Plant Locations and Capacities	II-48
Hexene and Pentene	II-48
Octene	II-49
Other Chain Lengths	II-49
Production Technology	II-50
Production by Chain Length	II-52
Product Specifications	II-52
Integration	II-53
Captive Versus Merchant Usage	II-54
Shell Chemicals	II-55
Plant Locations and Capacities	II-55
Recent and Future Expansions	II-55
Production Technology	II-56
Production by Chain Length	II-64
Integration	II-66
Feedstock Situation	II-66
Captive Versus Merchant Usage	II-66
Spolana A.S.	II-68
Plant Locations and Capacities	II-69
Production Technology	II-69
Production	II-70
Integration	II-71
Feedstock Situation	II-71
Captive Versus Merchant Usage	II-72
New and Potential Producers	II-73
SABIC	II-73
Institut Français du Pétrole	II-74
UOP	II-75
CONDEA Vista (Sasol)	II-76
Dow	II-76
ExxonMobil	II-77
Godrej	II-78
Henkel	II-78

III. END USE MARKETS FOR ALPHA-OLEFINS

III-1 - III-10

Table of Contents (continued)

	Page
Summary	III-1
Chain Lengths	III-1
Polyolefins	III-1
Surfactants and Intermediates	III-1
Plasticizer Alcohols	III-1
Oilfield Chemicals	III-2
 IV. POLYOLEFIN COMONOMERS	IV-1 - IV-136
Introduction	IV-1
Polyethylene Technology	IV-3
Process Types	IV-3
Polymerization in Solution Phase	IV-3
Polymerization in Dilute Slurry Phase	IV-4
Polymerization on Solids Dispersed in Gas Phase	IV-5
Catalyst Technology	IV-6
Ziegler-Natta Catalysts	IV-6
Metallocene Catalysts	IV-8
Other Single-Site Catalysts, Coordination Compounds And Chelates	IV-11
Hybrid Catalysts	IV-13
New Process/Catalyst Technologies	IV-13
Bimodal Processes	IV-13
Polyethylene Technology Available For License	IV-14
Intermaterial Competition	IV-18
Introduction	IV-18
Metallocene Catalyzed LLDPE	IV-19
Non-Metallocene SSC-based LLDPE Resins	IV-19
Plastomers	IV-19
Polyolefin Elastomers	IV-20
Other New Copolymer Technology	IV-20
Intercompetition by Major Application	IV-21
Conventional PE Copolymers	IV-21
Conventional and SSC-based PE Intercompetition	IV-23
VLDPE	IV-28
Metallocene PE vs Other Polymers	IV-28
Property Comparison	IV-29
Polyolefin Copolymer Producers and Capacities	IV-31
Notes For Regional Tables	IV-34
North America	IV-35
Atofina	IV-36
Basell	IV-36
Chevron Phillips	IV-36
Dow	IV-36
DuPont Dow Elastomers	IV-37
Eastman	IV-37
Equistar	IV-37
ExxonMobil	IV-37
Formosa	IV-38
Huntsman	IV-38
Nova	IV-38

Table of Contents (continued)

	<u>Page</u>
Pemex	IV-38
Petromont	IV-38
Solvay	IV-39
Ticona	IV-39
Union Carbide	IV-39
Westlake	IV-39
Latin America	IV-44
Argentina	IV-45
Brazil	IV-45
Chile	IV-46
Venezuela	IV-46
West Europe	IV-50
Atofina	IV-51
Basell	IV-52
Borealis	IV-52
BP	IV-53
CIPN	IV-53
Dex Plastomers	IV-54
Dow	IV-54
DSM	IV-54
Enichem	IV-55
Polimeri Europa	IV-55
Repsol	IV-55
Solvay	IV-55
Ticona	IV-56
Asia	IV-61
Japan	IV-61
South Korea	IV-65
China	IV-67
India	IV-71
Other Countries	IV-74
Other Regions	IV-88
East Europe	IV-88
Middle East	IV-91
Africa	IV-95
Markets	IV-103
World Summary	IV-103
HDPE	IV-105
LLDPE	IV-107
VLDPE/Plastomers	IV-109
Polyolefin Elastomers	IV-111
Polypropylene Multipolymers	IV-112
North America	IV-114
HDPE	IV-115
LLDPE	IV-116
VLDPE/Plastomers	IV-117
Polyolefin Elastomers	IV-118
Latin America	IV-119
HDPE	IV-120
LLDPE	IV-121

Table of Contents (continued)

	Page
VLDPE/Plastomers	IV-122
Polyolefin Elastomers	IV-122
West Europe	IV-123
HDPE	IV-125
LLDPE	IV-126
VLDPE/Plastomers	IV-127
Polyolefin Elastomers	IV-128
Asia	IV-128
HDPE	IV-130
LLDPE	IV-131
VLDPE/Plastomers	IV-132
Polyolefin Elastomers	IV-133
Other Regions	IV-133
HDPE	IV-135
LLDPE	IV-135
VLDPE/Plastomers and Polyolefin Elastomers	IV-136
V. SURFACTANTS AND INTERMEDIATES	V-1 - V-105
Introduction	V-1
Detergent Alcohols	V-2
Introduction	V-2
Sources and Technologies	V-3
Oleochemical Alcohol Manufacturing Processes	V-5
Synthetic-Based Alcohol Manufacturing Processes	V-11
Products	V-12
World Market Summary	V-13
North America	V-16
Producers and Capacities	V-16
Production	V-21
Alpha-Olefin Demand	V-21
West Europe	V-22
Producers and Capacities	V-22
Production	V-28
Alpha-Olefin Demand	V-28
Asia	V-29
Producers and Capacities	V-29
Production	V-37
Alpha-Olefin Demand	V-38
Other Regions	V-38
Production	V-40
Alpha-Olefin Demand	V-41
Linear Alkylbenzene	V-42
Introduction	V-42
Sources and Technologies	V-42
Starting Materials and Processes	V-43
Role of Internal and Alpha-Olefins in the	
Production of LAB	V-45
LAB Compositions	V-48
Developments in New Technology	V-50
World Market Summary	V-51
North America	V-54

Table of Contents (continued)

	Page
Producers and Capacities	V-54
Production	V-56
Alpha-Olefin Demand	V-56
Latin America	V-57
Producers and Capacities	V-57
Production	V-59
Alpha-Olefin Demand by Chain Length	V-59
West Europe	V-60
Producers and Capacities	V-60
Production	V-62
Alpha-Olefin Demand by Chain Length	V-62
Asia	V-62
Producers and Capacities	V-63
Production	V-68
Alpha-Olefin Demand by Chain Length	V-68
Other Regions	V-69
Producers and Capacities	V-69
Production	V-72
Alpha-Olefin Demand by Chain Length	V-73
Alkyldimethylamines	V-74
Sources and Technology	V-74
From Alpha-Olefin Via Alkyl Bromide	V-74
From Fatty Acid via Fatty Acid Nitrile	V-74
From Alcohol via Alkyl Chloride	V-75
From Alcohol via Direct Amination	V-75
Properties and Applications	V-76
World Market Summary	V-78
Capacity	V-78
Production	V-79
Utilization	V-81
Alpha-Olefin Demand	V-81
North America	V-83
Producers and Capacities	V-83
Production	V-85
Alpha-Olefin Demand	V-86
Latin America	V-87
Producers and Capacities	V-87
Production	V-87
Alpha-Olefin Demand	V-87
West Europe	V-88
Producers and Capacities	V-88
Production	V-90
Alpha-Olefin Demand	V-91
Asia	V-91
Producers and Capacities	V-91
Production	V-93
Alpha-Olefin Demand	V-93
Other Regions	V-93
Alpha-Olefin Sulfonates	V-94
Introduction	V-94
Technology	V-94

Table of Contents (continued)

	Page
World Market Summary	V-95
North America	V-96
Producers and Capacities	V-96
Production	V-97
Alpha-Olefin Demand	V-98
Latin America	V-99
West Europe	V-99
Producers and Capacities	V-99
Production	V-100
Alpha-Olefin Demand	V-101
Asia	V-101
Producers and Capacities	V-102
Production	V-103
Alpha-Olefin Demand	V-104
Other Regions	V-105
Alpha-Olefin Demand Summary	V-105
VI. PLASTICIZER ALCOHOLS	VI-1 - VI-61
Introduction	VI-1
Technology	VI-3
Oxo Process	VI-3
Products	VI-5
2-Ethylhexanol	VI-5
Isoalcohols	VI-7
Linear Alcohols	VI-8
Plasticizers	VI-11
Introduction	VI-11
Technology	VI-11
Phthalate Plasticizers	VI-15
Non-Phthalate Plasticizers	VI-18
Environmental and Health Issues	VI-19
Markets	VI-23
World Summary	VI-23
Plasticizer Alcohols	VI-23
Linear Plasticizer Alcohol Production	VI-26
Alpha-Olefin Demand	VI-27
North America	VI-28
Producers and Capacities	VI-29
Production	VI-34
Alpha-Olefin Demand	VI-36
Latin America	VI-37
Producers and Capacities	VI-38
Production	VI-39
Alpha-Olefin Demand	VI-40
West Europe	VI-40
Producers and Capacities	VI-41
Production	VI-47
Alpha-Olefin Demand	VI-49
Asia	VI-50
Producers and Capacities	VI-51
Production	VI-56

Table of Contents (continued)

		Page
	Alpha-Olefin Demand	VI-57
	Other Regions	VI-58
	Producers and Capacities	VI-58
	Production	VI-60
	Alpha-Olefin Demand	VI-61
VII.	SYNTHETIC LUBRICANTS	VII-1 - VII-38
	Introduction	VII-1
	Lubricants	VII-1
	Synthetic Lubricants	VII-1
	Hydroprocessed Base Oils	VII-3
	Technology	VII-5
	Major Lubricants	VII-5
	Polyalphaolefins	VII-5
	Polyol Esters	VII-6
	Polyalkylene Glycols	VII-7
	Dibasic Acid Esters	VII-7
	Phosphate Esters	VII-7
	Alkylated Aromatics	VII-7
	Hydroprocessed Base Oils	VII-8
	Comparison of Lubricant Types and Properties	VII-8
	Finished Lubricant Markets	VII-13
	World Lubricant Market	VII-16
	Producers	VII-16
	Demand	VII-16
	Polyalphaolefin Lubricants	VII-18
	Other Lubricants	VII-21
	Polyol Esters	VII-21
	Polymer Esters	VII-22
	Polyalphaolefin Markets by Region	VII-23
	World Summary	VII-23
	PAO Producers and Capacities	VII-24
	Production	VII-27
	Alpha-Olefin Demand	VII-28
	North America	VII-30
	Latin America	VII-32
	West Europe	VII-32
	Asia	VII-35
	Other Regions	VII-38
VIII.	SYNTHETIC ACIDS	VIII-1 - VIII-27
	Introduction	VIII-1
	Technology	VIII-2
	Commercial Processes	VIII-2
	Oxo Process	VIII-3
	End Uses	VIII-4
	Polyol Esters	VIII-4
	Bleach Activators	VIII-8
	Plasticizers	VIII-11
	Other End Uses	VIII-12
	Alpha-Olefin Derivatives (C _{5,7,9}) vs. Fatty Acids From Other	

Table of Contents (continued)

		Page
	Sources	VIII-12
	Markets	VIII-14
	World Summary	VIII-14
	North America	VIII-14
	Producers and Capacities	VIII-14
	Production	VIII-16
	Consumption	VIII-16
	Alpha-Olefin Demand	VIII-20
	Latin America	VIII-20
	West Europe	VIII-21
	Producers and Capacities	VIII-21
	Production	VIII-22
	Consumption	VIII-23
	Alpha-Olefin Demand	VIII-25
	Asia	VIII-26
	Other Regions	VIII-26
	Alpha-Olefin Demand Summary	VIII-26
IX.	PETROLEUM ADDITIVES	IX-1 -IX-34
	Introduction	IX-1
	Additive Function	IX-3
	The Petroleum Additive Industry	IX-6
	Technology	IX-10
	Lube Oil Performance	IX-10
	Additives	IX-10
	Alpha-Olefin Sulfonates	IX-12
	Alkylbenzene Sulfonates	IX-12
	Alkyl Phenates	IX-14
	Alkyl Salicylates	IX-15
	Chlorinated Alpha-Olefins	IX-15
	Sulfurized and Chlorosulfurized Alpha-Olefins	IX-16
	Alkenyl Succinic Acids/Anhydrides	IX-17
	Fuel Additives	IX-18
	Summary	IX-18
	Markets	IX-21
	Lubricant Base Oils	IX-21
	Petroleum Additive Market	IX-23
	Global Alpha-Olefin Demand	IX-24
	North America	IX-27
	Latin America	IX-29
	West Europe	IX-29
	Asia	IX-31
	Other Regions	IX-33
X.	ALKENYL SUCCINIC ANHYDRIDE	X-1 - X-17
	Introduction	X-1
	Technology	X-2
	Markets	X-3
	North America	X-4
	Producers	X-4
	Production	X-6

Table of Contents (continued)

		Page
	Consumption	X-6
	Alpha-Olefin Demand	X-9
	Latin America	X-10
	West Europe	X-11
	Producers	X-11
	Production	X-12
	Consumption	X-13
	Alpha-Olefin Demand	X-15
	Asia	X-16
	Producers and Production	X-16
	Consumption	X-16
	Alpha-Olefin Demand	X-16
	Other Regions	X-17
	Alpha-Olefin Demand Summary	X-17
XI.	OILFIELD CHEMICALS	XI-1 - XI-24
	Introduction	XI-1
	Oil Industry	XI-2
	Oilfield Chemical Companies	XI-2
	Technology	XI-4
	Drilling Fluids	XI-4
	Enhanced Oil Recovery	XI-8
	Drag Reducers	XI-9
	Pour Point Depressants	XI-9
	Markets	XI-11
	World Summary	XI-11
	North America	XI-11
	Producers	XI-11
	Utilization	XI-13
	Alpha-Olefin Demand	XI-14
	Latin America	XI-15
	Producers	XI-15
	Utilization	XI-16
	Alpha-Olefin Demand	XI-17
	West Europe	XI-17
	Producers	XI-17
	Utilization	XI-18
	Alpha-Olefin Demand	XI-19
	Asia	XI-19
	Producers	XI-19
	Utilization	XI-19
	Alpha-Olefin Demand	XI-20
	Other Regions	XI-20
	Producers	XI-20
	Utilization	XI-21
	Alpha-Olefin Demand	XI-22
	Alpha-Olefin Demand Summary	XI-22
XII.	MISCELLANEOUS END USES	XII-1 - XII-65
	Introduction	XII-1
	Metalworking Fluids and Additives	XII-3

Table of Contents (continued)

	Page
Introduction	XII-3
Metalworking Fluids Technology	XII-5
Metalworking Fluids by Process	XII-6
Removal Fluids	XII-6
Forming Fluids	XII-7
Treating Fluids	XII-7
Protecting Fluids	XII-8
Metalworking Fluid Product Classes	XII-8
Straight Oils	XII-9
Soluble (Emulsifiable) Oils	XII-10
Semi-Synthetics (Semichemical)	XII-11
Synthetics (Chemicals)	XII-12
Metalworking Additives	XII-13
Additive Types	XII-14
Alpha-Olefin Derived Additives	XII-15
Neat Alpha-Olefins	XII-18
Metalworking Fluid Market	XII-19
Metalworking Fluid Industry	XII-21
Alpha-Olefin Demand	XII-24
North America	XII-26
West Europe	XII-27
Asia	XII-28
Other Regions	XII-29
Epoxides	XII-30
Technology	XII-30
Producers	XII-31
Production	XII-32
Markets	XII-33
Alpha-Olefin Demand	XII-34
Mercaptans	XII-36
Technology	XII-36
Producers	XII-37
Production	XII-38
Markets	XII-38
Alpha-Olefin Demand	XII-39
High Molecular Weight Alpha-Olefin Waxes	XII-41
Technology	XII-41
Producers	XII-41
Production	XII-42
Markets	XII-43
North America	XII-43
Asia	XII-43
Other Region	XII-44
Alpha-Olefin Demand	XII-44
Polybutene-1	XII-46
Technology	XII-46
Producers	XII-46
Production	XII-47
Markets	XII-48
Alpha-Olefin Demand	XII-49
Leather	XII-51

Table of Contents (continued)

	Page
Technology	XII-51
Producers	XII-51
Markets	XII-53
Alpha-Olefin Demand	XII-54
Amyl Alcohol	XII-56
Technology	XII-56
Producers	XII-56
Production	XII-57
Markets	XII-58
Alpha-Olefin Demand	XII-59
Miscellaneous Other	XII-61
Diphenyl Oxide Disulfonates	XII-61
Technology	XII-61
Producers	XII-61
Markets	XII-62
Alpha-Olefin Demand	XII-62
Polydecenes	XII-62
Technology	XII-63
Producers	XII-63
Markets	XII-63
Alpha-Olefin Demand	XII-64
Other and Unspecified	XII-64
Alpha-Olefin Demand Summary	XII-65
XIII. APPENDIX	XIII-1 - XIII-8
List of Abbreviations	XIII-1
List of Contacts	XIII-5

SAMPLE TABLES

Table I-5								
WORLD - ALPHA-OLEFIN PRODUCTION BY REGION, 2000-2010 (thousand tons)								
Region	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
North America								
West Europe								
Asia								
Other Regions								
TOTAL								

Table I-6								
WORLD - ALPHA-OLEFIN PRODUCTION BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₄								
C ₆								
C ₈								
C ₁₀								
C ₁₂								
C ₁₄								
C ₁₆								
C ₁₈								
C ₂₀₊								
TOTAL								

Table I-7

WORLD - ALPHA-OLEFIN CONSUMPTION IN ALL APPLICATIONS, 2000-2010
(thousand tons)

	2000	2001	2002	2003	2004	2005	2010	AAGR% 2000-2010
POLYOLEFIN COMONOMERS								
HDPE								
LLDPE								
VLDPE/Plastomers								
Elastomers								
Polypropylene Multipolymers								
Subtotal								
SURFACTANTS AND INTERMEDIATES								
Detergent Alcohols								
Linear Alkylbenzene								
Alkyldimethylamines								
Alpha-olefin Sulfonates								
Subtotal								
Plasticizer Alcohols								
Synthetic Lubricants								
Synthetic Acids								
Petroleum Additives								
Alkenyl Succinic Anhydride								
Oilfield Chemicals								
Miscellaneous End Uses								
GRAND TOTAL								

Table II-22		
NIZHNEKAMSKNEFTEKHIM - ALPHA-OLEFIN PRODUCTION BY CHAIN LENGTH, 2000 (thousand tons)		
Carbon Chain Length	Production	Percent of Total Production
C ₄		
C ₆		
C ₈		
C ₁₀		
C ₁₂		
C ₁₄		
C ₁₆		
C ₁₈		
C ₂₀₊		
TOTAL		

Table II-37		
SABIC - POTENTIAL ALPHA-OLEFIN CAPACITY BY CHAIN LENGTH (thousand tons)		
Carbon Chain Length	Capacity	Percent of Total Capacity
C ₄		
C ₆		
C ₈		
C ₁₀		
C ₁₂₋₁₈		
C ₂₀₊		
TOTAL		

Table III-7

WORLD TOTAL - ALPHA-OLEFIN END USE CONSUMPTION BY CHAIN LENGTH, 2005
(thousand tons)

End Use	C ₄	C ₆	C ₈	C ₁₀	C ₁₂	C ₁₄	C ₁₆	C ₁₈	C ₂₀₊	TOTAL
POLYOLEFIN COMONOMERS										
HDPE										
LLDPE										
VLDPE/Plastomers										
Elastomers										
Polypropylene Multipolymers										
Subtotal										
SURFACTANTS AND INTERMEDIATES										
Detergent Alcohols										
Linear Alkylbenzene										
Alkyldimethylamines										
Alpha-olefin Sulfonates										
Subtotal										
Plasticizer Alcohols										
Synthetic Lubricants										
Synthetic Acids										
Petroleum Additives										
Alkenyl Succinic Anhydride										
Oilfield Chemicals										
Miscellaneous End Uses										
GRAND TOTAL										

Table IV-45								
WORLD - ALPHA-OLEFIN DEMAND FOR HDPE PRODUCTION BY REGION, 2000-2010 (thousand tons)								
	2000	2001	2002	2003	2004	2005	2010	AAGR% 2000-2010
North America								
Latin America								
West Europe								
Asia								
Other Regions								
TOTAL								

Table IV-64								
LATIN AMERICA - ALPHA-OLEFIN DEMAND FOR LLDPE ^a PRODUCTION BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR% 2000-2010
C ₄								
C ₆								
C ₈								
TOTAL								

^a Excluding VLDPE, Plastomers and Elastomers.

Table V-43								
WORLD - ALKYLDIMETHYLAMINE PRODUCTION BY SOURCE, 2000-2010 (thousand tons)								
Process	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
from olefin								
from alcohol								
from acid								
TOTAL								

Table V-65								
ASIA - AOS PRODUCTION BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₁₄								
C ₁₆								
C ₁₈								
TOTAL								

Table VI-23								
NORTH AMERICA - ALPHA-OLEFIN DEMAND FOR PLASTICIZER RANGE ALCOHOL PRODUCTION BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR% 2000-2010
C ₆								
C ₈								
C ₁₀								
TOTAL								

Table VII-26								
WEST EUROPE - ALPHA-OLEFIN DEMAND FOR POLYALPHAOLEFIN PRODUCTION BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₈								
C ₁₀								
C ₁₂								
TOTAL								

Table VIII-11								
NORTH AMERICA - CONSUMPTION OF LINEAR C ₅ , C ₇ , AND C ₉ ACID FROM ALL SOURCES BY END USE, 2000-2010 (thousand tons)								
End Use	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
Synthetic Lubricants								
NOBS Production								
PVB Production								
Other								
TOTAL								

Table IX-15								
ASIA - ALPHA-OLEFIN DEMAND FOR PETROLEUM ADDITIVE PRODUCTION BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₁₂								
C ₁₄								
C ₁₆								
C ₁₈								
C ₂₀₊								
TOTAL								

Table X-11								
WEST EUROPE - PRODUCTION OF ALPHA-OLEFIN DERIVED ASA BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₈								
C ₁₆								
C ₁₈								
C ₂₀₊								
TOTAL								

Table XI-7								
NORTH AMERICA - INTERNAL AND ALPHA-OLEFIN DEMAND FOR OILFIELD USES BY CHAIN LENGTH, 2000-2010 (thousand tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₆								
C ₈								
C ₁₀								
C ₁₄								
C ₁₆								
C ₁₈								
C ₂₀₊								
TOTAL								

Table XII-1								
WORLD - ALPHA-OLEFIN DEMAND FOR MISCELLANEOUS END USES, 2000-2010 (thousand tons)								
End Use	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
Metalworking								
Epoxides								
Mercaptans								
HMW Waxes								
Polybutene-1								
Leather								
Amyl Alcohol								
Misc. Other								
TOTAL								

Table XII-15								
ASIA - ALPHA-OLEFIN DEMAND FOR METALWORKING FLUIDS AND ADDITIVES BY CHAIN LENGTH, 2000-2010 (tons)								
Chain Length	2000	2001	2002	2003	2004	2005	2010	AAGR % 2000-2010
C ₁₀								
C ₁₂								
C ₁₄								
C ₁₆								
C ₁₈								
TOTAL								

QUALIFICATIONS AND PERSONNEL

Colin A. Houston & Associates Inc. (CAHA) 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, *ALPHA-OLEFINS - WORLD MARKETS, 2000-2010* and *ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE*.

Marilyn L. Bradshaw, Vice President,

was the project leader for *ALPHA-OLEFINS - WORLD MARKETS, 2000-2010* AND *ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE*. She is also the author and editor of CAHA's monthly alpha-olefin newsletter, and provides consultation to clients on alpha-olefins. Ms. Bradshaw was also the project leader for *POLY-OLEFIN 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 *INDUSTRIAL APPLICATIONS OF SURFACTANTS - NORTH AMERICAN FORECAST TO 2010*. 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 committee chair and former director of CDMA and a member of ECMRA.

Joel H. Houston, President,

authored the Detergent Alcohols section of ALPHA-OLEFINS - WORLD MARKETS, 2000-2010 AND ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE. In addition, Mr. Houston was the project leader for numerous multiclient studies including HIGHER ALCOHOLS: MARKET FORECAST TO 2010, SURFACTANTS FOR EMERGING MARKETS IN ASIA/PACIFIC, 1996-2010, OPPORTUNITIES IN PERFORMANCE SURFACTANTS IN THE U.S., SURFACTANTS FOR CONSUMER PRODUCTS - NORTH AMERICAN FORECAST TO 2008, and DETERGENT ALKYLATES - WORLD MARKETS, 1992-2005. He has guided CAHA's research in oleochemicals since 1980, and in detergents since 1987. Mr. Houston has extensive experience in projects for consumer products, has presented papers at CMRA, ECMRA and CSMA meetings, and is the editor of CAHA's global detergent newsletter, AGGLOMERATIONS. He is a member of CDMA, AOCS and ASTM.

H. James Bigalow, Senior Research Associate,

authored several sections of ALPHA-OLEFINS - WORLD MARKETS, 2000-2010 AND ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE. In addition he has contributed to numerous multiclient studies including INDUSTRIAL APPLICATIONS OF SURFACTANTS - NORTH AMERICAN FORECAST TO 2010, SURFACTANTS FOR EMERGING MARKETS IN ASIA/PACIFIC, 1995-2010, DETERGENT ALKYLATES - WORLD MARKETS, 1995-2010 and SURFACTANTS FOR CONSUMER PRODUCTS - NORTH AMERICAN FORECAST TO 2008. Mr. Bigalow has also worked on proprietary detergent and surfactant studies. Mr. Bigalow has over 20 years experience as a senior marketing research executive in the chemical industry. He has conducted successful business analysis projects which have included financial evaluations of businesses and acquisition candidates, identifying current and future markets for new and existing products, and product development and usage. Additional experience has included economic and sales forecasting, strategic planning, proprietary market research projects, benchmarking, and product safety. He is a member of the CDMA, the Society of Competitive Intelligence Professionals (SCIP), ACS and the Chemical Marketing and Economics Division of the ACS. Mr. Bigalow holds an M.S. Industrial Administration, Krannert School of Management, Purdue University and a B.S. degree in Chemistry, Denison University.

Mack Hunt, Senior Research Consultant

authored the Synthetic Lubricants, Petroleum Additives and Metalworking Fluids sections of ALPHA-OLEFINS - WORLD MARKETS, 2000-2010 AND ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE. He has over 35 years of experience in the creation, synthesis, development, manufacture and management of fuel and lubricating oil additives. Mr. Hunt is an internationally know expert in motor oil detergents and has authored or co-authored 53 U.S. patents and many foreign patents. He authored U.S. GASOLINE DETERGENT ADDITIVES, 1997-2004 and the U.S. portion of GASOLINE DETERGENT ADDITIVES - UNITED STATES AND WEST EUROPE II, 1992-2002 as well as

the Petroleum Additives section of ALPHA-OLEFINS - WORLD MARKETS, 1990-2002. He also conducted a global polyisobutylene market study and proprietary studies of market prospects for gasoline detergent additives. He holds an A.B. Chemistry, Math and Biology, Nebraska Wesleyan University and an M.S. Organic Chemistry, University of Nebraska.

Dr. Norman F. Brockmeier, President, Oakwood Consulting, Inc.

Dr. Brockmeier wrote the Polyolefin Technology section of ALPHA-OLEFINS - WORLD MARKETS, 2000-2010 AND ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE. He also authored Chapter I - Polyolefin Technology of POLYOLEFIN COMONOMERS - WORLD MARKETS, 1995-2005. In addition to his own consulting practice, Dr. Brockmeier is a chemical engineer with the Process Evaluation Section in the Energy Systems Division at Argonne National Laboratory. He has over 25 years experience in industry, and is recognized as a leading authority on polyolefin process design and economics, recently in the emerging field of metallocene catalysis, with many publications and conference lectures in these areas. He was codesigner of the first Amoco gas-phase manufacturing process for homopolymer polypropylene resin, and part of the design team for a new gas-phase ethylene-propylene copolymer plant in Texas. He has also taught the capstone senior design course at Ohio State University and at the University of Texas. Dr. Brockmeier has a B.S. degree in chemical engineering from the Massachusetts Institute of Technology. He is a member of ACS, AIChE, and the SPE, and is a registered professional engineer.

Michael Tepper, Research Associate

authored several of the Miscellaneous End Use sections of ALPHA-OLEFINS - WORLD MARKETS, 2000-2010 AND ALPHA-OLEFIN MARKET INTELLIGENCE DATABASE. He has conducted research in support of proprietary work and contributes to CAHA's newsletter, *Agglomerations*. Prior to joining CAHA, Mr. Tepper was a mathematician who worked as a senior computing assistant for the University of Chicago, Graduate School of Business while obtaining a Bachelor of Arts degree in Mathematics. His background in statistics and his computer skills were invaluable in developing and implementing the electronic version of the new alpha-olefin study.

HOW TO SUBSCRIBE

To subscribe to the study please contact CAHA at the address below.

Colin A. Houston & Associates, Inc.
262 Eastgate Drive 323
Aiken, SC 29803 USA
Phone: 803-226-0350
Fax: 803-693-0707
E-mail: CAHA1@colinhouston.com
Website: www.colin-houston.com