

## Report Synopsis

In 2005, the global chemicals industry carried on with the momentum generated in 2004 although facing many severe challenges. Production grew by 3.9% while revenue is estimated to have grown by approximately 4.8% to USD 1,310 billion. Rising feedstock and energy prices are a major concern to the industry as are environmental and other regulatory challenges. The profitability of many of the companies will depend largely on whether they are able to pass on the high costs to the end consumers.

Markets covered in this report include North America (the US and Canada), Europe (excluding the UK), the UK, Japan and the emerging markets of Brazil, China and India. In these markets "Commodity" chemicals accounted for over 53% of the total, an increase of 5.9% y/y. Most of the manufacture of these chemicals is concentrated in the top ten players in the industry.

Major trends in the industry are globalization, consolidation and outsourcing, while the growth drivers include industrial demand, economic growth in the emerging markets and substitution of conventional materials.

## CONTENTS

<b>1. Executive Summary</b>	<b>10</b>
<b>2. Highlights</b>	<b>12</b>
<b>3. Industry Overview</b>	<b>14</b>
3.1 Introduction	14
3.2 Present scenario	14
3.3 Market segmentation	15
3.3.1 Commodity chemicals	
3.3.2 Specialty and fine chemicals	
3.3.3 Agrochemical and fertilizers	
3.3.4 Industrial gases	
3.4 Trends in the industry	31
3.4.1 Consolidation	
3.4.2 Globalization	
3.4.3 Outsourcing	
3.4.4 Petrochemical cycle approaching peak	
3.5 Conclusion	35
3.6 References	36
<b>4. Growth Drivers</b>	<b>37</b>
4.1 Introduction	37
4.2 Major growth drivers	37
4.2.1 Industrial demand and growing economy	
4.2.2 Substitution of conventional materials	
4.2.3 International trade	
4.2.4 The Chinese chemicals industry – a key growth driver	
4.3 Conclusion	40
4.4 References	41
<b>5. Issues and Challenges</b>	<b>42</b>
5.1 Introduction	42
5.2 Volatile energy and feedstock prices	42
5.2.1 Natural gas	
5.2.2 Crude oil	
5.3 WTO and its impact on the chemical industry	44
5.4 Environmental challenges	44
5.4.1 Financial implications of REACH	
5.4.2 Impact of REACH on chemical industry	
5.5 Cost reduction	46
5.5.1 Operational cost reduction	
5.5.2 Financial cost reduction	
5.6 Conclusion	47
5.7 References	48

<b>6. Technology</b>	<b>49</b>
6.1 Introduction	49
6.2 Chemical sciences	49
6.2.1 Chemical synthesis	
6.2.2 Bioprocess and biotechnology	
6.2.2.1 Bioprocess	
6.2.2.2 Biotechnology	
6.2.3 Materials technology	
6.3 Enabling technologies	51
6.3.1 Process science and engineering technology	
6.3.2 Chemical measurement	
6.3.3 Computational technology	
6.4 Process technologies	53
6.4.1 Polymerization	
6.4.2 Liquefaction of gases	
6.4.3 Cracking	
6.4.3.1 Thermal cracking	
6.4.3.2 Catalytic cracking	
6.5 Conclusion	55
6.6 References	55
<b>7 Major Markets</b>	<b>57</b>
7.1 Introduction	57
7.2 North America	57
7.2.1 US	
7.2.2 Canada	
7.3 Europe (excluding the UK)	62
7.4 UK	64
7.5 Japan	67
7.6 Emerging markets	70
7.6.1 Brazil	
7.6.2 China	
7.6.3 India	
7.7 Conclusion	78
7.8 References	79
<b>8. Major Players</b>	<b>81</b>
8.1 Introduction	81
8.2 Chemicals—diversified	81
8.2.1 BASF	
8.2.2 Bayer	
8.2.3 Dow Chemicals	
8.2.4 DuPont	
8.2.5 Akzo Nobel	
8.3 Commodity chemical companies	94
8.3.1 Mitsubishi Chemicals	
8.3.2 Lyondell Chemical	
8.3.3 Sumitomo Chemicals	
8.3.4 Mitsui Chemicals	
8.3.5 LG Chemicals	
8.4 Specialty and fine chemicals	107
8.4.1 Degussa	
8.4.2 Royal DSM	
8.4.3 ICI Chemicals	
8.4.4 Rohm and Haas	
8.4.5 Clariant Chemicals	
8.5 Agro chemicals and fertilizers	121
8.5.1 Mosaic	

8.5.2 Syngenta	
8.5.3 Monsanto	
8.5.4 Agrium	
8.5.5 Potash Corporation	
8.6 Industrial Gas	131
8.6.1 Air Liquide	
8.6.2 Air products and chemicals	
8.6.3 Praxair	
8.6.4 Linde	
8.6.5 BOC	
8.7 Conclusion	145
8.8 Reference	146
<b>9. Regulations</b>	<b>148</b>
9.1 Introduction	148
9.2 Major international environmental regulations	148
9.2.1 The Basel convention on the control of trans-boundary movements of hazardous wastes and their disposal	
9.2.2 The Rotterdam convention on hazardous chemicals and pesticides In international trade	
9.2.3 The Stockholm convention on persistent organic pollutants	
9.2.4 Key elements of Basel, Rotterdam and Stockholm conventions	
9.2.5 Substances covered by conventions	
9.3 REACH	153
9.3.1 Key features in the white paper	
9.3.2 Expected business impact	
9.3.3 Industry concerns	
9.4 Global warming and related conventions	156
9.4.1 Reducing global warming	
9.4.2 Measures to protect the ozone layer	
9.4.3 The Vienna convention	
9.4.4 The Montreal protocol	
9.4.5 The Kyoto protocol	
9.5 Key international patent regulations	159
9.5.1 TRIPs	
9.5.2 The Paris convention	
9.5.3 The Patent co-operation treaty	
9.6 Recent regulatory amendments	164
9.6.1 Developments related to REACH	
9.6.2 The Kyoto Protocol	
9.6.3 The US Energy Bill and MTBE	
9.7 Conclusion	167
9.8 References	168
<b>10. Mergers and Acquisitions</b>	<b>169</b>
10.1 Introduction	169
10.2 Present scenario	169
10.3 Key Drivers for M&A	170
10.3.1 Private equity firms	
10.3.2 Increase in market share	
10.3.3 Cyclic nature	
10.4 Trends in M&A	172
10.4.1 2003	
10.4.2 2004	
10.4.3 2005	
10.5 Impact of M&A on the chemical industry	174
10.5.1 Declining R&D	
10.5.2 Concentration of the industry	

10.5.3 Strengthened the stock market	
10.6 Conclusion	175
10.7 References	176

## 11. Critical Success Factors 177

11.1 Focus on R&D	177
11.2 M&A	178
11.3 Economies of scale	179
11.4 Outsourcing	180
11.5 Collaboration	181
11.6 Technology	182
11.7 Conclusion	184
11.8 References	184

## 12. Future Outlook 185

12.1 Introduction	185
12.2 Economic outlook	185
12.3 Regional and segmental outlook	186
12.4 Challenges	187
12.5 Conclusion	188
12.6 References	188

## LIST OF FIGURES

- Figure 3.1: Global Chemical Industry Market Size (2001-2005E)
- Figure 3.2: Segmentation of Chemical Market (2005E)
- Figure 3.3: Global Commodity Chemical Market Size (2001-2005E)
- Figure 3.4: Ethylene Consumption by End Use (2005E)
- Figure 3.5: Ethylene Capacities by Region (2005E)
- Figure 3.6: Global Ethylene Capacity and Demand (2002-2006P)
- Figure 3.7: Propylene Consumption by End Use (2005)
- Figure 3.8: Propylene Consumption by Region (2005E)
- Figure 3.9: Global Propylene Capacity and Demand (2002-2006P)
- Figure 3.10: Styrene Consumption by End Use (2005E)
- Figure 3.11: Styrene Capacities by Region (2005E)
- Figure 3.12: Global Styrene Capacity and Demand (2002-2006P)
- Figure 3.13: PVC Consumption by End Use (2005E)
- Figure 3.14: PVC Capacities by Region (2004)
- Figure 3.15: Global PVC Capacity and Demand (2002-2006P)
- Figure 3.16: Chlorine Consumption by End Use (2005E)
- Figure 3.17: Chlor Alkali Consumption by Region (2004)
- Figure 3.18: Global Chlor Alkali Capacity and Demand (2002-2006P)
- Figure 3.19: TiO<sub>2</sub> Consumption by End Use (2005E)
- Figure 3.20: TiO<sub>2</sub> Demand by Region (2005E)
- Figure 3.21: Global Specialty & Fine Chemical Market Size (2001-2005E)
- Figure 3.22: Specialty & Fine Chemicals Consumption by Region (2004)
- Figure 3.23: Global Agrochemical & Fertilizer Market Size (2001-2005E)
- Figure 3.24: Agrochemicals & Fertilizers Consumption by Region (2004)
- Figure 3.25: Global Agrochemical Market Size (2001-2005E)
- Figure 3.26: Global Fertilizer Market Size (2001-2005E)
- Figure 3.27: Global Industrial Gases Market Size (2001-2005E)
- Figure 3.28: Global Industrial Gases Consumption by End Use (2004)
- Figure 3.29: Industrial Gases Consumption by Region (2004)
- Figure 3.30: Asian exposure of western companies (2005)
- Figure 4.1: GDP growth rate of major countries Vs global commodity chemicals growth rate (2000-2005\*)
- Figure 4.2: Chemical imports and exports in the US (2002-2005E)
- Figure 4.3: Chemical imports and exports in Japan (2002-2005E)
- Figure 4.4: Chemical imports and exports in China (2002-2005E)
- Figure 5.1: Industrial price of natural gas in the US – 2005

- Figure 5.2: Volatile crude oil prices (WTI) in the US – 2005
- Figure 7.1: The US Chemical Industry Market Size (2001-2005E)
- Figure 7.2: GDP growth Vs Chemical Industry growth in the US (2002-2005E)
- Figure 7.3; The US Chemical Market Segments (2004)
- Figure 7.4: Canada Chemical Industry Market Size (2001-2005E)
- Figure 7.5: GDP Growth Vs Chemical Industry Growth in Canada (2002-2005E)
- Figure 7.6: Canada Chemical Market Segments (2004)
- Figure 7.7: Europe (Excluding UK) Chemical Industry Market Size (2002-2005E)
- Figure 7.8: GDP Growth Vs Chemical Industry Growth in Europe (excluding UK) (2002-2005E)
- Figure 7.9: European Chemical Market Segments (2004)
- Figure 7.10: UK Chemical Industry Market Size (2001-2005E)
- Figure 7.11: GDP Growth Vs Chemical Industry Growth in UK (2002-2005E)
- Figure 7.12: UK Chemical Market Segments (2004)
- Figure 7.13: Japan Chemical Industry Market Size (2001-2005E)
- Figure 7.14: GDP Growth Vs Chemical Industry Growth in Japan (2002-2005E)
- Figure 7.15: Japan Chemical Market Segments (2004)
- Figure 7.16: Brazilian chemical market size and growth - (2001-2005E)
- Figure 7.17: Brazil Chemical industry growth vs GDP (2002-2005)
- Figure 7.18: Brazil Chemicals Market Segment (2005)
- Figure 7.19: Chinese chemical market size and growth - (2001-2005E)
- Figure 7.20: Chemical industry growth Vs GDP growth in China - (2002-2005E)
- Figure 7.21: Segmentation of chemicals - (2004)
- Figure 7.22: Indian chemical market size and growth - (2001-2005E)
- Figure 7.23: Chemical industry growth Vs GDP growth in India - (2002-2005E)
- Figure 7.24: Segmentation of chemicals - (2004)
- Figure 8.1: BASF Revenue by Segment (2004-2005)
- Figure: 8.2: BASF Share Price Movement in 2005
- Figure 8.3: Bayer Revenue by Segment (2004-2005)
- Figure 8.4: Bayer Share Price Movement in 2005
- Figure 8.5: Dow Chemical Revenue by Segment (2004-2005)
- Figure 8.6: Dow Chemical Share Price Movement in 2005
- Figure 8.7: DuPont Revenue by Segment in 2005
- Figure 8.8: DuPont Share Price Movement in 2005
- Figure 8.9: Akzo Nobel Revenue by Segment in 2005
- Figure 8.10: Akzo Nobel Share Price Movement in 2005
- Figure 8.11: Mitsubishi Revenue by Segment in 2005

- Figure 8.12: Lyondell Revenue by Segment in 2005
- Figure 8.13: Lyondell Share Price Movement in 2005
- Figure 8.14: Sumitomo Revenue by Segment in 2005
- Figure 8.15: Mitsui Revenue by Segment in 2005
- Figure 8.16: LG Chemicals Revenue by Segment in 2005
- Figure 8.17: LG Chemicals Share Price Movement in 2005
- Figure 8.18: Degussa Revenue by Segment in 2005
- Figure 8.19: Degussa Share Price Movement in 2005
- Figure 8.20: Royal DSM Revenue by Segment (continued business) in 2005
- Figure 8.21: ICI Chemicals Revenue by Segment in 2005
- Figure 8.22: ICI Chemicals Share Price Movement in 2005
- Figure 8.23: Rohm & Haas Revenue by Segment in 2005
- Figure 8.24: Rohm & Haas Share Price Movement in 2005
- Figure 8.25: Clariant Revenue by Segment in 2005
- Figure 8.26: Clariant Share Price Movement in 2005
- Figure 8.27: Mosaic Revenue by Segment in 2005
- Figure 8.28: Mosaic Share Price Movement in 2005
- Figure 8.29: Syngenta Share Price Movement in 2005
- Figure 8.30: Monsanto Share Price Movement in 2005
- Figure 8.31: Agrium Share Price Movement in 2005
- Figure 8.32: Potash Corp Revenue by Segment in 2005
- Figure 8.33: Potash Corp Share Price Movement in 2005
- Figure 8.34: Air Liquide Revenue by Segment in 2005
- Figure 8.35: Air Liquide Share Price Movement in 2005
- Figure 8.36: Air Products Revenue by Segment in 2005
- Figure 8.37: Air Products Share Price Movement in 2005
- Figure 8.38: Praxair Share Price Movement in 2005
- Figure 8.39: Linde Revenue by Segment in 2005
- Figure 8.40: Lind Share Price Movement in 2005
- Figure 8.41: BOC Revenue by Segment in 2005
- Figure 8.42: BOC Share Price Movement in 2005
- Figure 10.1: Global M&A in Chemical Industry (Deals >25m) (2001-2005)
- Figure 10.2: Total Number of Deals >25m (2001-2005)
- Figure 10.3: Mix of Buyers (2004-2005)
- Figure 10.4: Regional Break-up for number of Deals (2005)
- Figure 11.1: Research spending of 18 major US chemical firms - (2001-2005)

Figure 11.2: Global chemical outsourcing market - (2001-2005)

Figure 11.3: Competitive advantage offered by technology

Figure 12.1: Global chemical production growth rate (y/y) forecast for 2006

Figure 12.2: Global chemical production growth rate forecast (2006-2008)

## LIST OF TABLES

Table 8.1: Annual Result for Major Chemical Companies 2004-05 (All figures in USD billion except per share data)

Table 8.2: Top diversified companies

Table 8.3: Financial highlights of BASF

Table 8.4: Financial highlights of Bayer, 2003-2005

Table 8.5: Financial highlights of Dow Chemicals, 2003-2005

Table 8.6: Financial highlights of DuPont, 2003-2005

Table 8.7: Financial highlights of Akzo Nobel, 2003-2005

Table 8.8: Top Chemical Commodity Companies

Table 8.9: Financial highlights of Mitsubishi Chemicals, 2003-2005

Table 8.10: Financial highlights of Lyondell Chemical, 2003-2005

Table 8.11: Financial highlights of Sumitomo Chemicals, 2003-2005

Table 8.12: Financial highlights of Mitsui Chemical, 2003-2005

Table 8.13: Financial highlights of LG Chemicals, 2003-2005

Table 8.14: Top Companies in speciality and fine chemicals

Table 8.15: Financial highlights of Degussa, 2003-2005

Table 8.16: Financial highlights of Royal DSM, 2003-2005

Table 8.17: Financial highlight of ICI Chemicals, 2003-2005

Table 8.18: Financial highlights of Rohm and Haas, 2003-2005

Table 8.19: Financial highlights of Clariant Chemical, 2003-2005

Table 8.20: Top Companies in Agrochemicals and Fertilizers

Table 8.21: Financial highlights of Mosaic, 2003-2005

Table 8.22: Financial highlights of Syngenta, 2003-2005

Table 8.23: Financial highlights of Monsanto, 2003-2005

Table 8.24: Financial highlights of Agrium, 2003-2005

Table 8.25: Financial highlights of Potash Corp, 2003-2005

Table 8.26: Top companies in Industrial gas

Table 8.27: Financial highlights of Air Liquide, 2003-2005

Table 8.28: Financial highlights of Air Products and Chemicals, 2003-2005

Table 8.29: Financial highlights of Praxair, 2003-2005

Table 8.30: Financial highlights of Linde, 2003-2005

Table 8.31: Financial highlights of BOC Group, 2003-2005

Table 9.1: List of chemicals under Rotterdam Convention - PIC procedure

Table 10.1: Major M & A in the Chemical Industry (2002-2005)

Table 11.1: R&D spending of 10 major companies in the US in 2005