US outlook for

Pigments: Organic, Inorganic & Specialty

with forecasts to 2005 and 2010

New study finds:

• The US market for color pigments (organic, inorganic and specialty) is expected to increase 4.8 percent per annum to $3.5 billion in 2005, with volume exceeding one billion pounds.

• Printing inks will remain the largest market for pigments, as well as recording the fastest growth, boosted by double digit increases for metallic pigments used for packaging and promotional graphics, and for phosphorescent pigments used for anti-forgery, anti-counterfeiting and other security applications.

• Six companies -- Sun Chemical, Ciba Specialty Chemicals, Clariant, Bayer, BASF and Engelhard -- accounted for nearly 50 percent of the total US pigment market in 2000.
Pigments: Organic, Inorganic & Specialty, a new study from The Freedonia Group, provides you with an in-depth analysis of major trends in the industry and the outlook for product segments and major markets -- critical information to help you with strategic planning.

This brochure gives you an indication of the scope, depth and value of Freedonia’s new study, Pigments: Organic, Inorganic & Specialty. Ordering information is included on the back page of the brochure.

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• The US market for color pigments (organic, inorganic and specialty) is expected to increase 4.8 percent per annum to $3.5 billion in 2005, with volume exceeding one billion pounds.

• Color shifting, holographic metallic and glass flake pigments are expected to record the most rapid growth among specialty pigments.

• Organic pigments will record above average growth, spurred by the use of these environmentally acceptable colorants as replacements for heavy metal inorganic pigments. Increases will also be driven by the development of high performance pigments (HPPs) for use in water-based inks, powder coatings and radiation-curable inks and coatings.

• Printing inks will remain the largest market for pigments, as well as recording the fastest growth, boosted by double digit increases for metallic pigments used for packaging and promotional graphics, and for phosphorescent pigments used for anti-forgery, anti-counterfeiting and other security applications.

• Six companies -- Sun Chemical, Ciba Specialty Chemicals, Clariant, Bayer, BASF and Engelhard -- accounted for nearly 50 percent of the total US pigment market in 2000.

* Excluded are white pigments (i.e., titanium dioxide, zinc oxide, etc.) and pigments used for purposes other than coloring, such as raw materials for catalysts, reinforcing additives in raw materials for catalysts, reinforcing additives in rubber and anti-foulant and anti-corrosive additives in coatings.
### Pigment Demand

(million dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>1995</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>00/95</th>
<th>05/00</th>
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<td>Nondurable Goods Shpts (bil 1996$)</td>
<td>1632</td>
<td>1775</td>
<td>1940</td>
<td>2120</td>
<td>1.7</td>
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<tr>
<td>lb pigment/mil $ nondurable</td>
<td>515</td>
<td>515</td>
<td>521</td>
<td>528</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Pigment Demand (mil lb)</td>
<td>840</td>
<td>915</td>
<td>1010</td>
<td>1120</td>
<td>1.7</td>
<td>2.0</td>
</tr>
<tr>
<td>$/lb</td>
<td>2.55</td>
<td>2.99</td>
<td>3.43</td>
<td>3.90</td>
<td>3.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Pigment Demand</td>
<td>2145</td>
<td>2740</td>
<td>3460</td>
<td>4370</td>
<td>5.0</td>
<td>4.8</td>
</tr>
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<td>By Type:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>995</td>
<td>1340</td>
<td>1755</td>
<td>2290</td>
<td>6.1</td>
<td>5.5</td>
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<tr>
<td>Inorganic</td>
<td>879</td>
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<td>1210</td>
<td>1440</td>
<td>3.1</td>
<td>3.4</td>
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<tr>
<td>Specialty</td>
<td>271</td>
<td>375</td>
<td>495</td>
<td>640</td>
<td>6.7</td>
<td>5.7</td>
</tr>
<tr>
<td>By Market:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Printing Inks</td>
<td>586</td>
<td>786</td>
<td>1050</td>
<td>1385</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Paint &amp; Coatings</td>
<td>553</td>
<td>692</td>
<td>862</td>
<td>1085</td>
<td>4.6</td>
<td>4.5</td>
</tr>
<tr>
<td>Plastics</td>
<td>334</td>
<td>416</td>
<td>534</td>
<td>683</td>
<td>4.5</td>
<td>5.1</td>
</tr>
<tr>
<td>Textile &amp; Leather</td>
<td>146</td>
<td>163</td>
<td>184</td>
<td>203</td>
<td>2.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Paper &amp; Paperboard</td>
<td>67</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Other</td>
<td>459</td>
<td>598</td>
<td>729</td>
<td>895</td>
<td>5.4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

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Market Environment & Overview

These Sections discuss factors influencing pigment demand, including the outlook for colorants, and environmental and pricing trends.

This information provides you with an understanding and an analysis of the climate in which the pigment industry operates.

MARKET ENVIRONMENT

Colorant Industry Outlook

The colorant industry consists of both dye and pigment manufacturers. These colorants represent two distinct and separate products which possess different physical and chemical properties, and hence their use involves different application processes. Dyes are applied to a substrate in a soluble form through a process which imparts color via the selective absorption of light. In contrast, organic pigments are particulate organic solids which are insoluble in, and physically and chemically unaffected by, the vehicle or substrate in which they are incorporated. They provide color through either the selective absorption or the scattering of light. For the most part, dyes and organic pigments do not compete against one another, although many of their end uses (e.g., in printing inks) overlap.

Demand for colorants is expected to increase 3.3 percent per year to $4.8 billion in 2005, with volume over the same period forecast to reach 1.5 billion pounds. Market value gains reflect a modest rebound from the slow growth of 1995-2000, supported by improvements in pricing dynamics and a shift in the product mix toward more expensive colorants. Pigments will continue to lead growth, while demand for dyes will remain weak due to heavy reliance on the sluggish textile industry.

Pigment Pricing Trends

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</thead>
<tbody>
<tr>
<td>Pigment Demand (mil lb)</td>
<td>774</td>
<td>840</td>
<td>915</td>
<td>1010</td>
<td>1120</td>
</tr>
<tr>
<td>$/lb</td>
<td>2.24</td>
<td>2.55</td>
<td>2.99</td>
<td>3.43</td>
<td>3.90</td>
</tr>
<tr>
<td>Pigment Demand (mil $)</td>
<td>1735</td>
<td>2145</td>
<td>2740</td>
<td>3460</td>
<td>4370</td>
</tr>
</tbody>
</table>

Selected Pricing ($/lb):

- Pearlescent: 10.90 11.45 12.20 12.80 13.40
- Azo: 6.19 6.44 6.82 7.18 7.50
- Phthalocyanine: 4.18
- Ultramarine: 1.85
- Specialty Carbon Black: 1.34
- Iron Oxide: 0.47 0.48 0.52 0.55 0.58
Pigments by Type

The Organic, Inorganic and Specialty Pigments Sections provide demand for historical years and forecast growth to 2005 and 2010.

This information helps you:

- Analyze your company’s growth potential in the industry.
- Outline your strategic plans for five and ten years out.
- Establish sales goals.

Pearlescent

Demand for pearlescent pigments is projected to expand 5.5 percent yearly to $127 million, or ten million pounds, in 2005. Growth is expected to slow since when pearlescent plastics recorded rapid gains, specialty pigments offering novel optical effects will limit flexibility, growth will be supported by the growing popularity of pearl and luster flop effects in paints and coatings (particularly automotive finishes), printing inks and cosmetics. Development of improved pearlescent pigments offering new colors, greater hiding ability and improved processing characteristics (e.g., dispensability and durability) will also spur demand.

Pearlescent pigments, including nacreous or interference pigments, consist of thin mica or metallic platelets which are coated so as to create iridescent effects, simulate the luster of natural pearls and provide two-color luster flops (color shifts) which change with the viewing angle. Mica-based luster pigments accounted for nearly 90 percent of the US market for pearlescent pigments in 2000 due to their relatively low price, stability and weather resistance. These pigments are also non-toxic. Other commercially important pearlescent pigments include natural pearl (fish silver), lead carbonate and bismuth oxychloride. Recent development efforts have focused on the use of platelet-like graphite, laminar phthalocyanines, flaky iron oxides, silica flakes and thin physical vapor deposition (PVD) films as alternatives to mica in pearlescent pigments. PVD-based pigments display an extreme color flop which is valued in thin film security printing.

For single color formulations, pearlescent mica-based pigments are blended with a transparent color-producing pigment, or combined in a two-layer coating system with one containing the pearlescent pigment and the other containing the color formulation. For more brilliant colors with sharper color flops, mica platelets are coated with a thin layer of titanium oxide or other transparent inorganic or organic colorant. Transparent metal oxide coatings, for example, produce an extreme color flop which is valued in thin film security printing.

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Inorganic Pigment Demand</td>
<td>806</td>
<td>876</td>
<td>1025</td>
<td>1210</td>
<td>1440</td>
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<tr>
<td>% special carbon black</td>
<td>28.3</td>
<td>30.7</td>
<td>30.2</td>
<td>30.4</td>
<td>30.4</td>
</tr>
<tr>
<td>Special Carbon Black Pigment</td>
<td>228</td>
<td>270</td>
<td>310</td>
<td>368</td>
<td>438</td>
</tr>
<tr>
<td>Printing Inks</td>
<td>99</td>
<td>120</td>
<td>138</td>
<td>164</td>
<td>195</td>
</tr>
<tr>
<td>Plastics</td>
<td>72</td>
<td>85</td>
<td>92</td>
<td>114</td>
<td>137</td>
</tr>
<tr>
<td>Paint &amp; Coatings</td>
<td>38</td>
<td>45</td>
<td>52</td>
<td>61</td>
<td>70</td>
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<tr>
<td>Other</td>
<td>19</td>
<td>20</td>
<td>28</td>
<td>29</td>
<td>36</td>
</tr>
<tr>
<td>$/lb</td>
<td>1.34</td>
<td>1.40</td>
<td>1.45</td>
<td>1.52</td>
<td>1.60</td>
</tr>
<tr>
<td>Special Carbon Black (mil lb)</td>
<td>170</td>
<td>193</td>
<td>214</td>
<td>242</td>
<td>274</td>
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</table>

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Demand by Market

The Demand by Market Section analyzes trends and considers the threats and opportunities in each of the major markets for pigments.

The information presented will help you:

- Focus your sales and marketing efforts on high growth areas.
- Propose new areas for development.

Demand for pigments used in cosmetics and toiletries is forecast to advance 5.8 percent per year to $69 million, or 14 million pounds, in 2005. Opportunities will be best for pigments used in special effect color cosmetics to create pearlescent, frosted, glitter, metallic, flip flop, glassy, polymeric and glow-in-the-dark effects. However, gains will be restrained by the popularity of the no-makeup look and the preference among some consumers for products containing a minimum of additives. Competition with dyes will also moderate advances.

Although pigment color additives are a relatively minor component of cosmetics and toiletries in terms of dollar outlays, they provide much of the eye-appeal to which the consumer initially reacts. As a result, pigments are of particular importance in products sold to complement natural skin tones; enhance the appearance of facial features, and finger and toe nails; and add eye-catching optical effects.

### Paper & Paperboard: Pigment Demand (million dollars)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Paper &amp; Paperboard Prdn (mil ton)</td>
<td>80.4</td>
<td>91.4</td>
<td>108.1</td>
<td>118.5</td>
<td></td>
</tr>
<tr>
<td>lb pigments/000 ton paper</td>
<td>162</td>
<td>186</td>
<td>222</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>Paper Pigment (mil lb)</td>
<td>13</td>
<td>17</td>
<td>21</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>$/lb</td>
<td>3.92</td>
<td>3.94</td>
<td>4.05</td>
<td>4.21</td>
<td>4.41</td>
</tr>
<tr>
<td>Paper Pigment Demand Azo</td>
<td>51</td>
<td>67</td>
<td>85</td>
<td>101</td>
<td>119</td>
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<tr>
<td>Phthalocyanine</td>
<td>23</td>
<td>32</td>
<td>39</td>
<td>49</td>
<td>59</td>
</tr>
<tr>
<td>Ultramarine</td>
<td>14</td>
<td>16</td>
<td>19</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% paper &amp; paperboard</td>
<td>2.9</td>
<td>3.1</td>
<td>3.1</td>
<td>2.9</td>
<td>2.7</td>
</tr>
<tr>
<td>Total Pigment Demand</td>
<td>1735</td>
<td>2145</td>
<td>2740</td>
<td>3460</td>
<td>4370</td>
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</table>

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Industry Structure

Gain a better understanding of your competition and analyze your company's position in the industry with information about:

- market share
- competitive strategies
- manufacturing strategies
- marketing & distribution strategies
- mergers & acquisitions
- cooperative agreements
- research & development

Research & Development

Research and development efforts in the pigments industry have largely focused on the development of new products; environmentally acceptable products; and pigment formulations with performance characteristics such as stability, durability, lightfastness and dispersibility. Creating new pigment products that meet the needs of the major pigment markets and opening new pigment markets have also been the focus of much recent research and development activity.

Meeting the needs of pigment consuming industries, such as the printing inks, and paints and coatings markets, often concentrates on keeping up with new technology or creating pigments that offer easier processing attributes. For example, rapid changes in the paints and coatings industry continue to force many pigment manufacturers to expend considerable effort developing high performance pigments with good temperature stability, weather resistance and other performance advantages. For the printing ink market, pigment suppliers strive to produce pigments with better rheology, more gloss, easier flow, improved lightfastness, cleaner colors and other application-specific benefits. Granule-form pigments, such as those introduced by Bayer, Ciba and Clariant, are non-dusting, free-flowing products that also offer easy dispersability, faster throughput and fewer environmental problems.

Many pigment suppliers also perceive an increased demand from markets such as inks, paints and coatings, and plastics for novel effect pigments that will differentiate their products or make products more appealing to consumers. This has spurred many pigment producers to create color-changing, metallic and other special effect pigments in order to supply their customers with pigments that offer novel and striking appearances for such consumer products...
The Profiles Section analyzes 37 companies active in the U.S. pigments market. These profiles represent a sampling or cross-section of the types of companies involved in the industry.

Divisions, subsidiaries, joint ventures, etc., are discussed under appropriate parent companies.

Sources for profiles included:

- Information provided by key staff members in the respective companies
- Annual reports
- 10-K reports
- Security analysts reports
- Corporate product literature

Engelhard Corporation
101 Wood Avenue
Iselin, NJ 08830
732-205-5000
http://www.engelhard.com


Engelhard's Appearance and Performance Technologies segment, which had 2000 sales of $684 million, was created in late 2000 through the combination of Engelhard's former Specialty Pigments and Additives segment and Paper Pigments and Additives segment. Through the enlarged segment, Engelhard offers a range of pigments, specialty films and performance additives designed to provide customers with enhanced image and functionality for their products. The Company's wide range of pigment products include color pigments and dispersions, special effect pigments, and paper pigments and extenders. These colorants are used in such applications as automotive, paints and coatings, inks, packaging, paper, plastics, textiles, and cosmetics and personal care products.

Color Pigments & Dispersions -- Color pigment products offered by the Company include a broad range of organic and inorganic pigments, pigment dispersions and universal colorants that impart color and special effects to automotive finishes, industrial coatings, plastics and inks. Engelhard produces classical, medium and high performance organic pigments marketed under a variety of brand names.

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Companies Profiled

Apollo Colors Incorporated
Allegheny Color
Avecia Group plc
BASF AG
Bayer AG
Cabot Corporation
Ciba Specialty Chemicals Incorporated
Clariant International Limited
Colour-Chem India
Songwon Color
Dainichiseika Color & Chemicals Mfg. Co. Ltd.
Daicor-Pope
Dainippon Ink and Chemicals Incorporated
Sun Chemical
E.ON AG
Creanova Incorporated
Degussa AG
ECKART-Werke GmbH
Elementis plc
Engelhard Corporation
European Colour plc
EC Pigments
Roma Color Incorporated
Fabricolor Incorporated
Ferro Corporation
Flint Ink Corporation
CDR Pigments & Dispersions
Goodrich Corporation
Heubach GmbH
Heucotech Limited
Honeywell International Incorporated
AlliedSignal
JDS Uniphase Incorporated
Flex Products Incorporated
Optical Coatings Laboratory
Johnson Matthey plc
Magruder Color Company Incorporated
Uhlich Color
Merck KGaA
EM Industries Incorporated

Noveon Incorporated
Organic Dyestuffs Corporation
Phelps Dodge Corporation
Columbian Chemicals
PMC Global Incorporated
Plastics Color Corporation
PolyOne Corporation
Geon Company
Hanna (MA) Company
Star Color Company Limited
Rockwood Specialties Incorporated
Davis Colors
Laporte Pigments
RPM Incorporated
Day-Glo Color Corporation
Sensient Technologies Corporation
LCW
Les Colorants Wackherr
Universal Foods
Warner-Jenkinson Company
Sudarshan Chemical Industries Limited
Synalloy Corporation
Blackman Uhler Chemical
Organic Pigments Corporation
US Bronze Powders Incorporated
Makin Metal Powders Limited
Wacker-Chemie GmbH

Pigments: Organic, Inorganic & Specialty #1460

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Freedonia does not just collect and reprint data; Freedonia develops data. Our analysts thoroughly investigate an industry by extensively interviewing key industry participants and analyzing information from sources such as associations, government and trade literature. Once this research is complete, Freedonia establishes one set of forecasts. All writing, editing and forecasting is done in-house to assure quality and consistency. In cases where data does not exist, Freedonia develops the data based on input/output ratios, bills of materials and flow charts. The following chart summarizes Freedonia’s methodology:
The Freedonia Group, Inc. is a leading international industry study/database company.

Since 1985, Freedonia has published over 1,600 titles covering areas such as chemicals, coatings and adhesives, building materials, plastics, industrial components and equipment, health care, packaging, household goods, security, and many other industries.

Freedonia has produced a wide variety of titles, including:

- Dyes & Organic Pigments
- Printing Inks
- Paint & Coating Materials
- Textile Processing & Finishing Chemicals

Because Freedonia is a reliable information source, our forecasts are cited in numerous publications such as *The Wall Street Journal, Coatings World, Chemical Week* and *Purchasing*.

---

**About The Freedonia Group**

**Advantages of Freedonia Reports**

**In-house operations**

Because all of our staff work at the same location, interaction between analysts and departments provides a strong system of checks and balances.

**Consistency**

Our Economics Group develops indicators that are used by all analysts. Therefore, every Freedonia study is based on a consistent set of economic assumptions (colorants demand, consumer spending, nondurable goods shipments, etc.).

**Reliable forecasts**

Because all of our forecasts consider the environment in which a product or industry is operating, as well as threats and opportunities to the market, Freedonia forecasts are reliable indicators of future performance.

**One-on-one interviews**

All studies are produced by conducting interviews with key industry participants and end-users.

**Proprietary electronic database**

Freedonia’s analysts can tap into an extensive in-house electronic database containing corporate literature (including private company information), trade publications, government reports and many other sources of information.

---

*Pigments: Organic, Inorganic & Specialty #1460*  
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About Our Customers

Freedonia’s clients include major US and international companies in the manufacturing, services, consulting and financial sectors.

Typical purchasers of Freedonia studies:

- Key Executives
- Corporate Planners
- Market Researchers
- Financial Analysts
- Information Centers
- New Product Developers
- Merger & Acquisition Specialists

Since 1985 we have provided research to customers ranging in size from global conglomerates to one person consulting firms. More than 90% of the industrial companies in the Fortune 500 use Freedonia research to help with their strategic planning.

Some of Freedonia’s customers in the pigments market include: BASF AG, Cabot Corporation, Dainippon Ink and Chemicals, Engelhard Corporation and Sun Chemical.
Dyes & Organic Pigments
The US market for dyes and organic pigments will reach $3.1 billion in 2005. Organic pigments, having become the dominant segment in 2000, will continue to lead growth. Gains will be led by the development of high performance and other specialty pigments for water-based inks, powder coatings and radiation-curable inks and coatings. This study analyzes the 590 million pound US dyes and organic pigment industry to 2005 and 2010 by type and market. It also presents market share data and profiles key firms.

#1439 . . . . . . . . . 6/01 . . . . . . . . . $3,700

Printing Inks
US demand for printing inks will grow nearly 5% annually. Gains will be driven by a shift to more expensive digital and energy-cured inks which offer printers shorter production times and improved efficiency. Growth will also be supported by demand for inks providing higher quality color printing, particularly in advertising and packaging. This study analyzes the $4.5 billion US printing inks industry to 2004 and 2009 by material, type and market. It also presents market share data and profiles key firms.

#1368 . . . . . . . . . 1/01 . . . . . . . . . $3,600

Paint & Coating Materials: Resins, Pigments & Solvents
US demand for paint and coating materials will approach 11 billion pounds in 2004. Gains will be driven by more environmentally compliant coatings (e.g., water-based, high-solids, powder, radiation-cured) which require higher raw material loadings. Solvent-based paints will remain a major raw material in key heavy duty coating segments. This study analyzes the $6.8 billion US paint and coating materials industry to 2004 and 2009 by type and market. It also evaluates market share and profiles key firms.

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Textile Processing & Finishing Chemicals
Gains in US textile chemicals demand will be led by wrinkle-resistant finishes, fabric softeners and eco-friendly formulations (e.g., waterborne polymers, low-salt dyes, low-formaldehyde finishes, high-fixative colorants). The best markets will include high-performance industrial textiles and medical products, especially value-added nonwovens. This study analyzes the $2.3 billion US textile chemical industry to 2004 and 2009 by type, function and end-use. It also details market shares and profiles key companies.

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Dyes & Organic Pigments
Global dye and organic pigment demand will grow over 5% annually, driven by the organic pigments segment. Dye demand is concentrated in the textile producing countries of Asia, while organic pigment demand remains centered in North America, Western Europe and Japan, where most inks and coatings are produced. This study analyzes the $11 billion organic colorant industry to 2004 and 2009 by type and market in six regions and 20 countries. It also evaluates market shares and profiles key companies.

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Food & Beverage Additives
Food and beverages additives demand in the US will grow over 5% annually. Natural additives will remain a driving force, affecting all segments including flavors, coloring agents and preservatives. The rapid growth of processed and prepared foods, which typically contain relatively high additive contents, will also contribute to demand. This study analyzes the $4 billion US food and beverage additives industry to 2004 and 2009 by product and market. It also profiles key companies and evaluates market shares.

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