New study finds:

- World emulsion polymer demand is forecast to reach 9.9 million metric tons in 2005
- North America and Western Europe accounted for two-thirds of global demand for emulsion polymers in 2000
- The top four suppliers accounted for 27 percent of the emulsion polymers market in 2000
Freedonia Industry Study #1457

World Emulsion Polymers

Study Publication Date: September 2001
Price: $4,600
Pages: 264

World Emulsion Polymers, a new study from The Freedonia Group, provides you with an in-depth analysis of the major trends in the world market for emulsion polymers 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, World Emulsion Polymers. Ordering information is included on the back page of the brochure.

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World emulsion polymer demand is forecast to increase 4.5 percent per year to 9.9 million metric tons in 2005, as the emulsion market continues to outpace growth in the global economy.

Coatings applications, which encompass both paints and paper coatings, will offer the strongest gains as both major segments are forecast to see favorable opportunities.

In paper coatings, emulsion polymers demand will benefit from a continuing shift toward the use of higher end paper with color graphics for advertising, direct mail fliers, catalogs and glossy periodicals.

Demand for emulsion polymers in adhesives will offer favorable though below average gains due to solid demand arising from paper and paper packaging, and tape and label end-use segments.

North America and Western Europe accounted for two-thirds of global demand for emulsion polymers in 2000.

The global market for emulsion polymers was valued at $14.9 billion in 2000, and the top four suppliers -- Rohm and Haas, Dow Chemical, BASF and Air Products and Chemicals -- held 27 percent of the market.
### World Emulsion Polymer Demand by Market & Region

(Thousand metric tons)

<table>
<thead>
<tr>
<th>Item</th>
<th>1990</th>
<th>50</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>00/90</th>
<th>05/00</th>
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<tbody>
<tr>
<td>World GDP (bil US $98$)</td>
<td>27136</td>
<td>36230</td>
<td>43460</td>
<td>52510</td>
<td>2.9</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>kg emulsions/000$ GDP</td>
<td>0.20</td>
<td>0.22</td>
<td>0.23</td>
<td>0.23</td>
<td>--</td>
<td>--</td>
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<td>World Emulsion Polymer Demand</td>
<td>5300</td>
<td>7</td>
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<td></td>
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<td></td>
<td></td>
</tr>
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<td>By Market:</td>
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<td></td>
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</tr>
<tr>
<td>Coatings</td>
<td>2515</td>
<td>4025</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adhesives</td>
<td>1865</td>
<td>2590</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Other Markets</td>
<td>920</td>
<td>136</td>
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<tr>
<td>By Region:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>North America</td>
<td>1775</td>
<td>2654</td>
<td>3200</td>
<td>3940</td>
<td>4.6</td>
<td>4.4</td>
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</tr>
<tr>
<td>Western Europe</td>
<td>1654</td>
<td>2595</td>
<td>3225</td>
<td>3940</td>
<td>2.2</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>866</td>
<td>995</td>
<td>1145</td>
<td>1320</td>
<td>1.2</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Other Asia/Pacific</td>
<td>483</td>
<td>1070</td>
<td>1495</td>
<td>2045</td>
<td>8.3</td>
<td>6.9</td>
<td></td>
</tr>
<tr>
<td>Rest of World</td>
<td>522</td>
<td>661</td>
<td>880</td>
<td>1155</td>
<td>2.4</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>$/kilogram</td>
<td>1.64</td>
<td>1.87</td>
<td>2.02</td>
<td>2.19</td>
<td>1.3</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Emulsion Polymer Demand (mil $)</td>
<td>8675</td>
<td>14895</td>
<td>20050</td>
<td>27000</td>
<td>5.6</td>
<td>6.1</td>
<td></td>
</tr>
</tbody>
</table>

© Copyright by The Freedonia Group, Inc.
Tables and Charts are featured for each region and country. Historical data and forecasts are presented for 1995, 2000, 2005 and 2010.

For each country/region, the following are given:

- Population
- GDP per capita
- Gross Domestic Product

  kg per capita
  kg per 000$ GDP

Emulsion Polymer Demand (000 metric tons)

  By Type:
  - Acrylics
  - Styrene-Butadiene Latex
  - Vinyl Acetate Polymers
  - Other Emulsion Polymers

  By Market:
  - Paints & Coatings
  - Paper & Paperboard Coatings
  - Carpet Backings
  - General Purpose Adhesives
  - Other Markets

  average $/kg
  Emulsion Polymer Demand (mil $)
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World Emulsion Polymers #1457
Market Environment

The Market Environment Section discusses key indicators that drive demand for emulsion polymers, including demographic trends, paper and board trends, and Freedonia’s uniquely developed macroeconomic indicators.

This information provides you with an understanding and an analysis of the climate in which the global emulsion polymers industry operates and helps you build your market strategy to sustain long-term growth.

Emulsion Technology

Emulsion polymerization refers to the polymerization of a monomer or mixture of monomers in an aqueous medium. With this technology, monomer droplets are dispersed in water with the help of an emulsifying agent, usually a synthetic detergent. The detergent forms micelles which contain a small quantity of the monomer and are the initial site of the polymerization process. The resulting product of emulsion polymerization, the latex particles that are suspended in water and stabilized by the detergent, is neutralized to provide extended shelf stability. The latex is typically used directly as an emulsion without separation of the polymer from water and the other components.

Emulsion polymerization is used for the production of latexes that serve as the polymeric base for numerous products, most of which can be broadly classified as either coatings (architectural paints, industrial coatings, paper coatings) or adhesives (general purpose adhesives, white household glue, carpenter’s glue, carpet backing adhesives). Although the physical properties of individual latexes vary depending on numerous parameters, particularly the base polymer and the effects of various additives and fillers, basic characteristics of latex polymers include stability, good flow properties, good film-forming properties and adhesion to substrates, among others. Good film-forming properties are crucial for coating applications, where synthetic latexes form films by fusion of the polymer particles as the water evaporates. For latexes used in applications such as dipped goods, inks and coatings, good flow properties are a primary requirement.

Water-based emulsion polymer latexes represent an environmentally compatible alternative to solvent-based paint and coatings, inks, and adhesives. Latexes are generally quick drying, and have low odor and desirable water cleanup properties.

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Demand by Type & Market

These Sections highlight the key issues that have affected the global emulsion polymers market over the past ten years and summarize contributing growth factors.

This information helps you:

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

World demand for styrene-butadiene latex is forecast to increase 4.6 percent per year to 3.3 million metric tons in 2005. Market value is forecast to rise six percent per year to $5.8 billion in 2005. The market for SB latex will remain close to steady gains in global production levels for high quality coated paper. The market for coated paper is expanding due to greater demand for glossy paper used in advertising fliers, catalogs, magazines and other uses.

In the paper industry, SB latex serves as the primary coating material used for high gloss coated paper and paperboard. Coatings are applied to paper and paperboard to add whiteness, smoothness and brightness, and to improve printing properties. SB latex is used because it offers good gloss levels, low cost and environmental compatibility. Applications for coated paper include high gloss advertising and direct mail fliers, as well as paperboard used in packaging and displays.

Most growth in SB latex paper coatings will occur in developed regions, particularly the US and Europe, but rapid gains also are arising in emerging markets due to the increasing technological sophistication of the advertising and packaging industries.

Order form on last page
These Sections analyze demand trends and consider the threats and opportunities in each country and region.

**India -- Emulsion Polymer Demand**

Demand for emulsion polymers in India is forecast to increase 7.2 percent to 166,000 metric tons in 2005, outpacing real (inflation-adjusted) gains in India's economy. Market value is forecast to increase nearly ten percent per year to $240 million in 2005.

Adhesives will continue to dominate the market, with the largest volume market being vinyl acetate polymers such as polyvinyl acetate and ethylene vinyl acetate. Acrylic-based emulsions, particularly in the paint industry. Most remaining demand consists of SB latex, which is used in paper and paperboard coatings and carpet backing for tufted carpeting.

Demand for emulsion polymers used in the adhesives industry (including general purpose adhesives as well as carpet backings) is forecast to increase 7.2 percent per year to 58,000 metric tons in 2005. Packaging will remain a primary application, with emulsions used in the manufacture of paper and paperboard materials such as folding cartons, cans and drums, paper bags and sacks, envelopes, and tapes and labels. Within the adhesives segment, carpet backings are a relatively minor application, with demand totaling less than 5,000 metric tons per year. Though India is a leading global producer of carpets and rugs, most output is hand woven, not tufted, which means it does not require adhesives. However, demand for carpet backing such as SB latex is rising as India increasingly automates its textile industry.

Demand for emulsion polymers used in coatings markets (including paints as well as paper coatings) is forecast to increase 7.7 percent per year to 58,000 metric tons in 2005. In paints, rising demand will greater production of water-based paints. While latex paints remain a relatively minor component of the country's overall coatings product mix, usage of these materials is rising due to their environmental advantages and good performance. Paper coatings offer favorable gains as production of higher quality coated printing paper rises from a small base.

**Canada -- Suppliers**

Leading suppliers of emulsion polymers in Canada include BASF and Dow Chemical. BASF operates a facility that produces SB latex in Sarnia, Ontario. The plant had a capacity of around 35,000 metric tons per year at the end of 2000. BASF also produces polyvinyl acetate.

Dow Chemical operates a styrene-butadiene latex plant in Varennes, Quebec (annual capacity: 25,000 metric tons per year) which manufactures styrene-butadiene and acrylate latexes for coating and carpet backing. Dow also produces acrylic latexes at a facility in Sarnia, Ontario. The facility previously produced SB latex but was converted to acrylics in the early 1990s. In 2000, Dow Chemical formed Emulsion Systems, a new business unit within Dow's coatings and laminates division. Dow acquired General Latex and Chemical, a Massachusetts-based company that specializes in the manufacture of custom rubber compounds, including SB latex. The company operates a facility in Brampton, Ontario. General Latex and Chemical's custom compounds are designed for the adhesives, automotive, medical, fabric, paper and carpet industries.

Reichhold produces emulsions at facilities in Weston, Ontario and Port Moody, British Columbia. Other suppliers of emulsion polymers in Canada include Air Products and Chemicals (acrylic emulsions and vinyl acetate polymers); Avecia Item 1990.

**Spain - Emulsion Polymer Demand by Type & Market**

(Thousand metric tons)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Population (million)</td>
<td>38.8</td>
<td>39.2</td>
<td>39.3</td>
<td>39.1</td>
<td>38.8</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>13350</td>
<td>14130</td>
<td>16950</td>
<td>19740</td>
<td>22840</td>
</tr>
<tr>
<td>Gross Domestic Product</td>
<td>518</td>
<td>554</td>
<td>666</td>
<td>772</td>
<td>886</td>
</tr>
<tr>
<td>kg per capita</td>
<td>2.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg per 000$ GDP</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
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</table>

**Emulsion Polymer Demand**

<table>
<thead>
<tr>
<th>By Type:</th>
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<th>1995</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
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<tr>
<td>Acrylics</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Styrene-Butadiene Latex</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Vinyl Acetate Polymers</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other Emulsion Polymers</td>
<td>13</td>
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<tr>
<td>Paints &amp; Coatings</td>
<td>26</td>
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<td>Paper &amp; Paperboard Coatings</td>
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<td>Other Markets</td>
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</tr>
<tr>
<td>population S/kg</td>
<td>1.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emulsion Polymer Demand (mil $)</td>
<td>144</td>
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<td></td>
<td></td>
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</tbody>
</table>
Industry Structure

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

- market share
- mergers & acquisitions
- industry restructuring
- competitive strategies
- research & development
- distribution

Competitive Strategies

Emulsion polymer producers utilize a number of competitive strategies including low cost leadership, product differentiation and market segmentation. Vertical integration into chemical and polymer feedstocks also comes into play as a means of reducing costs and improving competitiveness. Low cost leadership strategies assume that lowering production costs creates an advantage for a given producer. This is particularly true in industries such as styrene-butadiene latex where there is considerable price sensitivity. In addition, the manufacture of styrene-butadiene latex is a capital-intensive business, and as such the reduction of production costs is one of the few ways for producers to increase their price competitiveness.

Vertical integration allows a significant reduction in manufacturing costs. For example, Dow Chemical and BASF are vertically integrated manufacturers of styrene, a leading feedstock for styrene-butadiene latex, thus ensuring a steady and competitively priced source of raw materials.

Focus or market segmentation strategies are widely employed in the emulsion polymer industry, and involve dividing the overall market into various segments, designing specific products for these target segments and then focusing marketing and sales efforts on these segments. Nearly all suppliers of emulsion polymers follow this strategy to the extent that they tend to focus primarily on one family of emulsions.

For example, Dow is heavily focused on styrene-butadiene latex, an outgrowth of the company’s strong position in styrene monomer, the feedstock for these materials. Rohm and Haas is a leading acrylic emulsion producer and is back integrated into acrylic acid production. BASF focuses on both SB latex and...
Company Profiles

The Profiles Section analyzes 33 companies active in the world emulsion polymers industry. 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

Avecia
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United Kingdom
44-161-740-1460
http://www.avecia.com

Avecia Incorporated
1405 Foulk Road
Wilmington, DE 19850
302-477-8000

Avecia is owned by the financial investment companies Cinven Limited (United Kingdom) and Investcorp (United Kingdom). The Company operates through five segments: Fine Chemicals, Electronic Materials, Specialty Products, NeoResins and Stahl Group. In the US, the Company operates through Avecia Incorporated. In 2000, Avecia had sales of $1.1 billion. The privately-held company employs about 4,800.

The Company participates in the emulsion polymers industry through its $252 million NeoResins segment. Headquartered in Waalwijk, the Netherlands, NeoResins develops, manufactures and markets water-based, or emulsified, resins for use as binders or additives in paints and coatings, printing inks, varnishes, adhesives, sealants and other products. Products include NEOCRYL specialty acrylic emulsions, NEOREZ waterborne urethane dispersions, NEOPAC urethane acrylic copolymer dispersions and HALOFLEX vinyl acrylic terpolymer emulsions. As of 2001, NeoResins had sales and production locations in Waalwijk, the Netherlands; Frankfurt, Germany; Barcelona, Spain; Wilmington, Massachusetts; Frankfort, Indiana; Brantford, Ontario, Canada; Sao Paulo, Brazil; Toluca, Mexico;
Companies Profiled

Air Products and Chemicals Incorporated
Air Products Polymers LP
Wacker Polymer Systems
Arch Chemicals Incorporated
Hickson International
Asahi Kasei Corporation
Aveca
Avery Dennison Corporation
BASF AG
Borden Incorporated
Cytec Industries Incorporated
Dainippon Ink and Chemicals Incorporated
Reichhold
Dow Chemical Company
  Arabian Chemical Company
  Buna Sow Leuna Olefinverbund
  General Latex and Chemical
  Shanghai Petrochemical Union Carbide
  Emulsion Systems Company
  Siam Synthetic Latex
  Union Carbide Corporation
Dow Corning Corporation
Eastman Chemical Company
  ABCO Industries
  Lawter International
  McWhorter Technologies
ENI SpA
Gantrade Corporation
  Ameripol Synpol Corporation
  Mallard Creek Polymers
Goodrich Corporation
Henkel KGaA
  Loctite Corporation
Imperial Chemical Industries plc
  National Starch and Chemical Company
  Vinamul Polymers
Johnson (SC) & Son Incorporated
JSR Corporation
Minnesota Mining and Manufacturing Company
Noveon Incorporated
  Goodrich (BF) Performance Materials

OMNOVA Solutions Incorporated
PolymerLatex GmbH & Company KG
  Eka PolymerLatex
PolyOne Corporation
  Geon Company
  Hanna (MA) Company
  Harwick Chemical Corporation
  Oxy Vinlys LP
Raisio Group
  Latexia SA
Rhodia SA
  Latexia SA
Rohm and Haas Company
Solutia Incorporated
  Vianova Resins GmbH
Total Fina Elf SA
  American Acryl
  Atofina
  Elf Aquitaine
UCB SA
  Valspar Corporation
  Engineered Polymer Solutions
Wacker-Chemie GmbH
  Air Products Polymers LP
  Wacker Polymer Systems
Zeon Corporation

World Emulsion Polymers #1457

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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.

**Forecasting Methodology**

Freedonia Economics Group

Consistent framework of indicators on . . .
- Paperboard Production
- Gross Domestic Product
- World Population
  . . . and many others

Freedonia In-house Research

- Quantitative forecasting
- Industry structure & market share analyses
- Product analyses & forecasts

Methodology for World Emulsion Polymers

Extensive Interviews
- Key participants
- Industry experts
- End-users

Proprietary Electronic Database
- Trade publications
- Government reports
- Corporate literature
- Online databases
  . . . and many others
About The Freedonia Group

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

Freedonia has produced a wide variety of titles, including:

- **Automotive Coatings, Sealants & Adhesives**
- **Powder Coatings**
- **World Paints & Coatings**
- **Emulsion Polymers**

Because Freedonia is a reliable information source, our forecasts are cited in numerous publications such as *The Wall Street Journal*, *Coatings World*, and *Adhesives & Sealants Newsletter*.

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 (GDP, world population, paper and paperboard production, 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.

Order form on last page
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
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