ChemQuest Group, Inc., a management consulting firm located in Cincinnati, OH, forecasts sales of resins for the U.S. coatings market to grow at an average of 3.1% per year to 4.1 billion pounds in 2006. The demand for acrylics and vinyls in architectural coatings remains and this group of resins will continue to experience above average growth and maintain its leading sales position. The use of epoxy resins for industrial maintenance and e-coat applications will also continue to grow, while alkyds will see a further decline in sales with the ongoing shift away from solventborne coatings.

As the shift to waterborne coatings continues in response to increasing environmental regulations, the ChemQuest Group sees an increased struggle for manufacturers to develop resins that meet the performance levels required for heavy industrial maintenance. The long-term trend is to reduce volatile organic compounds (VOCs) to 50 gms/liter. At the same time, there is a trend toward the use of higher performance resins such as polyurethanes, notes Mr. Brown.

Higher raw material and energy costs, increasing environmental regulations, and a demand for improved performance from customers are challenges facing suppliers of resins for the coatings market. The industry will also need to experience consolidation and globalization. Overall growth will remain at a very moderate rate for several years to come. Resins for solvent-vent coatings (waterborne, powder, UV) and higher performing resins such as polyurethanes offer the greatest potential for the future.

According to Steven Nerlfi of Kununig, Nerlfi & Growney, a market research firm, 4.66 billion pounds of vehicle (resin plus e-coat) valued at $4.5 billion in 2002 increased struggle for manufacturers to develop resins that meet the performance levels required for heavy industrial maintenance.

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U.S. Coatings Market

| Class/Resin             | 2002 Lbs Resin | 2007 Lbs Resin | % AGR  
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>All Urethanes</td>
<td>306.4</td>
<td>359.1</td>
<td>3.20%</td>
</tr>
<tr>
<td>All Polyesters</td>
<td>308.9</td>
<td>359.1</td>
<td>3.20%</td>
</tr>
<tr>
<td>All Polyurethanes</td>
<td>308</td>
<td>359.1</td>
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</tr>
<tr>
<td>All Vinyls</td>
<td>529.1</td>
<td>650.0</td>
<td>2.40%</td>
</tr>
<tr>
<td>Ca Sulph</td>
<td>9</td>
<td>5</td>
<td>-40%</td>
</tr>
<tr>
<td>Cellulosic</td>
<td>32.4</td>
<td>31.4</td>
<td>-0.60%</td>
</tr>
<tr>
<td>Chlor Rubber</td>
<td>-4.3</td>
<td>3.3</td>
<td>5.00%</td>
</tr>
<tr>
<td>Flospolymer</td>
<td>0.3</td>
<td>0.4</td>
<td>3.10%</td>
</tr>
<tr>
<td>Iron Zn</td>
<td>15.3</td>
<td>16.2</td>
<td>7.00%</td>
</tr>
<tr>
<td>All Vinyls</td>
<td>529.1</td>
<td>650.0</td>
<td>2.40%</td>
</tr>
<tr>
<td>All Acryls</td>
<td>1,209.5</td>
<td>1,453.5</td>
<td>3.50%</td>
</tr>
<tr>
<td>All Epoxies</td>
<td>641.5</td>
<td>524.4</td>
<td>3.50%</td>
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Aliphatic resins for the coatings market today. Henry Bunch, business director, Engineered Polymer Solutions/Color Corporation of America (EPC/CSC) notes Ozone Transport Commission (OTC) regulations coming in the northeastern U.S. and the need for maintaining product performance at the lower VOC levels are of most importance. He also notes that drivers in the Industrial market are the hazardous air pollutant (HAP’s) regulations and maximum incremental reactivity (MIR) compliance for aerosols, again, without sacrificing performance.

Waterborne technologies continue to increase in popularity as the EPA pushes through tighter VOC regulations and resin manufacturers respond with higher performance products, adds Wolfgang Regele, Vice President of product management for Reichhold. “Step-change technology is a big focus, at least for Reichhold. We are offering new waterborne alkyds as a technology bridge for those formulators and end-users reluctant to abandon conventional technologies,” he notes.

“Vinyl acetate/ethylene (VAE) emulsions will be a key technology to introduce the emissions-free concept to the entire European paint industry,” says Diana Penninger, director of strategic marketing for Celanese Emulsions. In these emulsions, water replaces the function of plasticizers (hydroplastification), but the emulsions maintain the same degree of processability and quality, such as wear resistance, as emulsions based on solvents and plasticizers.

“We see the new environmental regulations that address VOCs as outstanding opportunities for Surface Specialties to address the needs of our customers in the automotive, architectural and industrial segments,” says Terry Scoville, market manager for liquid coating resins—Americas, of Surface Specialties UCB. Reduced cost, solvent-free and reduced-VOC, and improved durability properties for construction and transportation coatings also provide large growth opportunities for innovative technologies, according to Chuck Reardon, Dow polyurethanes global business development manager, Rigid and CASE (coatings, adhesives, sealants, and elastomers).

In the polyurethane resins market segment, customer demands, created by unmet consumer needs, is the factor initiating new technologies, says Mr. Reardon. "Customers gravitate toward the technology leaders in initiating new technologies, says Mr. Reardon.

For powder coatings, resin manufacturers are continuing to focus on technologies for thinner films and low-temperature cure applications to reduce applied costs and offer powder coating technology to popular heat-sensitive substrates such as medium-density fiberboard (MDF), notes Mr. Regele.

UV cure coatings are also gaining interest. “The trend towards UV/Er cure coatings continues to gain momentum as more and more formulators recognize the incredible performance—not to mention environmental—benefit of the technology,” says Dr. Gary Cebula, vice president of technology for Sartomer Company. "In fact, a recent study reported that industrial coatings alone account for 47% of all UV/Er-cure applications. "We expect that number to keep climbing over the next 10 years and beyond, particularly as VOC regulations become increasingly stringent," he adds. Composites formulators are also finding that UV-cure coatings can
enable compliance with VOC mandates, and Sartomer anticipates a period of significant growth in this application.

"Many innovations in the architectural coatings market will focus on offering performance improvements such as better washability, block resistance, gloss, exterior durability, and application properties," says Graves Clayton, market manager for architectural coatings, UCA Emulsion Systems, a business unit of The Dow Chemical Co.

Other general trends in the resins market include a move from vinyl to acrylic to 100% acrylic resins for interior walls, a desire for lower odor interior paints, and an increased use of color for decorating, according to J.R. Rusty Johnson, marketing manager, architectural binders, with Rohm and Haas.

Resins producers must also contend with increasing raw material and energy prices. "With higher prices dominating the market, raw material manufacturers will reinvest," notes Mr. Bunch.

"However, there is a lag before that capacity will affect the market and we would anticipate generally higher costs to persist through the majority of 2004," he adds.

"There is an intense competition, based not on technical expertise but on prices," notes Wilfried Roberts, vice president of precoated metal for Degussa.

JCT CoatingsTech
January 2004
www.coatingstech.org

Leading Suppliers of Resins for the Coatings Market

Air Products and Chemicals, Inc.
Akzo Nobel
Aviex
BASF
Bayer
Celanese
Degussa
Dow/UCCL
DSM
EPS/CAPA
Eastman
Huntman
Novenon
Reichhold
Resolution Performance Products
Rhodia
Rohm and Haas Company
Sartomer Company
SC Johnson
Surface Specialties UCB
Th相信

Consolidation of resin producers has also been occurring. Some examples include Dow’s purchase of the acrylic monomers business of Celanese. UCB’s acquisition of Solutia’s resins business, and the sale of Crompton’s OSI unit to General Electric.

"In response to overcapacity in the market, which has resulted in severe margin erosion, we’re seeing some significant players selling off portions of their business in an effort to remain competitive," says Reichhold’s Mr. Brown. "We recently combined our former composites and coatings divisions into one business built around key end-to-end processes to better align our resources and support all of our customers needs more effectively and efficiently," he adds.

With the acquisition of Celanese’s acrylics business, Dow will position its current resin products into a complete, integrated acrylic acid chain. According to Celanese, the sale allows the company to maintain a reliable source of supply for its emulsions business in Europe and fulfill its strategic commitment to a more focused portfolio.

In addition to its purchase of Solutia’s resins, additives and adhesives, UCB also acquired the graphic arts business from Air Products in the first quarter of 2003 and merged its film and chemical sectors to create the new company.

Surface Specialties, Inc. Surface Specialties gained technology for liquid coating resins (including waterborne and high-solids). technical resins, additives, and adhesives for high-end industrial coating applications with the Solutia purchase.

The Air Products acquisition provides Surface Specialties with innovative liquid resins, including waterborne emulsion and solid acrylics for graphic arts applications.

Crompton continues to actively focus on its world-wide polymer resins business. "Formulation additives from GE/OSI are still recommended by Crompton for optimum performance in numerous end-use applications," notes Andy Lock, worldwide market manager for Crompton’s Wicobond polyurethane dispersions business.

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A leading Japanese supplier of specialty polyamide resins and epoxy curing agents with operations near Tokyo, Japan, and in Singapore. "Sanwa will be of great assistance in gaining greater access to the important Japanese and Asian markets," says John E. McCabe, vice president and general manager, performance materials for Air Products.

Akzo Nobel is a global supplier of solventborne, waterborne, UV, and powder resins for coatings and construction applications and offers alkyds, polysteres, acrylics, and melamines. The company has placed the Sanwa Acquisition with its subsidiary Eternit expects to find a buyer sometime in 2004.

The NeoResins business unit of A concede offers waterborne technologies such as acrylic emulsions and polyurethane dispersions for application in water-based coatings and water-based printing inks.

Market Update

Crompton’s Adiprene®/Vibranthate cast urethane propellants and Witcobond polyurethane dispersions business.

Both Akzo Nobel and Eastman Chemical have announced that they are planning to divest their resins businesses. Akzo is to sell its coatings resins business and two other businesses from its chemical portfolio “to create value by moving towards a more consistent portfolio of businesses,” according to Chairman of the Board of Management Hans Wijers. The company expects to close a deal some time in 2004.

Eastman has identified several product lines in its coatings, adhesives, specialty polymers, and inks segment (CASPI) that are performing below acceptable financial levels. (saturated polyester resins), liquid and powder resins, inks and graphic arts raw materials, and textile chemicals. Possible actions include restructuring, divestiture and consolidation.

Source:  Kusumgar, Nerfi & Growney

A first quarter of 2003

Crompton’s OSI unit to General Electric.

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Air Products and Chemicals, Inc. is a global supplier of curing agents, modifiers, and specialty resins. The main uses for these products are in adhesives, civil engineering and construction, and automotive. Air Products and Chemicals, Inc. Crompton is also focusing on growing its urethanes business through globalization efforts that include the placement of technical and market development personnel around the world, says Jeff Gault, worldwide market manager for Crompton’s Wicobond polyurethane dispersions business.

Resins — Supplier Round Up

Source:  Kusumgar, Nerfi & Growney

Air Products and Chemicals, Inc.
Akzo Nobel
Aviex
BASF
Bayer
Celanese
Degussa
Dow/UCCL
DSM
EPS/CAPA
Eastman
Huntman
Novenon
Reichhold
Resolution Performance Products
Rhodia
Rohm and Haas Company
Sartomer Company
SC Johnson
Surface Specialties UCB
Th

Source:  Kusumgar, Nerfi & Growney

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In July 2003, NeoResins entered into an agreement with Indulor Chemie (Germany) and Indulor AG (Zug, Switzerland) to distribute Indulex solid resins and Induprint solutions of these resins in the Americas and the Asia-Pacific region.

The company has also introduced several new resins in the Americas including NeoRes R 9627 and NeoCryl JCA-110 floor coating resins, NeoCryl XK-98 decorative coating resin, NeoCryl A-662, NeoCryl A-6115 and NeoCryl R-1000 automotive and plastic coating resins; and NeoCryl A-608 metal coating resins. Aecia has also introduced a broad range of coating products in Europe and Asia.

• BASF offers epoxy, acrylic, poly- ester, vinyl and polyvinyl ethers, amino resins, polyurethane and alkyd resins, acrylates, oils, alcohols, amino resins, polyurethane resins and technologies that will encourage the 'fusion' of BASF’s resins with Degussa.

• Celenese offers vinyl acetate monomer, emulsions, polyvinylalcohol, solvents, intermediates, and polymers to the coatings industry.

Recently, Celenese’s Ticona business launched GUR-MicroPowders, ultra-high molecular weight polyethylene (PE-UHMW), for use as additives in coatings, polymers, and adhesives that will be exposed to significant wear, corrosive media, abrasive, and impact stresses. Due to GUR's unique toughness, this micro-powder considerably improves abrasion and scratch resistance, as well as mechanical properties.

In July 2003, Crompton sold its OSI Spezialchemikalien (isolinate and urethane additives business) to General Electric in exchange for $645 million in cash plus GE's plastics additives business and $105-250 million in quarterly "earn-out" payments. Crompton used the proceeds to reduce debt and increase sales of its polymer additives business. Both Crompton and GE continue their commitment to the coatings market even though they now own separate operations.

• Degussa’s resins business includes polyurethane dispersions and specialty resins (synthetic, adhesion, and polybutadiene resins) for improving the adhesion, flow, and corrosion resistance characteristics of coatings. The crosslinkers business offers isocyanates and blocked isocyanates for light- and weather resistant polyurethane coatings as well as raw materials for powder coatings. The Coatings & Colorants Business Unit of Degussa plans to build a colorant and colorant manufacturing facility for producing coating polyesters at its Degussa Chemicals (Shanghai) Co. Ltd. facility. The plant will manufacture high-quality product solutions for the Chinese paint and coatings market.

• The Dow Chemical Company has several different businesses that offer resins to the coatings industry. The epoxy products and intermediates (EIPI) business at Dow produces liquid, solid, flexible, and laminated epoxy resins; epoxy novolacs; epoxy hardeners; and a line of acrylonitrile butadiene styrene (ABS) resins. Dow produces many raw materials used in the production of these resins.

• In the epoxy business, Dow is committing resources toward developing resins and technologies that will help customers develop more compliant coatings, “says Mr. Merino. In particular, Dow is working on the development of waterborne epoxy resins, high-solid content liquid epoxy resins, solid epoxy resins for powder coatings, and epoxy and polyurethane acrylates for UV-cure applications.

• XZ 9251.0 is an epoxy-acrylate resin with a very low viscosity that requires a significantly less diluent for adhesives and coatings. Dow Dispersion Technology is a proprietary new tech- nology used to produce extremely uniform and shelf-stable, waterborne UV dispersions. A new 41,000 MT/year converted polyurethane dispersions plant and a manufacturing facility have also announced that it intends to expand the facility to include an 80,000 MT/year liquid epoxy resin production facility but has delayed the expansion until market conditions improve. Phil Cook, Dow EIPI vice president emphasizes that this is a delay and not a cancellation.

• Crompton Corporation’s Witcobond aqueous polyurethane dis- persions business offers a full product line of waterborne grades used in coating applications. The company introduced two new solvent-free products: Witcobond W-281A, a 40% solids-aliphatic polyurethane adhesive, and Witcobond W-2901HC, a high solids (62%) waterborne polyurethane dis- persion. W-281F exhibits high-cohesive strength and can be laminating adhesive for PVC to a variety of substrates as well as for laminating fabrics to TPUs (thermoplastic polyurethanes). W-281F is also suitable for formulation in plastic and leather coatings, particu- larly for post-applied applications. W-2901HC offers outstanding yellowing resistance when subjected to end-use processing at temperatures as high as 140°C. It is particularly suitable for applications in plastic coating, textile coating, fiberglass sizing, and PVC laminating.

• The Dow Chemical Company offers epoxy, acrylic, polyurethane, and solvent coatings. Dow has begun production of a new polyester coating, fiberglass sizing, and PVC lamina- foring resistance when subjected to end-use processing at temperatures as high as 140°C. It is particularly suitable for applications in plastic coating, textile coating, fiberglass sizing, and PVC laminating.

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Investing in R&D is not only critical these days, but is imperative for creating new solutions for the customer and therefore is essential for future business.

Polymers and solventborne resins for the coatings market. Its polymers are used in a wide range of interior and exterior architectural coatings and industrial applications. Rohm and Haas introduced several new resins recently. Designed for use in the lower VOC concrete sealer/paint markets, Paraloid B-85-100% resin offers minimum application solids of 25% and viscosity suitability for application with standard low-shear tank mixing equipment. It is also suitable for general metal applications, plastics coating uses, plastics coatings, and as a leatoned (in combination with nitrocellulose) resin in gravure inks. Rohpex HG-700 100% acrylic am- bient crossing emulsion polymer is the company’s new offering for VOC- controlling applications with fast drying enam- els. Rohpex EC-1814 100% acrylic polymer emulsion for elastomeric wall coatings of fers an excellent balance of elongation, tensile strength, and tear pick-up resistance over a wide temperature range. Rohpex 5G-30 100% is designed to meet the needs of new regula- tions for 150 g/L VOC semi-interior, exterior architectural paints while maintaining key properties of conven- tional products.

“Rohm and Haas continues to develop binder and additive solutions that are essential in reducing re- duced VOC regulations,” says Mr. Johnson. Additional new products will be announced in the future.

Sartomer Company offers low molecular weight resins, functionalized and hydroxyl-terminated polybutadi- ene oligomers, modified acrylic resins, and oligomers. Their products find applications in powder coatings, over- print varnishes, pigment preparations, waterborne coatings, UV-cure coatings, metal and concrete coatings and UV/EB, two-part epoxy and per- oxide-cure coatings, and alkyd resin- based marine coatings.

Recently Sartomer introduced three new products: CNJ/50, a polyester acrylate oligomer for UV/EB adhesives, coatings, and inks; Q310: a thylene acrylate oligomer for UV/EB coatings (metal and plastic) and inks; and CN2258, a polyester acrylate oligomer for UV wood coatings.

Failure Analysis of Paints and Coatings
Dwight D. Weldon

Failure Analysis of Paints and Coatings describes the causes and cues of common surface appearance problems and practical guidelines for the prevention and solution of defects and problems. Weldon has devoted this book entirely to failure analysis. It deals with field and laboratory methods, both analytical and physical, involved in determining the causes of premature paint and coatings failures in commercial and industrial areas. Published by Wiley, it includes practical examples to show both the thought processes behind such investigations and how the individual techniques can be applied.

Market Update

Two books to help identify defects, reveal causes and formulate action plans.

Orders are being accepted on Soap surfactants in coatings. A new informational paper will be published in July 2004.