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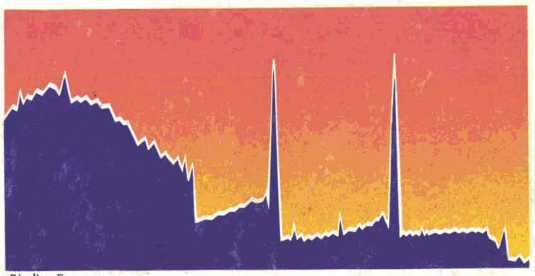
September 1990



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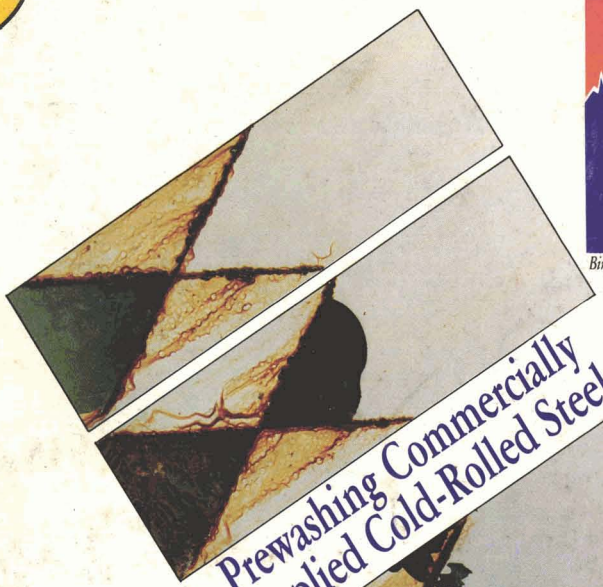
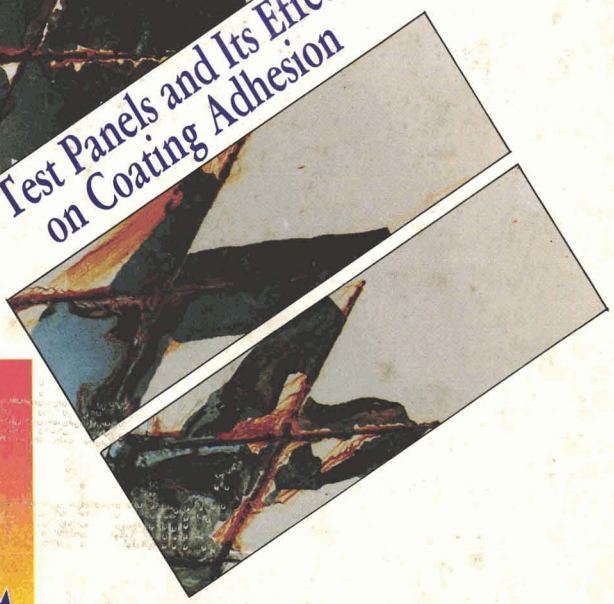
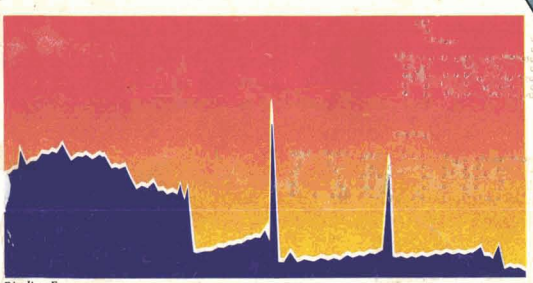


Prewashing Commercially Supplied Cold-Rolled Steel

Test Panels and Its Effect on Coating Adhesion





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SEPTEMBER 1990

jct JOURNAL OF COATINGS TECHNOLOGY

VOLUME 62 NUMBER 788

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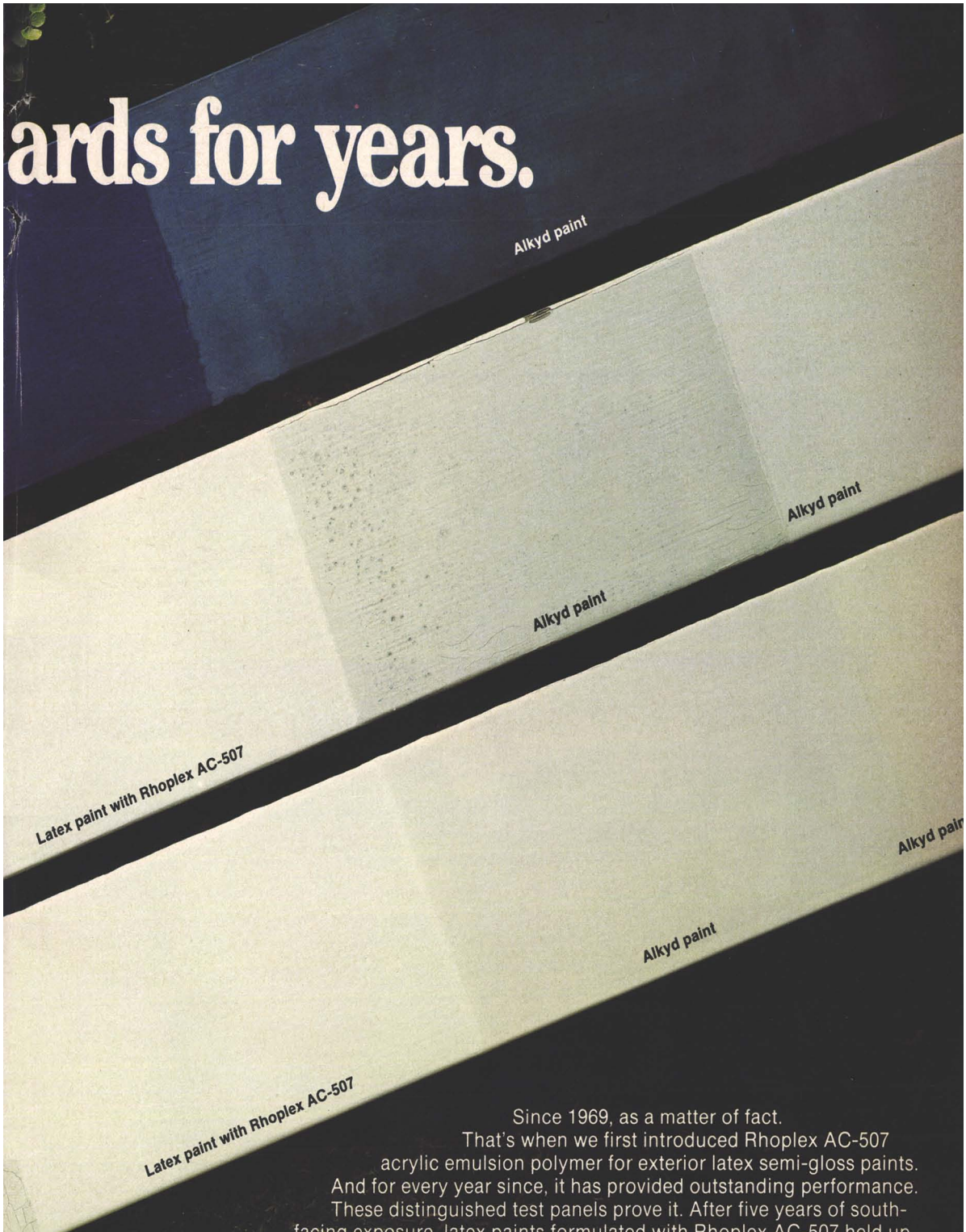

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Comment

Travelling Through Time

Many years ago, H.G. Wells explored the intriguing theory that, with proper scientific knowledge, the barriers imposed by time could be broken and travel through time could be possible. His book, "The Time Machine," is by no means the only reference to this concept. It seems that each summer sees the release of yet another "time travel" movie in which heroes (and even villains) climb aboard a specially converted vehicle (be it automobile or phone booth) and take off for times future—or past!

Imagine having access to such a contraption. (*The Federation has many resources, but, unfortunately, a time machine isn't one of them.*) Our destination: the Mayflower Hotel, Washington, D.C., November 11, 1932. There we could witness the events surrounding the first Paint Industries' Show. The Chairman of this premiere event, Mr. F.S. Atwood, announces, "There are 25 exhibitors at this convention & exhibit and it is anticipated that this will become an increasingly popular feature."

Of course, Mr. Wood doesn't know his words are prophetic. The Paint Show has grown into an international event, attracting visitors worldwide to its displays of raw materials, production equipment, and services to the paint and coatings industry. (*Some examples of the Annual Meeting and Paint Show in times past can be seen in the photographs on page 44.*)

We set our time controls to arrive in Washington just a little later that century: at the Washington Convention Center, on October 29, 1990. Here we become part of a much larger event—the 55th Paint Industries' Show and the 68th Annual Meeting of the Federation. With over 270 exhibitors occupying over 84,000 square feet of space, and over 60 technical presentations on varied topics of interest to the industry, a much greater amount of time will be required to experience it all.

Of course, you are all invited to join us. Details on the Annual Meeting and Paint Show are contained in this issue, beginning on page 21. Make your plans today—the future is just around the corner!

Patricia D. Viola

Patricia D. Viola,
Editor

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Abstracts of Papers in This Issue

PREWASHING COMMERCIALLY SUPPLIED COLD-ROLLED STEEL TEST PANELS AND ITS EFFECT ON COATING ADHESION—B.S. Skerry et al.

Journal of Coatings Technology, 62, No. 788, 55 (Sept. 1990)

The present study investigates whether precleaning commercially available cold-rolled steel test panels affects the adhesion and subsequent performance characteristics of coatings applied to them. X-Ray Photoelectron Spectroscopy (XPS) identified nitrogen containing species on the surface of the panels "as received" and confirmed that these could be removed by a simple cleaning procedure. Differences in adhesion characteristics before and after humidity and salt spray exposures were obtained for three organic coatings depending on whether they were applied to prewashed or untreated panels.

HIGH PERFORMANCE EPOXY RESINS FOR CONTAINER COATING APPLICATIONS BASED ON *IN-SITU* ADVANCEMENT TECHNOLOGY—R.C. Whiteside et al.

Journal of Coatings Technology, 62, No. 788, 61 (Sept. 1990)

Industry trends toward higher performance in container coating applications have shown a need for properties characteristic of high molecular weight phenoxy resins. The advantages of phenoxy resins include enhanced flexibility, toughness, and outstanding chemical and solvent resistance. Most disadvantages are related to the high viscosity of these high molecular weight resins. The high viscosity of these resins results in a higher solvent requirement to obtain suitable application viscosity. The increased solvent demand can also make it difficult to control film thickness. Because of the high viscosity, phenoxy resins often require higher bake temperatures and longer bake times than epoxy resins to obtain good adhesion. High performance experimental epoxy resins have been prepared which offer performance at much lower viscosity. In addition to performance characteristics of a phenoxy resin, these experimental resins also exhibit lower solvent demand, lower viscosity, improved wettability, higher solvent resistance, and outstanding flexibility.

See page 21 for Annual Meeting Preliminary Program

STUDIES ON THE SEQUENTIAL ADSORPTION OF ALKYD RESIN ON ANATASE TiO_2 AND IRON POWDER—R. Janardhan et al.

Journal of Coatings Technology, 62, No. 788, 69 (Sept. 1990)

Studies on sequential adsorption have been carried out with an alkyd resin as adsorbate and anatase TiO_2 and iron powder as adsorbents at two different concentrations. Two sets of experiments were performed: in the first set, the alkyd solution was first equilibrated with a pigment and subsequently the supernatant solution was equilibrated with iron powder in a mineral spirit-xylene (1:1 v/v) solvent system, which was selected on the basis of a resin-solvent interaction parameter (χ); in the second set of experiments this order was reversed. After each equilibration, the supernatant solution was analyzed by size exclusion chromatography to determine the type of molecular species preferentially adsorbed on the pigment and iron powder.

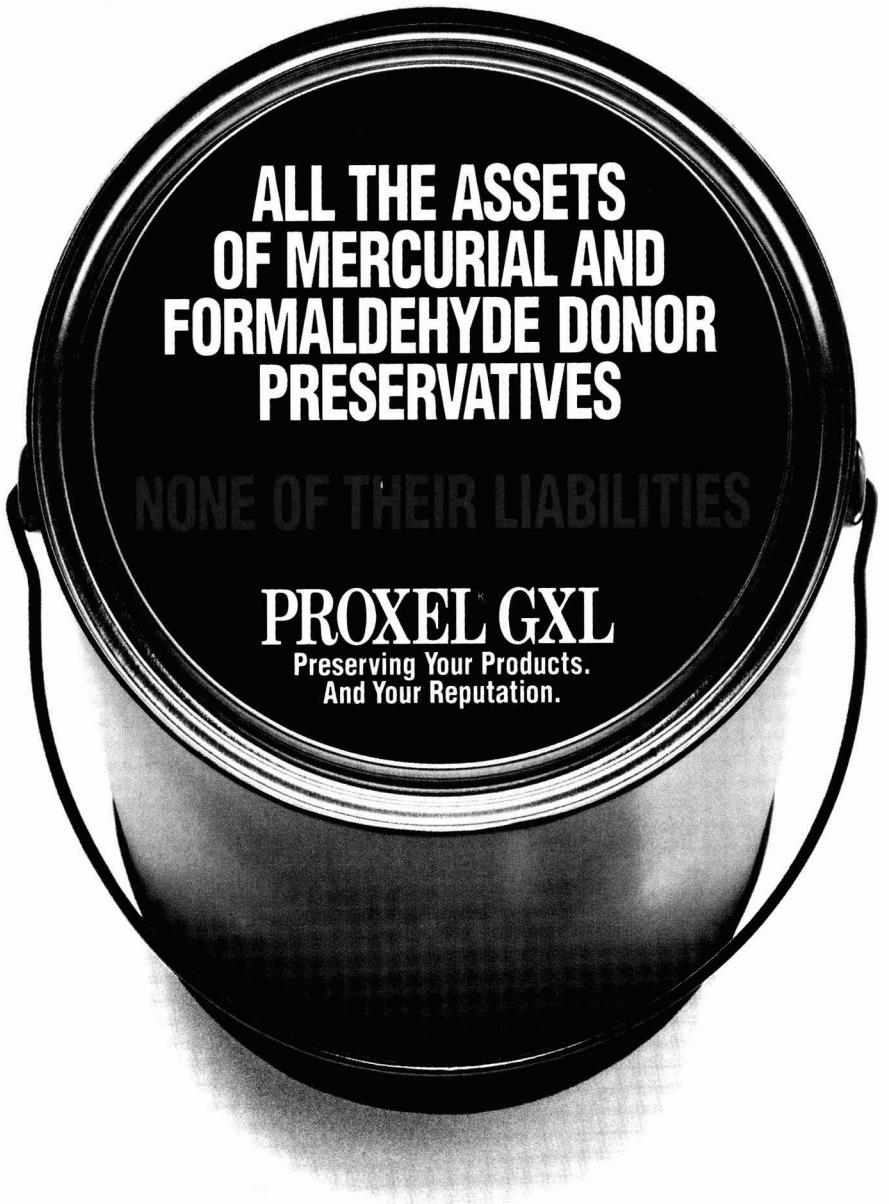
The adsorption of the polymeric binder species on the TiO_2 pigment was found to be concentration dependent. At lower concentrations, high molecular weight species preferentially adsorb, while the preference shifts towards lower molecular weights at higher concentrations. The metal powder adsorbs mostly oligomers and low molecular weight species at both concentrations. Fractionation of the polymer does take place when it is equilibrated with pigment, but no such phenomenon is noticed with iron powder.

HEALTH, SAFETY, AND ENVIRONMENTAL LEGISLATION IN THE UK AND EUROPE—K.R. Smith

Journal of Coatings Technology, 62, No. 788, 77 (Sept. 1990)

The long-expected legislative pressures to force British companies to reduce VOC's has still not materialized, although there are positive signs that it is now on the way.

Meanwhile, the British coatings industry has had to contend with a series of new laws, many of European Community origin, which have progressively tightened controls on a broad front. This started in earnest with the Health and Safety at Work, etc., Act 1974, to which were added several other Acts and Amendments, one of the most recent being the Control of Substances Hazardous to Health Regulations, which came into force in 1989. These specifically require control and monitoring of harmful substances in the atmosphere, and, together with a European Council Directive on air pollution in 1984, could well signal a renewed drive to low VOC coatings in Europe.



Effective though they may be, mercurial and formaldehyde donor preservatives are under close scrutiny by federal and state regulatory agencies. And, chances are, these regulators will see fit to publish their findings in the form of consumer warnings on the labels of products containing them.

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Peter Jennings and Mark Russell to Be Speakers At NPCA Annual Meeting, in Washington, Oct. 31-Nov. 2

Peter Jennings, anchorman and senior editor of ABC News' "World New Tonight," will be the Keynote Speaker at the Opening Session of the National Paint and Coatings Association's (NPCA) 103rd Annual Meeting, on October 31, at The Washington Hilton, in Washington, D.C.

A distinguished journalist for nearly 30 years, Mr. Jennings has reported on most of the major events of our time. He has covered the assassination and funeral of President John F. Kennedy, the civil rights movement of the 1960s, and the presidential campaigns of George Wallace, Barry Goldwater, and Eugene McCarthy. During every major U.S. election since 1984, Mr. Jennings and David Brinkley have anchored ABC News' comprehensive coverage of the candidates, the races, and key campaign issues.

Internationally, he established the first American television news bureau in the Arab world when he began as ABC News Bureau Chief for Beirut, Lebanon, in 1969. In January 1981, Mr. Jennings brought U.S. viewers the first news of the release of the American hostages from Iran. Before becoming anchorman in 1983, he was ABC's chief foreign correspondent and foreign desk anchor in London.

Mr. Jennings' numerous news specials have most recently included the unprecedented "Capital to Capital" series of live, unedited broadcasts of exchanges between senior Soviet officials and members of the U.S. Congress. The series marked the first time any program was aired live, simultaneously in both countries.

Over the years, he has received numerous accolades and awards. Readers of the prestigious *Washington Journalism Review* named him the country's best anchor in 1988, and a 1986 Gallup Poll ranked him high in "believability" among reporters. Also, in 1986, Mr. Jennings' peers in the Radio & Television News Directors Association selected him as the "most professional network news anchor." He has won two national Emmys, an Alfred I. duPont-Columbia University Award, and several Overseas Press Club Awards for his coverage of such events as the Falkland Islands War, the assassination of Anwar Sadat, and life within the Soviet Union.

The NPCA's 1990 Annual Meeting will close with a lighter look at official Washington by nationally acclaimed satirist Mark Russell.

Mr. Russell, a Washington institution for more than 30 years, is host of the *Mark Russell Comedy Special* on PBS. The program, which is in its 15th season, has consistently placed among the five top-rated shows on that network.

He has been described by Don Merrill, television critic for *TV Guide*, as "the funniest man on television." *The New York Times* has called Mr. Russell "one of the most visible and trenchant American humorists," and the *Atlanta Constitution* observes that "he hands it out equally to Democrats and Republicans, conservatives and liberals."

Born in Buffalo, NY, Mr. Russell served in the U.S. Marines before launching his career as a piano player and comedian. In the late 1950s, he began playing at the Carroll Arms Hotel bar, across from the U.S. Senate Office Building on Capitol Hill. The bar soon became one of the city's "in" spots, as Mr. Russell became popular for his funny stories and quick wit.

In 1961, he moved to the Shoreham Hotel (now the Omni Shoreham), where he enjoyed a 20-year run of performances six nights a week. During this time, Mr. Russell's reputation became legendary, and on a "hot news night," patrons would line up around the block to hear his comments.

Since retiring from the Shoreham, he has become a popular performer on the national speakers' circuit.

Dodge Reports New Construction Up in May

Contracting for new construction was up six percent during the month of May, as reported by the F.W. Dodge Division of McGraw-Hill, New York, NY.

The Dodge Index of construction contracting which uses 1982 as its 100 base, rebounded to 155 for May, an increase over April's four-year low of 147. The seasonally adjusted indicator of future construction activity represents the value of newly started projects of all kinds.

Three waterway development projects, together totalling $300 million, helped boost May's rating.

Contracting for "nonbuilding" construction (public works and utilities) surged 12% to its best level so far in 1990. The month's major projects included three lock/dam structures being built by the U.S. Corps of Engineers along waterways in Oregon, West Virginia, and Pennsylvania. Nonresidential building contracting advanced six percent, while a four percent gain in residential building rounded out the month's generally improved picture.

Despite May's pickup, the year-to-date contracting total for 1990 remained seven percent below the comparable five month period of 1989. By far the biggest shortfall was in the Northeast, where the value of newly started work was off its year-ago pace by 24%. By contrast, the North Central region showed a five percent gain through May. The West remained even with 1989 through five months, while the South was down 10%.

Red, White, and Black Top Auto Color Charts for 1989

Du Pont Automotive Products, Troy, MI, has released figures indicating that red, white, and black topped the American automotive color popularity charts in the 1989 model year.

Red and white were the leaders in 1988, and expected to place in the top again, according to experts at Du Pont. However, black emerged in 1989, especially in the sports/compact and light truck/van segments of the American car market

In 1989, red again held the first-place position as the leading color choice for sports and compact cars with 19.1% of the segment. The second-place color was white with a 17.6% share, followed by black, medium/dark blue, and medium/dark gray.

In the light truck/van segment, white increased its share of the segment over 1988 levels with 16.5%. Red remained in second place with 16%, and black moved up to 11.7%, followed by medium/dark blue and medium/dark red.

With 1989, luxury, full- and intermediate size cars, white was the leading consumer choice for the second year, increasing its overall share to 19.5% of the segment. Medium red retained its second place position while dropping to 12.7%, followed by medium gray/light blue, and silver.

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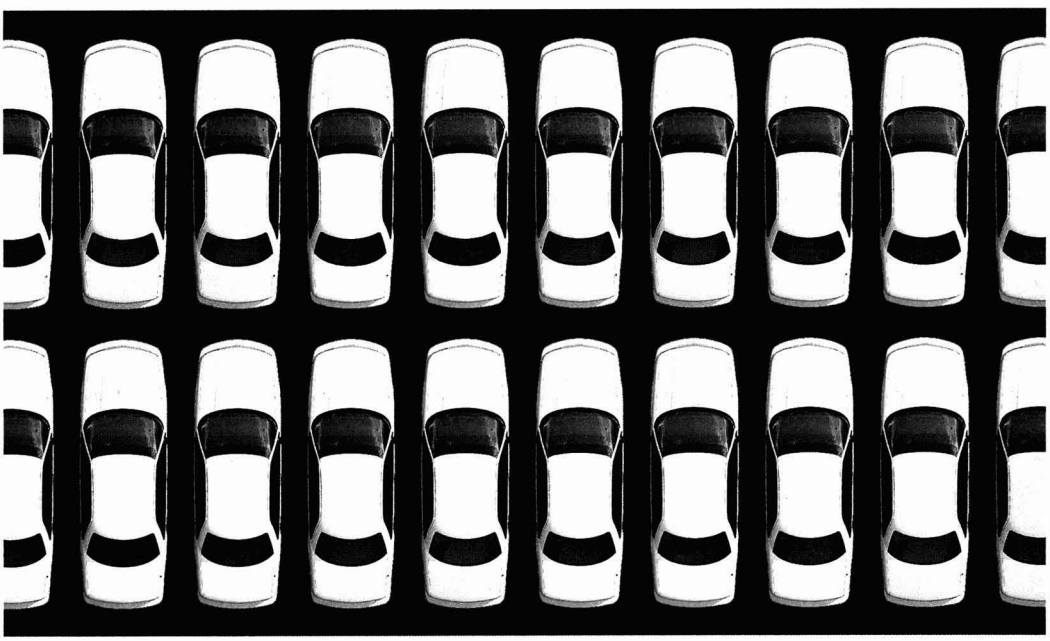

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ASTM Subcommittee Developing Standards For Factory-Coated Wood Building Products

ASTM Committee D01.52 on Factory-Coated Wood Building Products is developing standards for areas such as hardboard, prefinished siding, and film thickness. D01.52 is a subcommittee of standards-writing Committee D-1 on Paint and Related Coatings and Materials.

The hardboard task group recently has developed two test methods: the Cobb Ring Water Permeability Test and the Surfactant Edge Wick Test. Currently, both tests are at various stages of balloting.

The Standard Test Method for Block Resistance of Organic Coatings on Wood Substrates, already published as D 2793, has been revised and will be reviewed prior to Committee D-1's next meeting.

The prefinished siding task group has been conducting experiments with accelerated weathering exposure tests of unweathered retain boards. The boards will be brought to Committee D-1's next meeting for examination.

The film thickness task group questioned the procedure for calibrating the filar micrometer eyepiece in microscopic film thickness measurements. The task group is asking optic manufacturers for additional guidelines. A new Standard Method for Microscopical Measurement of Dry Film Thickness of Coatings on Wood Products will be submitted to balloting without the filar micrometer calibration section.

All interested parties are welcome to participate in subcommittee D01.52's activities. For more information, contact Subcommittee Chairman S.B. Schroeder, The Glidden Co., 16651 Sprague Rd., Strongsville, OH 44136. More details are available from David Bradley, ASTM, 1916 Race St., Philadelphia, PA 19103-1187.

Mobay Consolidates Dyes and Pigments Division

The Dyes and Pigments Division of Mobay Corporation, Pittsburgh, PA, has completed the consolidation of administrative, marketing, and technical applications operations in new facilities at the company's headquarters in Pittsburgh.

In a concurrent action, the division's pigments and dyestuff research programs have been centralized at Mobay's manufacturing facility in Bushy Park, SC.

As part of an earlier announced $130 million, five-year expansion program, Mobay will expand its pilot plant in Pittsburgh. The soon-to-be-expanded location will entail a new manufacturing plant for high-performance organic pigments and an innovative wastewater treatment system which will utilize Bayer AG's patented Tower Biology Process.

Mobay is a specialty chemical company and produces dyes, optical brighteners, pigments, polyurethane, plastics, coatings, organics, industrial chemicals, and agriculture. Mobay is part of the Bayer U.S.A. group of companies. Bayer U.S.A. is the U.S. management holding company of Bayer AG, West Germany.

Study Predicts Demand for Advanced Armor Materials Will Exceed $400 Million in the Next Decade

The combined North American and Western European market for advanced armor materials is estimated at $220 million for 1989, according to the study, "Advanced Armor Materials 1990," conducted by Kline & Company, Inc., Fairfield, NJ.

The study assesses material requirements for military and civilian applications, identifies critical product specifications, and analyzes technical developments and future demands for materials which compete with and replace conventional metal armor unsuitable in defending against higher level threats.

Advanced armor materials include advanced ceramics, polymer composites, fabrics, and specialty metals. The forecast for the armor materials market is expected to exceed $400 million by the year 2000.

The 1980s saw the pace of new armor materials developments continuing with new ceramics and composites. In 1989, polymer composites captured nearly 45% of the advanced armor materials market, with fabric, specialty metals, and ceramics representing the remaining consumption. Personal protection, land vehicles, and shipboard applications were the three leading end uses for the $220 million market in 1989.

Some of the U.S. suppliers of armor materials and systems include Alcoa, Dow Chemical Company, Du Pont Company, and Owens-Corning Fiberglass. For Western Europe, Akzo, BP Advanced Materials, ESK, and St.-Gobain are suppliers to the industry.

In civilian applications, armor procurement continues at a moderate pace, driven by expected increases in drug-related crimes and terrorist activity.

The consumption of advanced armor materials in North America and Western Europe is forecast to grow in value at 5.7% a year over the next decade.

The 350-page report by Kline & Company is based on interviews with individuals and organizations in the U.S. and Western Europe.

Valspar to Purchase Part of DeSoto Operations

Valspar Corporation, Minneapolis, MN, has announced that it has reached a definitive agreement with Courtaulds PLC, a British specialty industrial materials company, and DeSoto, Inc., to purchase parts of DeSoto's U.S. and Canadian industrial coatings operations.

The businesses to be purchased include industrial coatings for the coil, packaging, appliance, and specialty markets, and a major coatings and resin manufacturing facility in Garland, TX. Revenues for these businesses were approximately $48 million in 1989.

The transaction, which is structured as an asset purchase for approximately $46 million cash subject to certain adjustments, is conditional upon clearance by the U.S. regulatory authorities and approval of the shareholders of DeSoto.

First "Picture It Painted Internationally" Project Sponsored by NPCA in Warsaw, Poland

The National Paint and Coatings Association (NPCA), Washington, D.C., commemorated the 10th anniversary of its "Picture It Painted" community service program this year by celebrating its first international project, "Picture It Painted Internationally."

The paint industry has donated several hundred gallons of paint to restore the Wilanow Palace, a beloved landmark in Warsaw, Poland.

The project was initiated in September 1989 when U.S. Secretary of Commerce Robert Mosbacher was seeking an appropriate gift to present to the people of Warsaw during his ceremonial visit to Poland. He contacted NPCA to find out if the association would be willing to donate a gift of paint to contribute to the Wilanow Palace restoration.

NPCA President C. Angus Wurtele, Chairman of Valspar Corporation, volunteered to donate the paint if NPCA would arrange for shipping. Another NPCA member company, Wooster Brush, agreed to donate the brushes.

The project eventually became more than just a paint industry project. It developed into a national volunteer coalition effort that included the support of the U.S. Department of Commerce and the U.S. Embassy in Warsaw, as well as an international shipping line, freight forwarder, and other professionals who helped to resolve the logistical problems of transporting the paint to eastern Europe.

NPCA's first international community service project became a reality when the paint left the U.S. aboard the vessel Starzynski, an international shipping company, in late April and arrived in Poland in mid-May.

As a final gesture, NPCA printed custom T-shirts bearing the PIP logo and the words "Wiobrazic On Namalowas" which the association hopes is the Polish translation of "Picture It Painted."

CMA Honors Safety Award Winners

Three companies recently were honored by the Chemical Manufacturers Association (CMA), Washington, D.C., for their outstanding safety records.

Among the honored companies were Merck & Company, Inc., Rahway, NJ; Texaco Chemical Company, a subsidiary of Texaco Inc.; and Unocal Chemicals Division, Unocal Corporation, Schaumburg, IL.

The safety award winners were presented with Lammot du Pont Safety Award plaques during the CMA Annual Meeting held in White Sulphur Springs, WV. The companies were honored for their excellent improvement in safety.

The safety awards are presented to CMA companies which have shown, in their respective size range, the greatest percentage reduction in total recordable incidence rates of occupational injuries, deaths, and illnesses during the past five years. In addition to the reduction in injury rates, a company's total recordable incidence rates for the award year must not exceed the average for all companies in the same category.

Merck accepted the award for the large-size company winner, Texaco Chemical Company accepted the the mid-size company award, and Unocal was the small company winner.

Certificates were awarded to second place winners in the large and mid-size company categories: E.I. du Pont de Nemours and Company, Wilmington, DE, was the large size winner and Quantum Chemical Corporation, New York, NY, took home the prize for the mid-size category.

The annual awards are named for the late Lammot du Pont, a former Chairman of the Du Pont Company, and were established in 1950 "to inspire and encourage member companies to improve and effectuate their industrial safety programs to prevent personal injuries."

Henkel Unit to Service Coatings and Inks Industries

The Henkel Corporation, LaGrange, IL, has announced the creation of a Coatings & Inks Division to provide services to the coatings, graphic arts, civil engineering, and adhesives industries.

The new division will provide additives, such as wetting agents, biocides, mildewcides, and defoamers for paints and coatings; radiation curable monomers and oligomers for inks and coatings; epoxy curing agents and acrylic urethanes for coatings; and water-based acrylics and thermoplastic polyamides for inks. The paints, coatings, and inks serve a wide range of industries, including appliances, automotive, packaging, printing, and food and beverage containers.

The new division was restructured from two earlier Henkel organizations, the Polymers Division, based in LaGrange, and the Coatings Division, based in Ambler, PA.

Products for the new division will be manufactured at Henkel plants in Kankakee, IL, Charlotte, NC, and Cedartown, GA.

Henkel is based in Gulph Mills, PA, and is the U.S. operating company of the Henkel Group, headquartered in Duesseldorf, West Germany.

ICI Forms New Specialties Business

ICI has announced its intention to create a specialty products business, ICI Specialties, headquartered in Manchester, U.K.

The new business will bring together the company's existing businesses in Color and Fine Chemicals (less aniline and derivatives); Specialty Chemicals; C&P Resins; parts of C&P Chemical Products, principally surfactants; and the Biological Products business.

The organization restructuring is scheduled to take effect on January 1, 1991.

ICI Specialties will employ 12,000 people in more than 100 countries and will have sales of approximately $2.5 billion. In the U.S., ICI Specialties will employ about 3,000 people with sales of approximately $700 million.

The new business will be comprised of 12 business areas in different parts of the world, each of which will be focused on a distinctive market sector. Rodney Brown, currently a Director of ICI Chemicals & Polymers, has been appointed Principal Executive Officer of ICI Specialties. Lance K. Ziering has been named President of ICI Specialties U.S. and will work out of Wilmington, DE.

The product range to be marketed includes dyestuffs, leather finishes, specialist inks, surfactants, resins, polymer additives, coatings and adhesives, mining chemicals, and PHBV biodegradable plastic.

Witco Corporation to Expand Sulfonate Capacity in Europe

Witco Corporation, New York, NY, has announced its intention to expand sulfonate capacity at its facility in Amsterdam, the Netherlands, to include neutral and overbased calcium sulfonate production. The Amsterdam plant is operated by Witco Holland, a wholly owned subsidiary of Witco Corporation, with additional plants in Haarlem and Koog aan de Zaan.

Also, the company reported the completed expansion of sulfonation facilities in Elbeuf, France to manufacture sulfonic acids. Elbeuf is operated by Witco France, also a wholly owned subsidiary of Witco Corporation.

Federal Trade Commission Files Suit Against Arco Chemical; Explosion at Channelview Plant Forces Product Allocation

The Federal Trade Commission (FTC) has filed suit in Federal District Court in Washington, D.C. to challenge the proposed acquisition, by Arco Chemical Company, Newtown Square, PA, of the propylene glycol and urethane polyether polyols businesses of Union Carbide Chemicals and Plastics Company, Inc., Danbury, CT.

On June 29, the FTC announced that it had authorized its staff to seek a preliminary injunction rescinding the proposed acquisition.

Arco Chemical agreed in September 1989 to purchase the Union Carbide businesses, but the transaction has not been closed pending FTC review.

In other news, Arco Chemical has notified its customers that the firm will begin allocating the supply of some of its products as a result of the explosion and fire that occurred at the company's Channelview, TX, plant on July 5.

In placing customers on allocation, Arco exercised its contracted right of "force majeure" to establish an equitable distribution of available products.

Production at the Channelview facility was shut down following the accident, which killed 17 people. Damage to the Channelview plant was confined to the area providing utilities to the plant. Therefore, the company was expected to be able to restart the facility in phases during the past several months. Investigations of the accident, including one by OSHA, have been instituted and were ongoing.

Arco believes it has sufficient property damage, business interruption, and general liability insurance to mitigate the financial impact of this tragic accident.

Plastics Packaging Plant Acquired by Plastite

Brockway Standard, Inc., Atlanta, GA, and Plastite Corporation, have agreed on the sale of the Brockway plastics packaging plant in Morrow, GA, to Plastite.

The facility produces one-gallon containers and five-gallon pails sold primarily to the building and construction materials, lubricant, and food industries. Customers are located throughout the Southeast. Plastite will continue to focus on serving the plastic container needs of these same customers.

Croda Inks Acquires Clark Graficolor Company

Croda Inks Corporation, Niles, IL, has acquired Clark Graficolor Company, Inc., Ewing, NJ. Clark Graficolor specializes in flexographic and rotogravure inks for converters.

Officials at Croda stated that Clark's management team has remained in place under the leadership of its former President, Clark Travers. However, the Ewing location now operates under the name of Croda Inks Corporation.

Croda Inks, a high technology producer of inks for lithography/web offset, rotogravure, flexography, and letterpress, as well as metal decorating and color dispersions, also produces resins for printing inks and laminating adhesives, plus industrial paints and lacquers. Croda Inks Corporation is a division of Croda International, PIC.

CALL FOR PAPERS

FSCT Spring Seminar

"Formulating for the Future"

Philadelphia, Pennsylvania

May 13-14, 1991

This technical seminar, jointly sponsored by the Federation of Societies for Coatings Technology and the Philadelphia Society for Coatings Technology, will focus on new water-borne resin and additive technology that is available to the coatings formulator, or will be available in the near future. Papers addressing formulating strategies that minimize waste disposal will also be considered.

Appropriate topics include water-borne vehicle technologies that represent recent and significant technical advances. New additive technologies of interest include recent developments in rheological modifiers, defoamers, dispersants, surfactants, heavy metal free corrosion inhibitive pigments, opacifying pigments, and biocides.

In addition, papers that address technical advances made in understanding the formulation science of any of the above coating material technologies will be considered.

Each speaker will be allotted 30 minutes.

Interested persons should submit a preliminary title and 150 to 200-word abstract no later than October 15, 1990

Submissions are to be sent to: Chairman—1991 Spring Seminar, Federation of Societies for Coatings Technology, 492 Norristown Road, Blue Bell, PA 19422.

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55th Annual Paint Industries' Show

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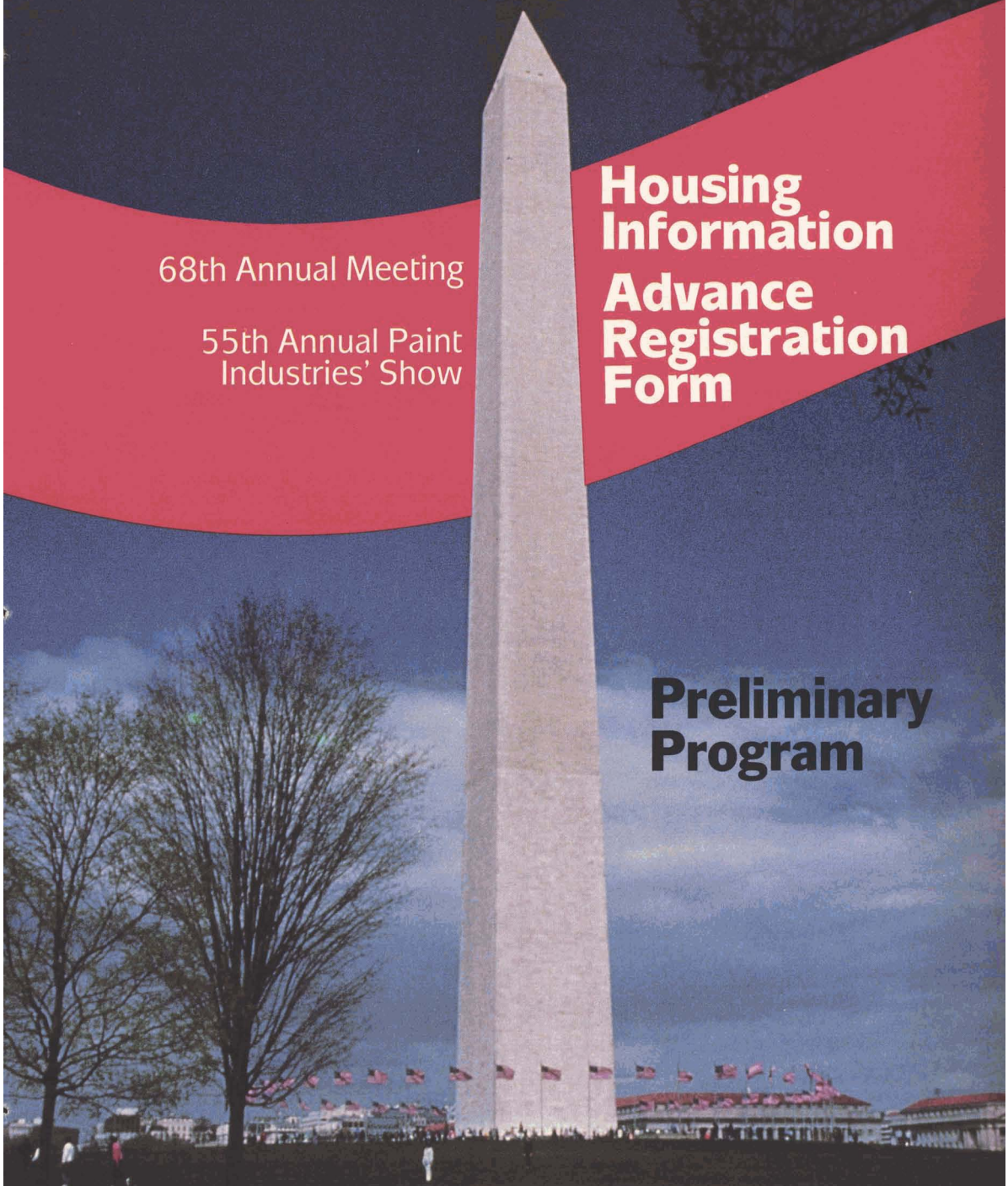

Preliminary Program

WASHINGTON CONVENTION CENTER

Monday, Tuesday, Wednesday ★ October 29-30-31, 1990

WASHINGTON, D.C.

Preliminary Program

"A Decade of Decision: Preparing for the Year 2000"

MONDAY, OCTOBER 29

OPENING SESSION
(9:00)

Sixty-Eighth Annual Meeting of the Federation of Societies for Coatings Technology opened by President John C. Ballard

Invocation and In Memoriam

Welcome: Gary Morgereth, President of Baltimore Society for Coatings Technology

Richard C. Chodnicki, Chairman of the Host Committee

Gary W. Gardner, Chairman of the Program Committee

Kenneth R. Hyde, Chairman of the Paint Industries' Show Committee

Introduction of Distinguished Guests

E.W. FASIG KEYNOTE ADDRESS

A Generation of Eagles—Lee Sherman Dreyfus, President, Lee Sherman Dreyfus, Inc., and former Governor of the State of Wisconsin

PROFESSIONAL DEVELOPMENT COMMITTEE SYMPOSIUM

PART I — TESTING : THE KEY TO THE QUALITY REVOLUTION
(2:00-3:30)

Moderator: Dan Gilbert, Technical Director, Surface Protection Industries, Inc., Los Angeles, CA

Testing Quality in the Coatings Industry—Dr. David P. Schussler, Senior Research Associate, Chemicals and Pigments Department, DeLisle Plant, E.I. du Pont de Nemours & Co., Inc., Pass Christian, MS

Testing Experiences Involving Coatings Purchased by U.S. Government—Speakers from General Services Administration and U.S. Navy

Results of Good and Bad Testing—Saul Spindel, President, D/L Laboratories, New York, NY

PART II—ADVANCED TOPICS IN COATINGS RESEARCH
(3:30-5:00)

Moderator—Dr. Richard J. Himics, President, Daniel Products Co., Jersey City, NJ, and Chairman of the Professional Development Committee

New Developments in Transportation Coatings—Dr. John Gardon, Vice-President, Research and Development, Akzo Coatings Inc., Troy, MI

A New Viewpoint in Formulation of Latex Coatings—Dr. Gordon P. Bierwagen, Dept. of Polymers and Coatings, North Dakota State University, Fargo, ND

Novel Liquid Organic Corrosion Inhibitors for Coatings—Dr. Adalbert Braig, Technical Manager, Organic Corrosion Inhibitors for Coatings CIBA-GEIGY, Corp., Ardsley, NY

INTERACTIVE EFFECTS OF COATINGS COMPONENTS
(2:00-5:00)

Moderator—Richard M. Hille, Products Manager, General Paint and Chemical Co., Cary, IL

Structural Effects of Hydroxyalkyl(methyl)acrylate Monomer on Cure Rates of Acrylic Polyol Resins—Phillip W. Barnett, Project Leader, Automotive Group, Coatings Applications Laboratory, Dow Chemical U.S.A., Freeport, TX

Water-Reducible Unsaturated Polyester Prepolymers as Binders for UV-Curable Coatings—Michael J. Dvorchak, Mobay Chemical Corp., Pittsburgh, PA

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The Role of Emulsifiers in Autodeposition Latexes—Dr. Taki J. Anagnostou, Coatings Research Institute, Eastern Michigan University, Ypsilanti, MI, and Dr. Pravin K. Kukkala, National Starch & Chemical Co., Bridgewater, NJ

Formulating Stable Acrylic Latex Paint Containing Zinc Oxide—Eric A. Johnson, Research Laboratories, Rohm and Haas Co., Spring House, PA

Development of a New Adhesion Promoter for Coating Thermoplastic Polyolefin—Dr. Slayton E. Fry, Senior Development Chemist, Arkansas Eastman Co., Batesville, AR

The Effect of Diol Selection on Polyesters for Urethane Coatings—Dr. Carl J. Sullivan, R & D Dept., ARCO Chemical Co., Newtown Square, PA

SOCIETY PAPERS (2:00-4:30)

Moderator—Patricia A. Shaw, Technical Director, Davlin Paint Co., Berkeley, CA

Changes in Hiding During Latex Film Formation. Part II. Pigment Packing Effects—Cleveland Society for Coatings Technology. Presented by Ben J. Carlozzo, Tremco, Inc., Cleveland, OH

Changes in Hiding During Latex Film Formation. Part III. Effect of Dispersant Level and Emulsion Properties—Cleveland Society for Coatings Technology. Presented by Freidun Anwari, Coatings Research Group, Inc., Cleveland, OH

The Effect of Dispersion on the Physical and Performance Properties of Trades Sales (Architectural) Coatings—Baltimore Society for Coatings Technology. Presented by Mary Somerville, Technical Service Representative, Bruning Paint Co., Baltimore, MD

Correlation of Hardness in Coating Films Using Koenig and Sward Pendulum Hardness Testers—Toronto Society for Coatings Technology. Presented by Steven P. Nuyten, R&D Chemist, Reichhold Limited, Weston, Ontario, Canada

A Statistical Model Study of How Coatings Dry—Golden Gate Society for Coatings Technology

COATING A SOUND FOUNDATION (2:00-4:30)

Moderator—George R. Pilcher, Technical Director, Akzo Coatings, Inc., Columbus, OH

Wood/Coating Interactions: Pretreatments, Primers, and Topcoats—Dr. William C. Feist, Project Leader, Wood Surface Chemistry and Protection, Forest Products Laboratory, U. S. Dept. of Agriculture, Madison, WI

Aluminum Sheet Substrate/Coating Interfacial Adhesion as Related to Surface Properties and Processing Conditions—Dr. Jean Ann Skiles, Technical Supervisor, and John K. McBride, Technical Specialist, Alcoa Laboratories, Aluminum Co. of America, Alcoa Center, PA

Substrate Factors Affecting the Performance of Organic Coatings on Steel Sheet Surfaces—Bruno Perfetti, Senior Research Consultant on Organic Coatings, Technical Center, U.S. Steel Div. of USX Corp., Monroeville, PA

Coating Thermoplastic Olefins—Dr. Rose A. Ryntz, Technical Director, ICS Laboratory, Akzo Coatings, Inc., Troy, MI

Moderator and speakers will assemble as a panel for an open discussion period to conclude session.

TUESDAY, OCTOBER 30

COATINGS HISTORY IN THE MAKING: A TECHNOLOGY PROFILE—I (9:00-11:00)

Moderator—Gerry Parsons, Technical Director, DeSoto Coatings Limited, Mississauga, Ontario, Canada

Electron Beam Processing—Now and for the Future—Dr. Alan F. Klein, President and Chairman of the Board, RPC Industries, Hayward, CA

UV Curing—A Compliance Technology for the 90s—Donald L. Eshenbaugh, Jr., Vice-President, R & D Coatings Inc., Wexford, PA

Electrodeposition—The Adventure Continues—Dr. Edward L. Jozwiak, Director for Electrodeposition Research, R&D Center, PPG Industries, Inc., Allison Park, PA

Photoinitiated Laser Curing: State of the Art and Opportunities—Dr. Douglas C. Neckers, Executive Director, Center for Photochemical Sciences, Bowling Green State University, Bowling Green, OH

MANUFACTURING COMMITTEE SEMINAR ON CHALLENGING TRADITION (9:00-11:00)

A stimulating investigation into flexible manufacturing and various alternatives to our industry's "batch" approach for making coatings.

Moderator—John W. Covington, Principal, Covington Consultants, Millersville, MD

Why It's Dangerous Not to Challenge Our Traditional Ways of Doing Business—John W. Covington

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Flexible Manufacturing for the Paint Industry—Phillip C. Howlett, Senior Vice President of Fluid Management, Miller Equipment Co., Addison, IL

The Other Side of the Story—How Other Industries Produce Color—Kenneth Boyle, Product Manager, Applied Color Systems, Inc., Princeton, NJ

Increasing Service and Reducing Costs While Addressing Small Orders—Larry K. Kytasaari, Vice President, Operations, Tnemec Co., Inc., N. Kansas City, MO

Quick-Tint—An Automated Factory Approach to Custom Color Problems—Kenneth N. Edwards, Corporate Secretary, Dunn-Edwards Corp., Los Angeles, CA

Moderator and speakers will assemble as a panel for an open discussion period to conclude the seminar.

Presentation of the 1990 Morehouse Golden Impeller Award for outstanding achievement in dispersion technology will be made at this session.

POLYMERS: THE KEY BUILDING BLOCK (9:00-11:00)

Moderator—John Hall, Manager of Coatings Technical Service, Tioxide, Inc., St. Laurent, Quebec, Canada

Fundamental Studies of Epoxy Resins for Can and Coil Coatings. III. Effect of Bisphenol Structure on Flexibility and Adhesion—Robert A. Dubois, Dow Chemical U.S.A., Freeport, TX

Use of Oxazolidines as a Route to High Build, One-Component, Moisture-Curing Polyurethane Coatings for the Construction Industry—M. B. Bassi, Mobay Corp., Pittsburgh, PA

Novel Fluoropolymer Resins for Coatings Applications—Robert E. Gilliam, Technical Manager, Coatings, Polymers, and Resins Div., Reichhold Chemicals, Inc., Pensacola, FL

Conducting Polymer Colloids—Dr. Mahmoud Aldissi, Research Fellow, Champlain Cable Corp., Winooski, VT

ROON AWARDS COMPETITION PAPERS—I (9:00-11:00)

Moderator—Dr. Richard Eley, Scientist, Coatings Research Dept., The Glidden Co., Dwight P. Joyce Research Center, Strongsville, OH

Gloss of Paint Films and the Mechanism of Pigment Involvement—Dr. Juergen H. Braun, Research Associate, Chemicals and Pigments Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington, DE

Prediction of Coating Failure Over Sheet Molding Compound (SMC): Solvent Permeation Studies—Dr. Rose A. Ryntz, Technical Director, ICS Laboratory, Akzo Coatings, Inc., Troy, MI

The Interactions of Associative Thickeners with Paint Components as Studied by the Use of a Fluorescently Labeled Model Thickener—Dr. John W. Hook III, Research Laboratories, Rohm and Haas Co., Spring House, PA

Surface Studies of Hydrous Oxide-Coated Rutile in Non-Aqueous Media—Dr. Louis J. Dizikes, Kerr-McGee Chemical Corp., Oklahoma City, OK

COATINGS HISTORY IN THE MAKING: A TECHNOLOGY PROFILE—II (2:00-4:30)

Moderator—Mary G. Brodie, Corporate Director of Technical Facilities Planning and Development, The Sherwin-Williams Co., Cleveland, OH

Retrospect and Prospect of Water-borne Industrial Coatings—Dr. Robert Fitch, S. C. Johnson & Son, Inc. (Retired), Racine, WI

Status and Future Prospects for High Solids Coatings—Dr. Frank N. Jones, Chairman, Dept. of Polymers and Coatings, North Dakota State University, Fargo, ND

Powder Coatings from Finishing Curiosity to Finishing Ahead in the 90s—Steven Kiefer, Morton International, Reading, PA

Registration Hours

Sunday, October 28	8:00 a.m.-5:00 p.m.
Monday, October 29	8:00 a.m.-5:30 p.m.
Tuesday, October 30	8:00 a.m.-5:30 p.m.
Wednesday, October 31	8:00 a.m.-3:00 p.m.

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Paint Show Hours

Monday, October 29 ..... 11:00 a.m.-5:30 p.m.
Tuesday, October 30 ..... 9:00 a.m.-5:30 p.m.
Wednesday, October 31 ..... 9:00 a.m.-3:00 p.m.

Architectural Water-borne Coatings; Technological Advances in the Past Decade—Freidun Anwari, Coatings Research Group, Inc., Cleveland, OH

CORROSION COMMITTEE SYMPOSIUM ON ANTI-CORROSIVE COATINGS: THE NEXT GENERATION (2:00-4:45)

Moderator—Donald W. Collier, Technical Director, Trade Sales, Porter Paints Div., Courtaulds Coatings, Inc., Louisville, KY

How to Develop an Improved Laboratory Corrosion Test—Herb Townsend, Senior Research Fellow, Bethlehem Steel Corp., Bethlehem, PA

A Combined Corrosion/Weathering Accelerated Test for Coatings for Corrosion Control: Correlating Field and Laboratory Exposures—Dr. Brian S. Skerry and C.H. Simpson, Consumer Div., Technical Center, The Sherwin-Williams Co., Cleveland, OH, and C.J. Ray, Industrial Maintenance Laboratory, The Sherwin-Williams Co., Morrow, GA

General Phenomenon of Adhesion—J.P. Whiteman, Center for Adhesion Science, Virginia Polytechnic Institute, Blacksburg, VA

Compliance when Using Heavy Metals—William Stewart, The Valspar Corp., Minneapolis, MN

Development of Chromate-Free Primers for Aluminum and Steel to Meet CGSB Specifications—Terry Foster, G.N. Blenkinsop, P. Blattler, and M. Szandorowski, Canadian Department of National Defence, Ottawa, Ontario, Canada

Presentation of 1990 Corrosion Committee Publication Award for best corrosion-related paper published in the JOURNAL OF COATINGS TECHNOLOGY will be made at this session.

SAFETY AND PERFORMANCE INTO THE 21st CENTURY (2:00-4:30)

Moderator—Steve Bussjaeger, Technical Director, Davis Paint Co., N. Kansas City, MO

Solvent-Based Paint Strippers; Alternatives to Methylene Chloride—Dr. Carl J. Sullivan, R & D Dept., ARCO Chemical Co., Newtown Square, PA

Polyurethane Coatings; Safe Application in Outdoor Maintenance Painting—H. E. Myer, Mobay Corp., Pittsburgh, PA

Characterization of the Components of an Oven Condensate by Gas Chromatography/Mass Spectrometry—Ronald J. Wingender, Packaging Products Div., The Dexter Corp., Waukegan, IL

Flexible Coatings for Exterior Wood—Steven W. Rees, Coatings Evaluation Laboratory Manager, Cray Valley Products Ltd., Farnborough, Kent, England (Presented on behalf of OCCA: Oil and Colour Chemists' Association — UK)

Statistical Analysis of the Evolution of the Yellowness Index During an Accelerated Weathering of a Coating—Dr. Patrick Schutyser, Coatings Research Institute, Limelette, Belgium (Presented on behalf of FATIPEC: Federation of Associations of Technicians in the Paint, Varnish, Lacquer, and Printing Ink Industries of Continental Europe)

ROON AWARDS COMPETITION PAPERS—II (2:00-4:30)

Moderator—Dr. Gordon P. Bierwagen, Dept. of Polymers and Coatings, North Dakota State University, Fargo, ND

Specific Interactions and Adsorption of Film-Forming Polymers—Dr. Henry P. Schreiber, Ecole Polytechnique l'Universite de Montreal, Montreal, Quebec, Canada

Adhesion and Flexibility Contributions to the Performance of Epoxy Phosphate Ester Coatings—Dr. John L. Massingill, Development Associate, Resin Products Dept., Dow Chemical U.S.A., Freeport, TX

Phase Change Control of Reactivity 2. Synthesis and Reactivity of Latent Amine Catalysts for Epoxy-Carboxyl Hybrid Powder Coatings—Dr. S. Peter Pappas, Loctite Corp., Newington, CT

Ketoxime-Blocked Aromatic Isocyanate-Epoxy Resin-Based Low-Temperature Cured Water-borne Coatings—Dr. John M. McIntyre, Research Leader, Coatings Application Development Laboratory, Dow Chemical U.S.A., Freeport, TX

Rheological Considerations of Abrasion Resistant Self-Healing Polyurethane Resins—Dr. Andrew Woo, Coatings, Polymers, and Resins Div., Reichhold Chemicals, Inc., Pensacola, FL

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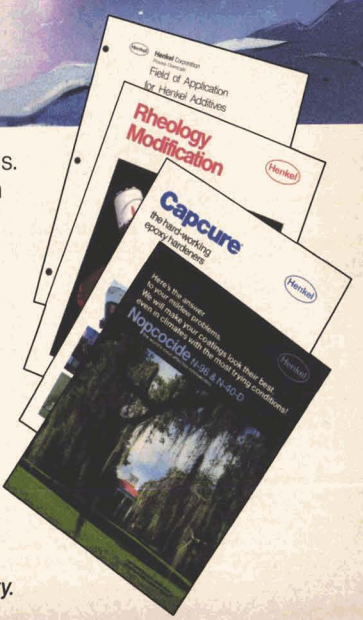

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WEDNESDAY, OCTOBER 31

ANNUAL BUSINESS MEETING
(9:00-10:00)

Annual Business Meeting of the Federation.

Presentation of these awards: A. F. Voss/*American Paint & Coatings Journal* . . . Southern Society A. L. Hendry . . . Outstanding Service . . . Society Speaker . . . Society Secretaries.

Installation of Officers, 1990-1991.

REGULATORY AFFAIRS
(9:00-10:30)

Moderator—Sidney J. Rubin, Vice-President, Empire State Varnish Co., Inc., Brooklyn, NY, and Chairman of the Environmental Affairs Committee

Crystalline Silica; A Material Showing "Limited Evidence of Carcinogenicity" to Humans—Sidney Lauren, CR Minerals Corp., Golden, CO

A Coatings Manufacturer's Guide to Regulatory Requirements and Pollution Prevention Options—Kevin F. Gashlin, Director, New Jersey Technical Assistance Program, Hazardous Substance Management Research Center, New Jersey Institute of Technology, Newark, NJ

Formaldehyde Regulatory Update—Jeffrey D. Felder, Manager, Product Safety, Monsanto Chemical Co., St. Louis, MO

BASICS FOR THE YEAR 2000
(9:00-10:30)

Moderator—Dr. Mary E. McKnight, Research Chemist, United States Dept. of Commerce, National Institute of Standards and Technology, Gaithersburg, MD

Spheroidal Iron Oxide Yellows; A New Generation of Pigments for Paints and Colorants—Axel Wilms, Mobay Chemical Corp., Pittsburgh, PA

Sorption of Moisture on Epoxy and Alkyd Free Films and Coated Steel Panels—Howard N. Rosen, United States Dept. of Commerce, National Institute of Standards & Technology, Gaithersburg, MD

Cyclic and Continuous Immersion Results for Scribed and Unscribed Alkyd Coated Steel Panels—Dr. Jonathan W. Martin, Senior Materials Reserch Engineer, United States Dept. of Commerce, National Institute of Standards & Technology, Gaithersburg, MD

MATTIELLO MEMORIAL LECTURE
(10:30-11:30)

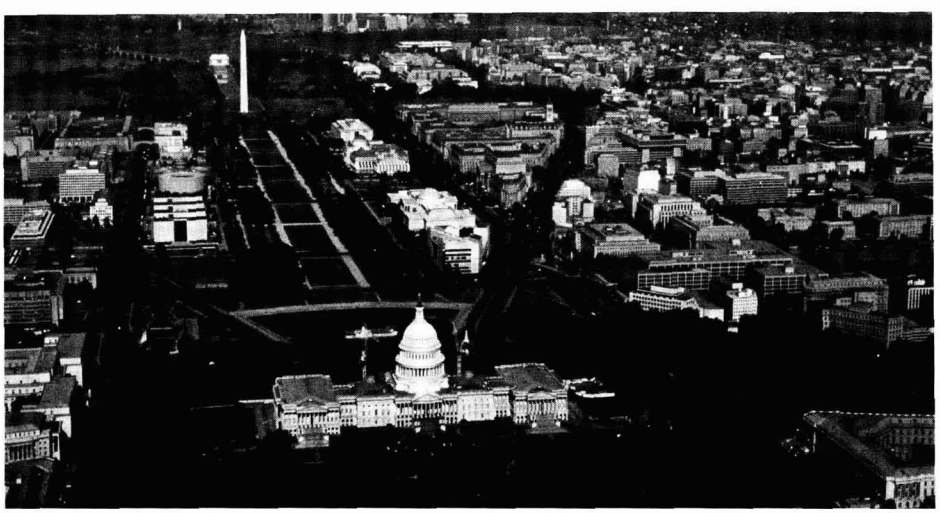
Introductory comments by John C. Ballard, Vice-President/Manager, Technical Service, Kurfees Coatings, Inc., Louisville, KY, and President of the Federation of Societies for Coatings Technology and Chairman of the Joseph J. Mattiello Memorial Lecture Committee.

Electrochemical Techniques for Studying Protective Polymeric Coatings—Dr. Henry J. Leidheiser, Jr., formerly Director of the Center for Surface and Coatings Research, Lehigh University, Bethlehem, PA.

AWARDS LUNCHEON
(12:00)

Presentation of these awards: George Baugh Heckel . . . Paint Show . . . Roon Foundation.

Featured Speaker: Douglas Kiker, TV News Correspondent.



Guess which surfactant line reflects everything you want in your water-based inks and coatings. Surfynol® surfactants.

What do you want from your surfactant? Coverage over difficult to wet surfaces? Rapid wetting and color development? Defoaming? Low water sensitivity and viscosity? All of the above?

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JCT

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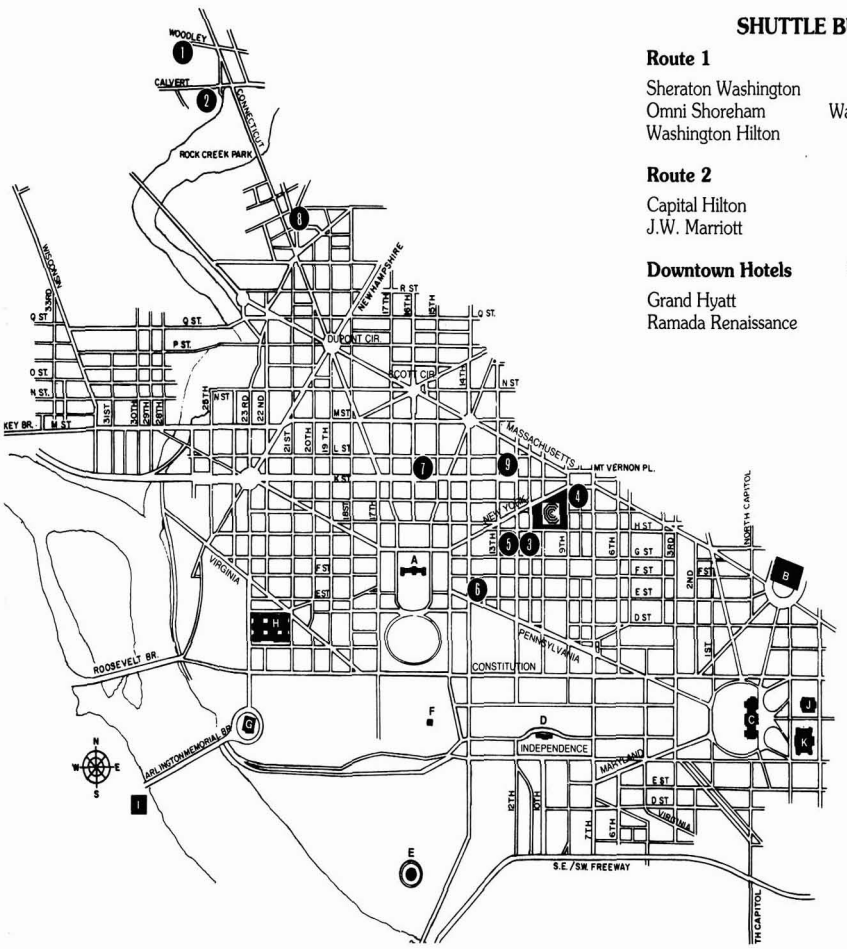
AIR PRODUCTS

Map Key	Hotel	Singles	Doubles/Twins	Suites 1 BR	Suites 2 BR
1	Sheraton Washington*	$145,160,170	$175,190,200	$260-1,600	$555-1,700
2	Omni Shoreham	130	150	350-425	525-1,200
3	Grand Hyatt*	152,167,182	175,200,215	425-950	500-1,100
4	Ramada Renaissance	148,168	168,188	500-2,000	648-2,148
5	Holiday Inn Crowne Plaza	130	150	300-450	450-600
6	J.W. Marriott	155	168	475-700	700-900
7	Capital Hilton	145,165,180	165,185,200	550	700
8	Washington Hilton	125,135,145	145,155,165	360-680	525-845
9	Days Inn Downtown Convention Center	70	70		

Note: Rates subject to 11% District of Columbia Sales tax and $1.50 occupancy tax per room per night.
Upon receipt of confirmation from the Housing Bureau, please send deposit check directly to hotel.
*Requests for accommodations at either Sheraton or the Hyatt will be limited to 10 rooms per company.



SHUTTLE BUS ROUTES

Route 1

Sheraton Washington	24th Street Entrance
Omni Shoreham	Walk to Sheraton Washington
Washington Hilton	T Street Entrance

Route 2

Capital Hilton	16th Street
J.W. Marriott	E Street Entrance

Downtown Hotels — Walk to Convention Center

Grand Hyatt	Holiday Inn Crowne Plaza
Ramada Renaissance	Days Inn Downtown

Key

A. White House
B. Union Station
C. U.S. Capital
D. Smithsonian Institution
E. Jefferson Memorial
F. Washington Monument
G. Lincoln Memorial
H. Department of State
I. Arlington Cemetary
J. Supreme Court
K. Library of Congress

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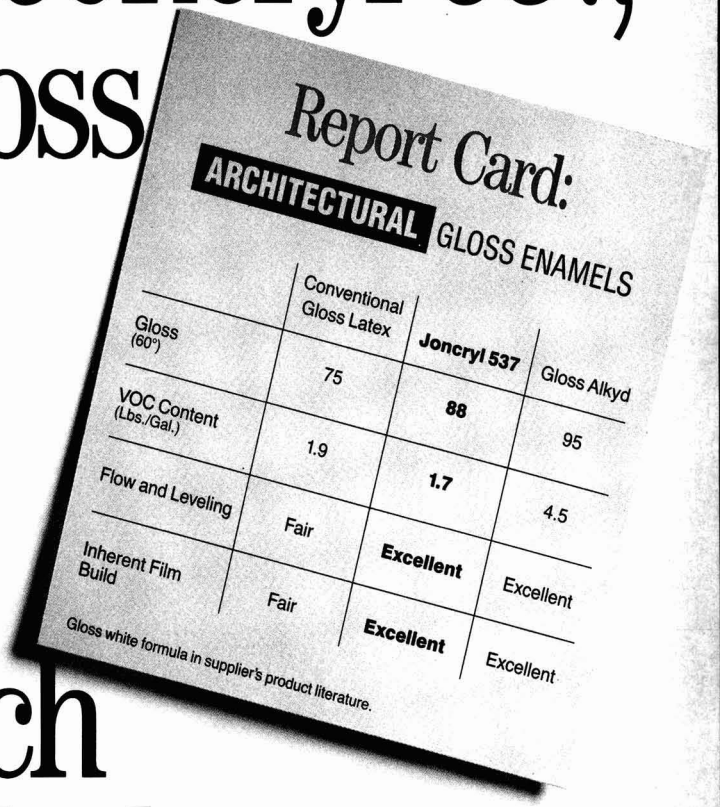

If tougher environmental laws mean you'll be adding a high gloss, latex coating to your architectural line, consider the benefit of formulating with Joncryl 537, the polymer that's closing the gap between latex and alkyd.

Our report card stands for itself. In the critical areas of gloss, flow, leveling and film build, water-based Joncryl 537 formulations closely match the performance of solvent-based alkyds, and far surpass conventional gloss latex.

Take a close look at the VOC figures and you'll see how Joncryl 537 can help you meet even the toughest environmental regulations.

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So look over our report card. The move to latex high gloss can be much easier than you thought possible. For more information about Joncryl 537, call **1-414-631-3920,** or write to SC Johnson Wax, Specialty Chemicals, Racine, WI 53403.

SC Johnson wax Specialty Chemicals

1990 FSCT ANNUAL MEETING AND PAINT INDUSTRIES' SHOW
WASHINGTON CONVENTION CENTER, WASHINGTON, D.C.
MONDAY, TUESDAY, AND WEDNESDAY, OCTOBER 29, 30, 31

Washington
Convention Center
Washington, D.C.
October 29-30-31, 1990

HOUSING INSTRUCTIONS

Hotel reservations are easy this year—everything can be done by phone! We are using the Housing Bureau of the Washington Convention and Visitors Association to make reservations. Please call them directly, weekdays between 9 a.m. and 5 p.m. (EST).

Metropolitan Washington area: (202) 842-2930
United States: 1-800-535-3336
Canada: 1-800-535-3356

Reservations must be made by September 28, 1990.

International attendees may send hotel reservations to:

FSCT Housing Bureau
1212 New York Avenue, NW
Washington, D.C. 20005 USA

International attendees ONLY may send reservations by facsimile machine to (202) 789-7037. All eleven items requested below must be included when sending any form of written reservation.

All changes/cancellations prior to September 28 should be made directly with the housing bureau. After this date, please contact the hotel directly with changes or cancellations.

Confirmations will be sent to you from the housing bureau. If a credit card number has been given, a deposit is not required. Otherwise, please send deposit amount indicated on the confirmation directly to the hotel within 15 days of receipt of confirmation.

Please have the following information available PRIOR to calling for reservations:

1. Name of Convention: FSCT
2. 1st, 2nd, and 3rd choice of hotels
3. Arrival/Departure dates
4. Number of rooms required
5. Type of room (single, double, etc.)
6. Number of persons in party
7. Arrival time
8. Name of credit card, number, and expiration date
9. Names of occupants of room
10. Confirmation address
11. Telephone number

NON-EXHIBITOR REGISTRATION INSTRUCTIONS

Advance register to attend the 1990 Annual Meeting and Paint Industries' Show by filling out the form included in this brochure.

The registration options are listed below. Advance registration forms must be received by October 5.

Register in Advance and SAVE!

Full Time	Advance	On-Site
Member	$65	$75
Non-member	$80	$95
Spouse	$50	$60

If you register in advance you may pick up your badge in the Convention Center during the following hours (use H Street or 9th Street entrance):

Saturday, Oct. 27 ..... 1:00 pm - 5:00 pm
Sunday, Oct. 28 ..... 8:00 am - 5:00 pm
Monday-Tuesday, Oct. 29-30 .... 8:00 am - 5:30 pm
Wednesday, Oct. 31 ..... 8:00 am - 3:00 pm

On-Site Registration

Register at Convention Center (use H Street or 9th Street entrance).

Sunday, Oct. 28 ..... 8:00 am - 5:00 pm
Monday-Tuesday, Oct. 29-30 .... 8:00 am - 5:30 pm
Wednesday, Oct. 31 ..... 8:00 am - 3:00 pm

Cancellation and Refund Policy

All cancellations must be submitted in writing to the FSCT Headquarters Office. Cancellations received by October 5 will be subject to a $10 handling charge. *No refunds will be issued after that date.*

1990 Advance Registration

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY
1315 Walnut St., Philadelphia, PA 19107

C	Office Use Only
U	Date Received _____
V	Amount $ _____
	Check No. _____

Please fill out this form and mail with a check in the correct amount (made payable to the FSCT) **to the Federation address shown above.** All checks must be payable in U.S. Funds. Any that are not will be returned. DEADLINE DATE FOR ADVANCE REGISTRATION IS OCTOBER 5. NONE WILL BE ACCEPTED AFTER THAT DATE.

A $10.00 charge will be made for cancellations received prior to October 5. No refunds will be made after that date.

INDUSTRY REGISTRATION FEES:

A ☐ MEMBER $65.00

Please name the Federation Society in which you are a paid-up member:

_____
Federation Constituent Society

B ☐ NON-MEMBER $80.00

G ☐ SPECIAL FEE FOR RETIRED MEMBERS $25.00

_____
Federation Constituent Society

INFORMATION FOR REGISTRATION BADGE:

NICKNAME

FIRST NAME LAST NAME

COMPANY

STREET

CITY STATE *(U.S. only)* POSTAL CODE

COUNTRY *(OTHER THAN U.S.)* TELEPHONE NO.

BUSINESS CLASSIFICATION DATA FOR THE ABOVE REGISTRANT:

YOUR COMPANY (CHECK ONE BLOCK)

- AA ☐ Manufacturers of Paints, Varnishes, Lacquers, Printing Inks, Sealants
- BB ☐ Manufacturers of Raw Materials
- CC ☐ Manufacturers of Equipment and Containers
- DD ☐ Sales Agent for Raw Materials + Equipment
- EE ☐ Government Agency
- FF ☐ Research/Testing/ Consulting
- GG ☐ Educational Institution Library
- HH ☐ Paint Consumer
- JJ ☐ Other

YOUR POSITION (CHECK ONE BLOCK)

- KK ☐ Management/ Administration
- LL ☐ Manufacturing and Engineering
- MM ☐ Quality Control
- NN ☐ Research and Development
- PP ☐ Technical Sales Service
- QQ ☐ Sales and Marketing
- RR ☐ Consultant
- SS ☐ Educator/Student/ Librarian
- TT ☐ Other

SPOUSES REGISTRATION AND INFORMATION FOR REGISTRATION BADGE:

D ☐ SPOUSE $50.00

NICKNAME

FIRST NAME LAST NAME

SPECIAL FEE FOR THE SPOUSES OF RETIRED MEMBERS ONLY:

CITY STATE *(U.S. only)* POSTAL CODE

H ☐ $25.00

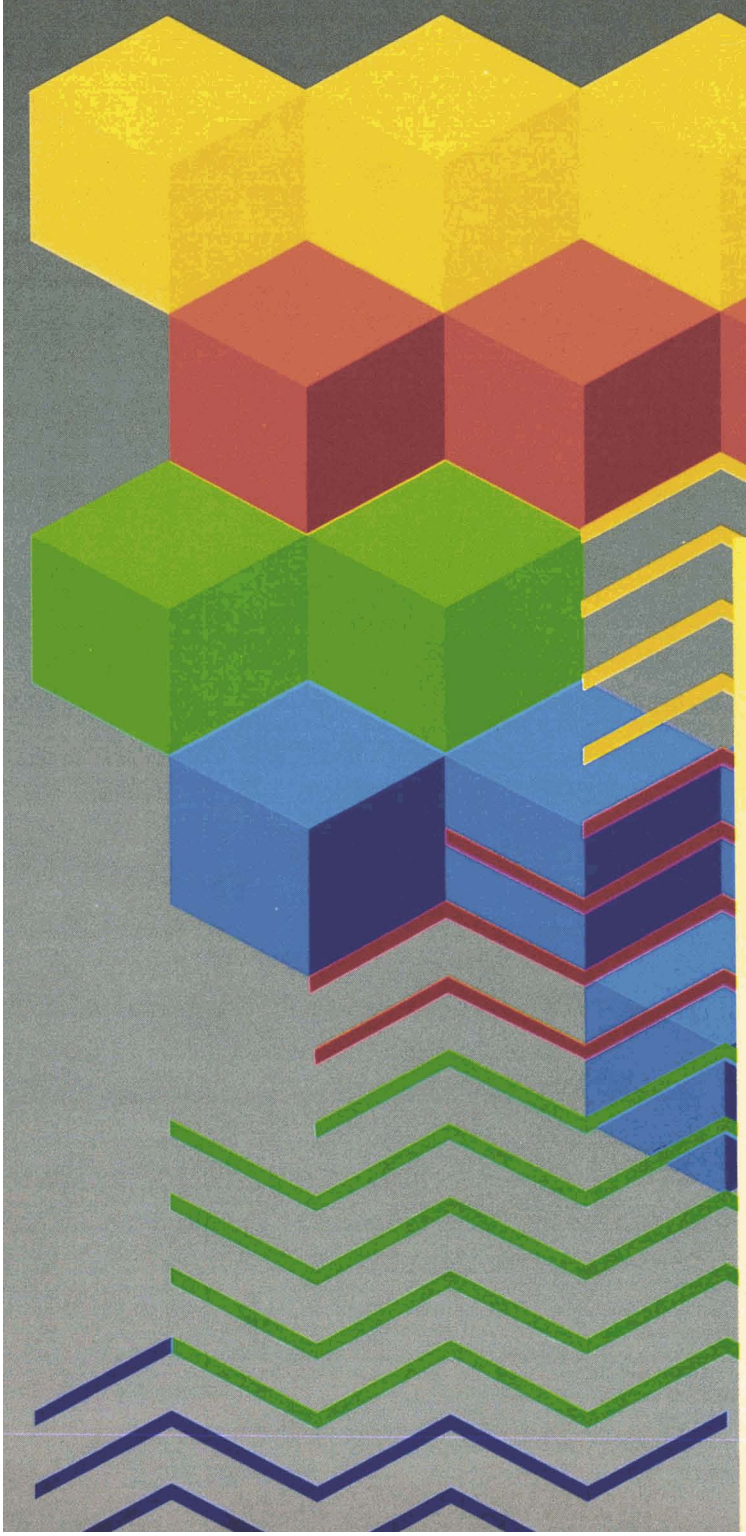
TICKETS FOR FEDERATION LUNCHEON, WEDNESDAY, OCTOBER 31 (@$ 25.00)

Z ☐ NUMBER REQUIRED: _____
$25.00 EACH.

A CHECK IN THE AMOUNT OF:
$_____
IS ENCLOSED

EXHIBITORS

BASF–
Performance Products for Coatings



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BASF is one source where you can get almost everything you need to formulate quality paints and coatings regardless of system; solvent based; aqueous; Lo VOC; high solids or powder coatings.

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Intermediate Chemicals
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Plasticizers
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Solvents
Specialty Resins
Surfactants and Stabilizers
Urethane Chemicals

No matter what you need to fill out your formula, **call or write:** BASF Corporation, 100 Cherry Hill Road, Parsippany, NJ 07054. Phone: 1(800) 669-BASF.

The Spirit of Innovation

BASF

A Five Kilometer Fitness Run

Especially for Attendees at the 1990 Paint Show in Washington, D.C.

Tuesday, October 30, 1990, at 7:00 a.m.

Start: On the Mall near the Ice Rink,
Madison Drive Walk
Finish: Inner Walkway of the Mall

Sponsored by Troy Chemical Corporation
In conjunction with the Federation of Societies for Coatings Technology

All runners are invited to join us this year for the annual event on the Paint Show schedule— the Paint Show 5000, a five kilometer fun and fitness run in Washington, D.C.

The run is scheduled for 7:00 a.m. on Tuesday. Participants will run on a measured, police-protected five kilometer (3.1 mile) course twice around the Mall. A time clock will be located at the finish.

The Paint Show 5000 is designed to be a fun, fitness, or training event open to all who want to take a five kilometer running tour of Washington, D.C.. Everyone will be a winner!

T-shirts and a memento will be given to all participants, but you must be pre-registered to run. *No entries will be accepted on race day.*

Entry fee: $5.00. **Entries must be received before October 15, 1990.** A portion of every runners' registration fee will be donated to the Coatings Industry Education Fund.

Mail entry form with a check for $5.00 entry fee (no cash, please) payable to:

Troy Chemical Corporation/Paint Show 5000
One Avenue L, Newark, NJ 07105.

NAME

TITLE

COMPANY

CITY/STATE/ZIP

TELEPHONE

SHIRT SIZE (Circle One)
Large — Extra-Large

In consideration of this entry being accepted, I the undersigned intending to be legally bound, hereby for myself, my heirs, executors and administrators, waive and release any and all rights and claims I may have against the Troy Chemical Corporation, the Federation of Societies for Coatings Technology, the host city, sponsors, their staffs, officials, volunteers and any representatives, successors or assignees for any injuries that may be suffered by me in this event. I further hereby certify that I am physically fit and have sufficiently trained for the completion of this event.

NAME (PLEASE PRINT)

DATE

SIGNATURE

FEDERATION MEETINGS AND OTHER EVENTS

Sunday, October 28

Board of Directors Meeting (9:00 a.m.) ..... Sheraton, Maryland
Women in Coatings Reception (5:30 p.m.) ..... Sheraton, Richmond and Arlington
Paint Show Exhibitors Reception (6:30 p.m.) ..... Convention Center, Second Floor Lobby

Monday, October 29

Speakers Breakfast (7:30 a.m.) ..... Convention Center, Room 20
International Visitors Lounge (8:00 a.m.-5:00 p.m.) ..... Convention Center, Room 6
Opening Session (9:00 a.m.) ..... Convention Center, Hall C
Paint Show Opens (11:00 a.m.) ..... Convention Center, Halls A & B
Spouses Welcome Reception (2:00 p.m.) ..... Convention Center, Hall C
Gallows Bird Reception (5:00-7:00 p.m.) ..... Sheraton, Colorado

Tuesday, October 30

Speakers Breakfast (7:30 a.m.) ..... Convention Center, Room 20
Spouses Continental Breakfast (7:30 a.m.) ..... Sheraton, Maryland and Grand Hyatt, Independence Ballroom
International Visitors Lounge (8:00 a.m.-5:00 p.m.) ..... Convention Center, Room 6
Spouses Tour (9:30 a.m.) ..... Sheraton, 24th Street Entrance and Grand Hyatt, 10th Street Entrance
NDSU Alumni Reception (11:30 a.m.) ..... Convention Center, Room 20
Canadian Luncheon (12:00 noon) ..... Grand Hyatt, Independence A
International Visitors Reception (6:30 p.m.) ..... Sheraton, Washington

Wednesday, October 31

Speakers Breakfast (7:30 a.m.) ..... Convention Center, Room 24
Spouses Continental Breakfast (7:30 a.m.) ..... Sheraton, Maryland and Grand Hyatt, Constitution Ballroom
International Visitors Lounge (8:00 a.m.-5:00 p.m.) ..... Convention Center, Room 6
Annual Business Meeting (9:00 a.m.) ..... Convention Center, Room 15
Annual Luncheon (12:00 noon) ..... Convention Center, Hall C
President's Reception (6:30 p.m.) ..... Sheraton, Early Light
Past-Presidents' Dinner (7:30 p.m.) ..... Sheraton, Colorado
Past-Presidents' Wives' Dinner (7:30 p.m.) ..... Sheraton, Idaho

SPOUSES ACTIVITIES

Monday, October 29

The Spouses Program of Activities will begin with the traditional get-acquainted wine and cheese social in the Convention Center Hall C. There will be favors and door prizes contributed by suppliers to the Paint Industry.
Wine courtesy of Pfizer, Inc.

Tuesday, October 30

Continental Breakfast will be served in the Maryland Suite of the Sheraton Washington Hotel and the Independence Ballroom of the Grand Hyatt Hotel.

Luxury coaches will depart from the Sheraton and Grand Hyatt for a spectacular tour of the our nation's capital. The tour includes Washington's famous sights and museums. A visit to the Capitol, National Gallery of Art, the Smithsonian's Museum of American History, the Lincoln Memorial, and Vietnam Memorial will be included in the tour. Buses will journey past the White House, through Georgetown, and along "Embassy Row." As an added delight, the tour guides will present tales of Washington's past and present—and, especially for Halloween—the city's best documented ghost stories.

Luncheon will be served at the famous Sequoia Restaurant in Georgetown's Washington Harbor complex. The restaurant features American cuisine, and offers a lovely view of the Potomac River and the Kennedy Center.

Wednesday, October 31

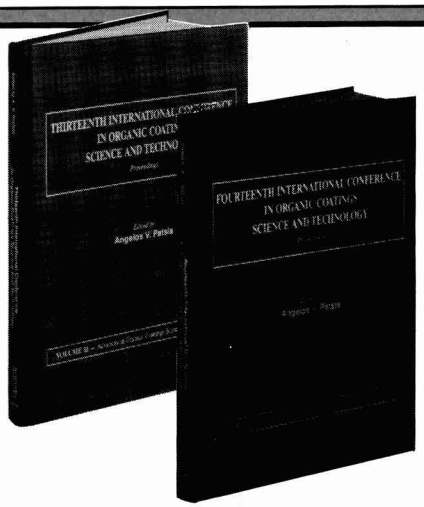
Continental Breakfast at the Sheraton Washington and Grand Hyatt.

The Annual Luncheon will be held in Hall C of the Convention Center. The featured speaker will be Douglas Kiker, noted TV news correspondent. Several Federation awards will be presented.

The spouses registration fee ($50.00 in advance, $60.00 in Washington, D.C.) includes the wine and cheese social, two continental breakfasts, and the Tuesday tour and luncheon. Tickets for the Wednesday luncheon are available for $25.00 in the registration area at Convention Center

New Volumes in International Coatings Series:

Advances in Organic Coatings Science and Technology



Proceedings of the International Conference in Organic Coatings Science andTechnology, Athens, Greece. Editor: *Angelos V. Patsis,* Head, Chemistry Department, State University of New York, New Paltz, NY

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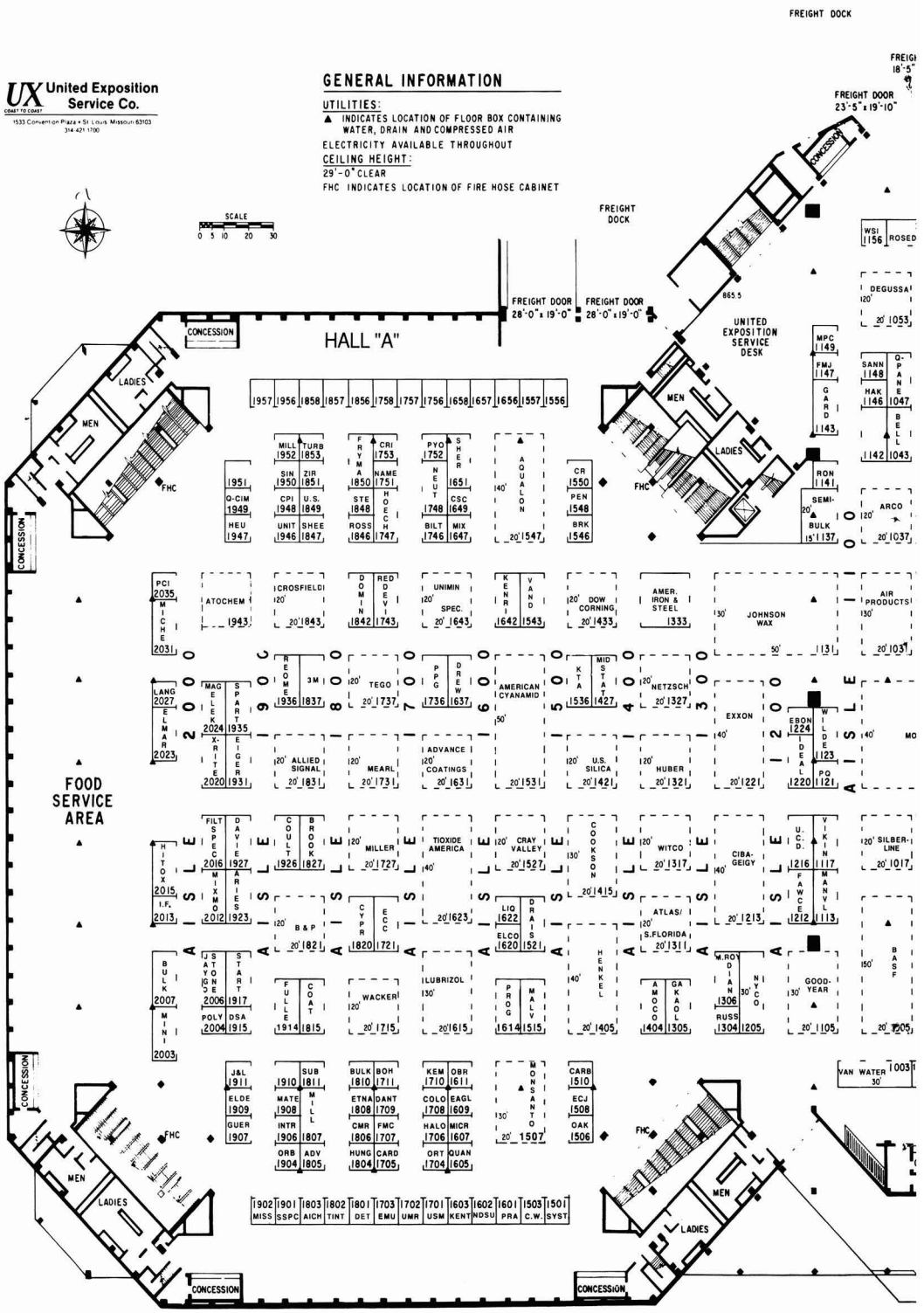
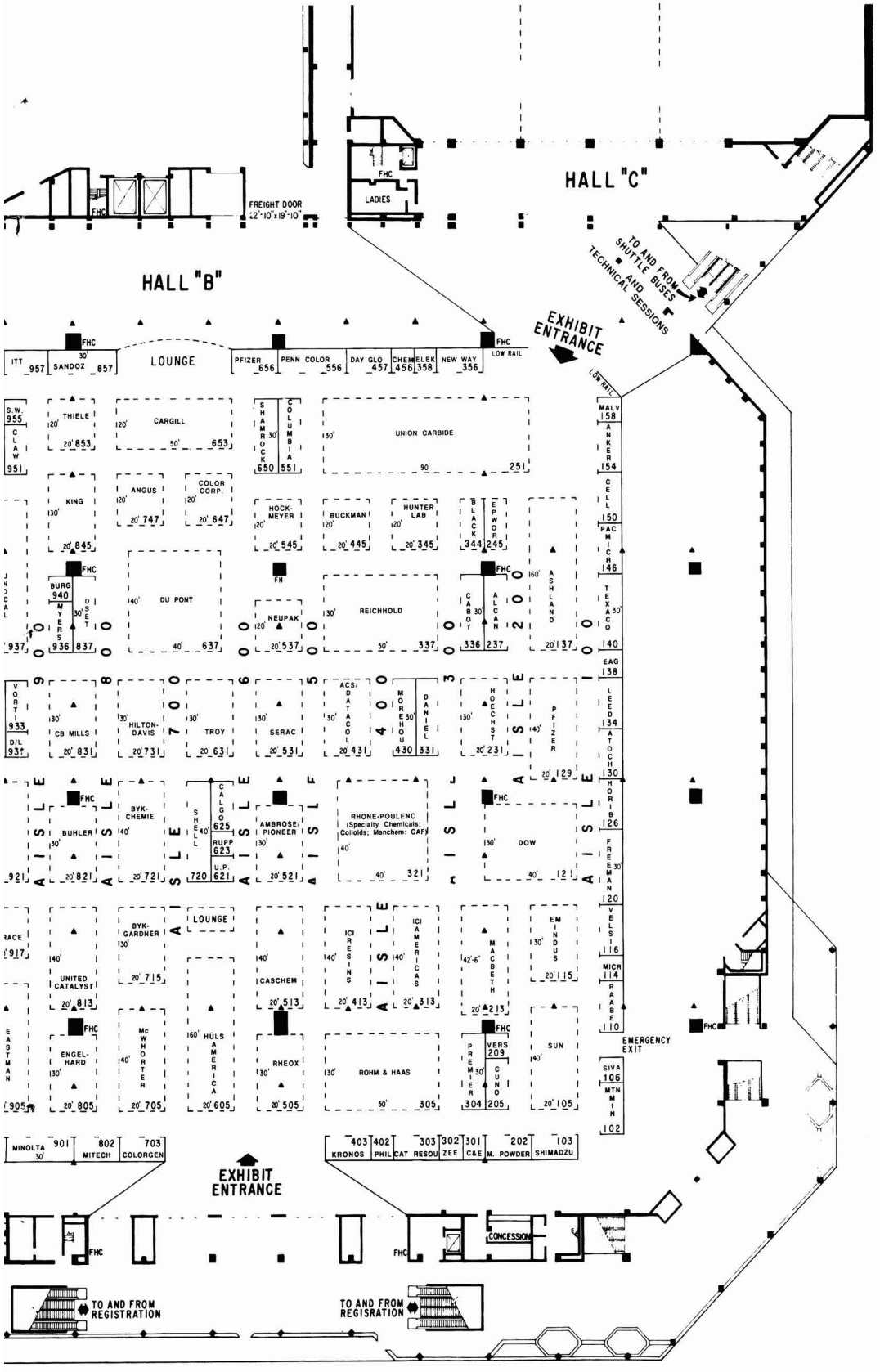
1990 PAINT INDUSTRIES' SHOW
OCTOBER 29-31, 1990
WASHINGTON, D.C.
CONVENTION CENTER

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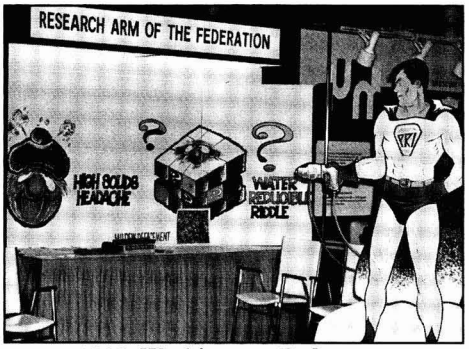
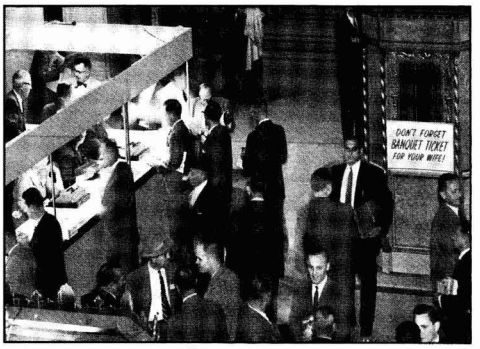
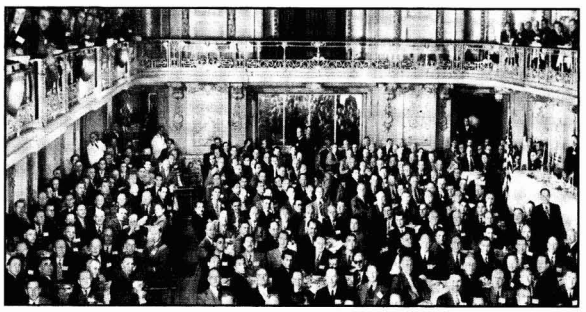


1982, Washington, D.C.



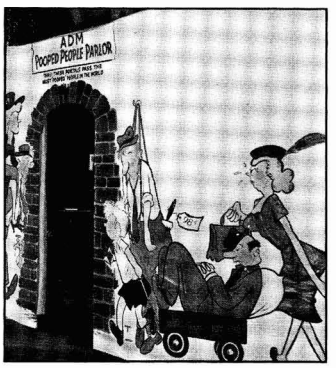
1958, Cleveland, Ohio

FSCT Paint Shows of the Past



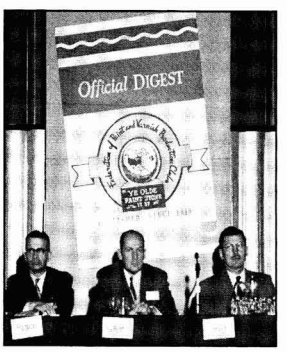
1948, Chicago, Illinois

1977, Houston, Texas



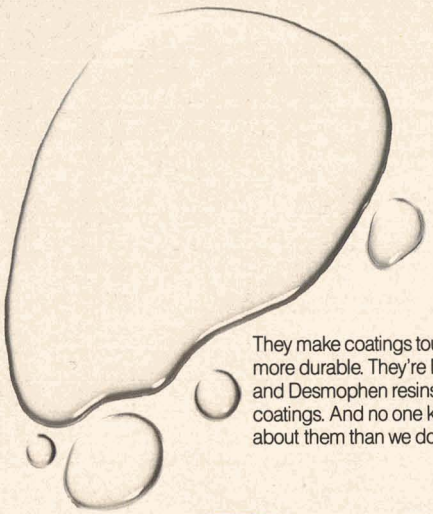
1958, Cleveland, Ohio

1961, Washington, D.C.



1952, Chicago, Illinois

One of the biggest names in the paint business



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Our organic pigments provide hues that stay true for millions of cars and homes.

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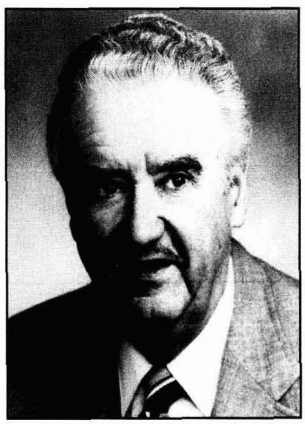
Opening Session

Monday, October 29

Keynote Address

"A Generation of Eagles"

Lee Sherman Dreyfus



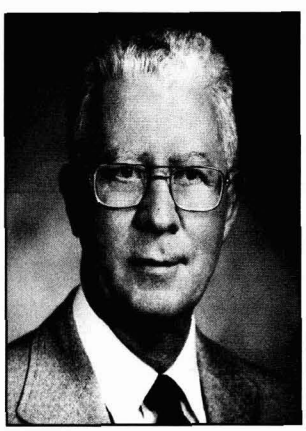
The former Governor of the State of Wisconsin (1979-83), Lee Sherman Dreyfus is a noted orator. Currently President of Lee Sherman Dreyfus, Inc., Dr. Dreyfus serves on the Board of Directors for many organizations, including the Wisconsin-based Marcus Corporation, the President's Council of Experimental Aircraft Association, and the Milwaukee Orchestra. In addition, he serves on the Board of Directors for American Energy Week, Inc. in Washington, D.C. The achievements of Dr. Dreyfus have been noted in *Who's Who in the World* and *Who's Who in America.*

Mattiello Lecture

Wednesday, October 31

"Electrochemical Techniques for Studying Protective Polymeric Coatings"

Dr. Henry Leidheiser, Jr.



Most recently the Director of the Center for Surface and Coatings Research at Lehigh University, in Bethlehem, PA, Dr. Henry J. Leidheiser is recognized for his work on the surface properties of single crystals of metals. He is renowned for his electrochemical studies of protective metallic and organic coatings. Dr. Leidheiser is also recognized for his extensive publishing credits and for his work in organizing many technical conferences. His most recent research activities have focused on such areas as corrosion under organic coatings, the nature of ions within a coating, the chemistry of the metal/organic coating interface, and the application of electrochemical techniques to appraising organic coatings.

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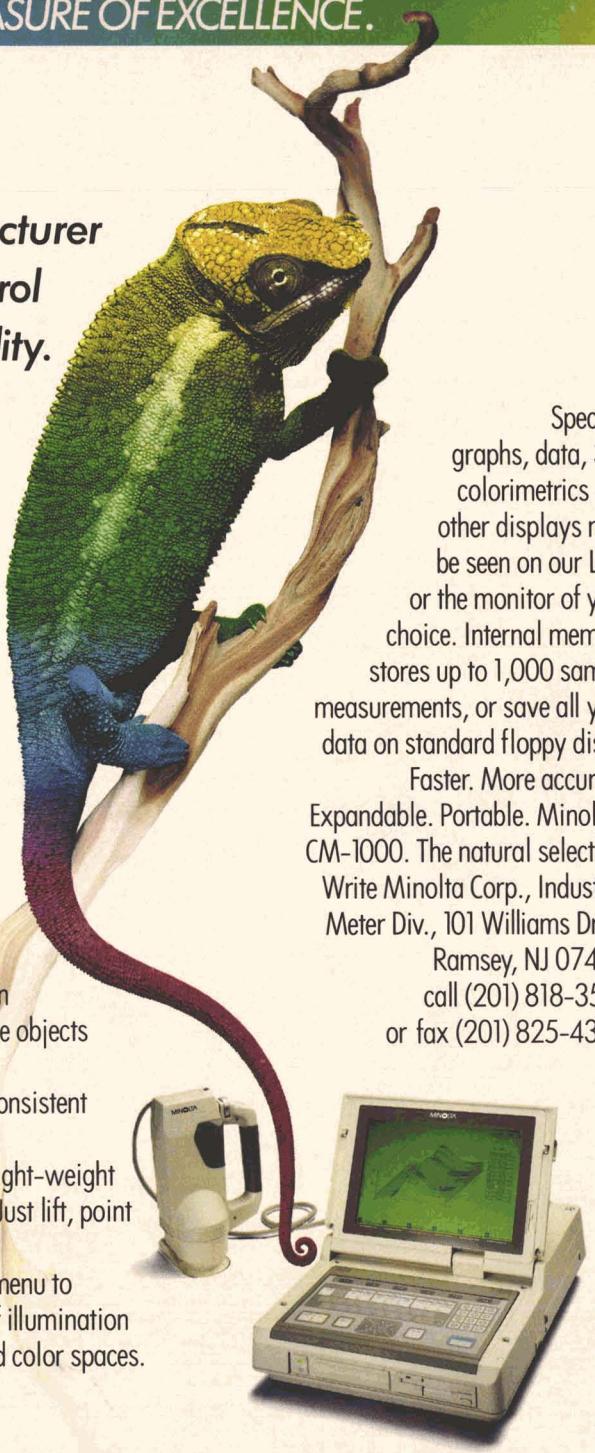

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FSCT Annual Luncheon

Wednesday, October 31
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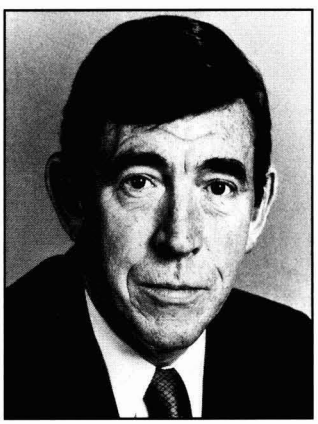

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- Paint Industries' Show Awards

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ADDITIONAL HIGHLIGHTS

"A DECADE OF DECISION: PREPARING FOR THE YEAR 2000"

The theme of the 1990 Annual Meeting emphasizes that, more so than in decades past, the 1990s will demand decisions on coatings technology, substrates, and application methods which will influence the products, markets, and profitability of the industry as it enters the 21st Century. Programming will focus on discussions of these areas as they relate to current state-of-the-art and future demands, as well as environmental considerations. Also on the program will be the Mattiello Memorial Lecture, Roon Awards Papers, Society Papers, and Seminars. Speakers will come from throughout the world of coatings science and manufacture.

NINE HOTELS TO FURNISH HOUSING

Nine hotels have reserved blocks of rooms for the Federation, with the Sheraton Washington serving as headquarters hotel. Other hotels include the Omni Shoreham, Washington Hilton, Capital Hilton, Ramada Renaissance Techworld, Grand Hyatt Washington, Holiday Inn Crowne Plaza, J.W. Marriott, and Days Inn/Downtown Convention Center. All housing will be processed through the Washington D.C. Convention Bureau.

HOST COMMITTEE

The Baltimore Society will serve as the Host for the Annual Meeting. General Chairman of the 1990 Annual Meeting is Richard C. Chodnicki, of Van Horn, Metz & Co., Inc. Assisting him are the following sub-committee chairpersons: *Information Services*—Mitch Dudnikov, of Genstar Stone Products Co.; *Program Operations*—Tom Mitchell, of Hüls America, Inc.; *Registration Area*—Mel Hammel, of Fein Container Corp.; *Federation Exhibit*—Bob Hopkins, of SCM Chemicals Inc.; *Hospitality Suite*—Richard DiMarcantonio, of Steeltin Can Corp.; and *Spouses' Activities*—Carolyn (Richard) Chodnicki and Carolyn (Tom) Mitchell.

PROGRAM COMMITTEE

Chairman of the 1990 Program is Gary M. Gardner, of Tnemec Co., Inc. Serving with Mr. Gardner are: Gerry Parsons (Vice-Chairman), DeSoto Coatings Ltd., Mississauga, Ont., Canada; Robert F. Brady, Jr., U.S. Naval Research Laboratory, Washington, D.C.; Mary G. Brodie, The Sherwin-Williams Co., Cleveland, OH; Richard M. Hille, General Paint & Chemical Co., Cary, IL; Richard J. Himics, Daniel Products Co., Jersey City, NJ; Terryl F. Johnson, Cook Paint & Varnish Co., Kansas City, MO; and George R. Pilcher, Akzo Corp., Columbus, OH.

REGISTRATION FEES

Advance registration forms and information was sent to all members in April. Advance fees are $65 for members and $80 for non-members. The fee for spouses' activities is $50 in advance. Retired members and their spouses may register for the special advance fee of $25 each.

On-site registration will be $75 for full-time and $55 for one-day for members. Non-member fees will be $95 for full-time and $65 for one-day. Spouses' activities will be $60 on-site.

DELTA AND US AIR OFFER SPECIAL FARES TO D.C.

Delta Airlines and US Air, in cooperation with the Federation, are offering special discounted airline fares which afford a 40% minimum savings off round trip, undiscounted day coach fares for travel to the FSCT Annual Meeting and Paint Industries' Show on the airlines' domestic systems. The discount from Canada is 35%.

To take advantage of these discounts, you must travel to Washington, D.C. between October 24 and November 4, 1990; purchase tickets at least seven (7) days in advance; and telephone the following numbers for reservations, giving the applicable FSCT File Number: for Delta—1-800-241-6760 **(File #U0235)**; for US Air—1-800-334-8644 in the U.S., or 1-800-428-4322 in Canada **(File #719568).** These special fares are available only through these numbers.

Discounts are good for both direct and connecting flights to Washington, D.C. If you use a travel agent, have reservations placed through the toll-free numbers to obtain the same fare advantages. Both Delta and US Air have a variety of other promotional fares, some of which may represent even greater savings. When making reservations, request the best discount applicable to your itinerary.

FEDERATION ANNUAL LUNCHEON WILL BE HELD ON WEDNESDAY

The annual Federation Luncheon will be held on Wednesday, October 31, at the Convention Center. Tickets may be purchased in advance or on-site at the registration area of the Convention Center. Highlighting the event will be an address by Douglas Kiker, one of the nation's most respected television news correspondents.

FEDERATION BOARD OF DIRECTORS TO MEET ON SUNDAY IN SHERATON

The Board of Directors of the Federation will meet on Sunday, October 28, at 9:00 a.m. in the Sheraton Washington Hotel.

NPCA TO MEET SAME WEEK AT WASHINGTON HILTON

The National Paint and Coatings Association will meet beginning Wednesday, October 31, at the Washington Hilton. Persons who have registered for NPCA and who pick up their badges on Tuesday, October 30 will be admitted to the Paint Show on *Tuesday only* with the compliments of the Federation.

ASTM STANDARDS TRAINING COURSE TO FOLLOW FSCT ANNUAL MEETING

The American Society for Testing and Materials (ASTM) will sponsor a Standards Technology Training Course, "Measuring Paint Volatile Organic Compounds (VOC)" on November 1-2, 1990 in Washington, D.C., following the Annual Meeting and Paint Show. The course will be held at the Holiday Inn-Washington, D.C.-Central, 1501 Rhode Island Ave. For more information, contact Kathy Dickinson, ASTM, 1916 Race St., Philadelphia, PA 19103.

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And for technical data or product literature on Exxon Chemical's complete line of hydrocarbon and oxygenated solvents for architectural coatings, call your technical sales representative, at 1-800-526-0749 (in Texas, 713-870-6956).

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CAUSES OF DISCOLORATION IN PAINT FILMS

Some of the common causes of paint discoloration, such as mildew, sulfide staining, dirt retention, and staining by cedar or redwood, are illustrated on houses and on painted panels. Chemical tests for distinguishing between these types of stains are shown. A test for distinguishing efflorescence and chalking of paint films is also described. 15 minutes (37 slides) **$40**

THE SETAFLASH TESTER

Produced by the Technical Committee, Birmingham Paint, Varnish and Lacquer Club

The Setaflash Tester offers the capability to quickly ascertain the flash point of a volatile product. This presentation describes the equipment and explains the procedures for determining flash point in two temperature ranges (ambient to 110° C; 0° C to ambient) by both the flash/no-flash method and the definitive method. 54 minutes (134 slides) **$100**

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(3 Lessons) Lessons vary from 7 to 11 minutes (79 slides . . . **$70**

Lessons	*Producing Society*
A Simple Method to Determine Microbiological Activity	Philadelphia
A Salt Spray (Fog) Testing Cabinet	Golden Gate
Wet Film Thickness Gages	Golden Gate

*Volume I not available at this time.

HIGH SPEED DISPERSION

Produced by the Manufacturing Committee, Montreal Society for Coatings Technology

The program covers theoretical and practical techniques used for dispersion in paint plants, showing laboratory test equipment and plant scale manufacturing procedures. 20 minutes (60 slides) **$65**

INTRODUCTION TO RESIN OPERATIONS

Produced by the Manufacturing Committee, Toronto Society for Coatings Technology

This presentation has been developed to assist in the selection and training of resin plant operators, and focuses on basic concepts of manufacture and the role of a resin operator. 12 minutes (58 slides) **$65**

A BATCH OPERATED MINI-MEDIA MILL

Produced by the Manufacturing Committee, New York Society for Coatings Technology

This presentation describes the design and operation of a batch operated mini-media mill, and was developed to assist in the training of plant personnel to operate such equipment. 8½ minutes (51 slides) **$60**

NOW AVAILABLE!

OPERATION OF A VERTICAL SANDMILL—(Produced by the Manufacturing Committee, Kansas City Society for Coatings Technology). This program describes the design and operation of a vertical sandmill, to assist in the training of plant personnel to operate such equipment. 14 minutes (73 slides)..... **$75**

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Regulatory UPDATE

SEPTEMBER 1990

This digest of current regulatory activity pertinent to the coatings industry is published to inform readers of actions which could affect them and their firms, and is designed to provide sufficient data to enable those interested to seek additional information. Material is supplied by National Paint and Coatings Association, Washington, D.C.

Lead Bill Moves Through Subcommittee—The Senate Environmental Oversight, Research and Development Subcommittee approved an amendment to the Toxic Substances Control Act (TSCA) in the form of a substitute lead bill that reflects elements of two previous lead bills. The legislation, S. 2637, sponsored by Senator Harry Reid (D-NV), is a compromise combination of Reid's original bill (The Lead Exposure Reduction Act) and Senator Bill Bradley's (D-NJ) Lead Ban Act (S. 2593).

The most significant changes in the substitute are specific restricted exemptions for some products including lead paint and materials used by artists and stained glass crafts people; lead solder (other than those used in plumbing and food cans), and lead fishing weights. Under the legislation, EPA would be required to inventory all products containing lead. If the Administrator determines that the lead content in a specific product is harmful to human health or the environment, EPA may promulgate a regulation to reduce or eliminate the lead in that product.

Under TSCA section 5(d), manufacturers and processors of any new lead product would be subjected to a pre-notification requirement of 180 days before manufacturing, importing or processing of the product; must submit any test data required under TSCA section 5 (b), and produce any information that the product is not likely to disperse lead into the environment.

House Subcommittee Passes RCRA Amendment—On July 27, The House Subcommittee on Transportation and Hazardous Materials passed a watered down version of a comprehensive amendment to the Resource Conservation and Recovery Act.

Most members of the House and Senate have repeatedly said they would prefer to deal with a comprehensive RCRA overhaul during the next Congress when there will be sufficient time required to pass effective legislation. Congress is scheduled to adjourn October 5, and it is very unlikely that any further action will be taken on this issue.

Cabinet Status for EPA Still Uncertain—Action is still expected this year on S.2006 (Glenn D-OH), a bill to raise the Environmental Protection Agency to Cabinet level. The legislation was approved by the Governmental Affairs Committee on February 28.

Environmental Crimes Bill May See Action in September—Legislation that would make it a criminal offense to simply cause the risk of an environmental accident or to endanger life is still waiting for action by the House Judiciary Committee.

The Environmental Crimes Act, H.R. 3641, (Schumer D-NY) would impose fines of up to $500,000 for individuals and up to $2 million for corporations who "knowingly create a risk of death by polluting." Persons can also be charged with a misdemeanor for negligent endangerment, and repeat offenders could face up to 30 years in prison.

Clean Air Act—On Friday, August 3, the Clean Air Conference Committee reached an agreement on a section of the Clean Air Act (S. 1630) that would phase out the production of certain chemicals that destroy the ozone layer.

As a result of a compromise, conferees agreed to ban CFC's by the year 2002. The Senate version originally called for a phase out by 2000, and the House bill set the deadline at 2005. A widely used industrial solvent, methyl chloroform will be included in that ban.

Environmental Protection Agency
July 24, 1990—55 FR 30082
EPA Administered Permit Programs; the National Pollutant Discharge Elimination System; General Pre-treatment Regulations for Existing and New Sources; Regulations to Enhance Control of Toxic Pollutants and Hazardous Waste Discharges to Publicly Owned Treatment Works
Action: Final Rule

The Environmental Protection Agency (EPA) has announced the promulgation of a final rule implementing proposed revisions to the General Pre-treatment and National Pollutant Discharge Elimination System regulations.

The final rule directs the EPA Administrator to revise existing regulations and issue new regulations on an as needed basis in order to "adequately control" the discharge of hazardous wastes to public facilities. The rule is effective as of August 23, 1990.

For further information contact: Marilyn Goode, Permits Division (EN-336), Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460 (202) 475-9526.

Department of Labor
Occupational Safety and Health Administration
July 27, 1990—55 FR 30720
Accreditation of Training Programs for Hazardous Waste Operations
Action: Proposed rule; notice of informal public hearing; reopening of comment period.

On January 26, 1990 (55-FR 2776), the Occupational Safety and Health Administration (OSHA) published a notice of proposed rulemaking on the accreditation of training programs for general industry.

The hearings are scheduled for October 2-5, 1990 in Washington, DC, in the Auditorium of the Frances Perkins Building, U.S. Department of Labor, 200 Constitution Avenue, NW and October 10-11, at the Holiday Inn Riverfront, 600 West Third Street, Covington, Kentucky (Cincinnati, Ohio). Notices of intention to appear at the hearings must be postmarked by September 10, 1990. Testimony and all evidence which will be offered into the hearing record must be postmarked by September 21, 1990. Four copies of all documents must be sent to Tom Hall, Division of Consumer Affairs, Occupational Safety and Health Administration, U.S. Department of Labor, Room N-3647, 200 Constitution Avenue, NW, Washington, DC 20210, (202) 523-8615.

Written comments on the proposed rule will be accepted until September 21, 1990, and should be sent in quadruplicate to the Docket Officer, Docket No. S-760-B, U.S. Department of Labor, Room N-2625, 200 Constitution Avenue, NW, Washington, DC 20210. For further information, contact James Foster, Occupational Safety and Health Administration, U.S. Department of Labor, Room N-3647, 200 Constitution Avenue, NW, Washington, DC 20210, (202) 523-8151.

Environmental Protection Agency
July 26, 1990—55 FR 30632
Community Right-to-Know Reporting Requirements
Action: Final Rule

On October 15, 1987 (52 FR 38344), the Environmental Protection Agency (EPA) established reporting thresholds for hazardous chemicals as specified by Section 311 of the Emergency Planning and Community Right-to-Know Act (EPCRA).

At that time, the reporting thresholds for the first two years of reporting were set at 10,000 pounds for hazardous chemicals and at 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances (EHSs). In the same rulemaking, EPA had promulgated zero thresholds for the third year of reporting.

Following a study of alternative thresholds, EPA subsequently published an Interim Final Rule extending, for manufacturing facilities, the first two years of reporting [(October 12, 1989) 54 FR 41904]. On July 26, 1990, EPA promulgated final reporting thresholds under sections 311 and 312 at the current levels. Therefore, for non-EHS, the reporting thresholds remain at 10,000 pounds, and for EHSs, 500 pounds or the TPQ, whichever is lower.

All facilities from all industry sectors are subject to the final thresholds as of August 27, 1990.

For further information contact: Kathleen Jones, Project Officer, Chemical Emergency Preparedness and Prevention Office, Office of Solid Waste and Emergency Response, OS-120, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460, or the Emergency Planning and Community Right-to-Know Information Hotline at (800) 535-0202.

Environmental Protection Agency
August 1, 1990—55 FR 31312
TSCA Chemical Substance Inventory; Removal of 207 Incorrectly Reported Chemical Substances from the TSCA Inventory
Action: Notice

The Environmental Protection Agency has announced the deletion of 207 chemicals from the Toxic Substances Control Act (TSCA) chemical substances inventory.

The chemicals were deleted as of August 1, 1990.

For further information, contact Michael M. Stahl, Director, Environmental Assistance Division (TS-799), Office of Toxic Substances, EPA, 401 M Street, SW, Washington, DC, 20460, (202) 554-1404; TDD: (202) 554-0551.

Environmental Protection Agency
August 1, 1900—55 FR 31342
Zinc Sulfide; Toxic Chemical Release Reporting; Community Right-to-Know; Denial of Petition
Action: Denial of Petition

Because of evidence that zinc ion, a derivative of zinc sulfide, has been found to be toxic to marine organisms, the Environmental Protection Agency (EPA) has denied a petition to remove zinc sulfide from the list of toxic chemicals subject to reporting under section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). Additionally, further evidence indicates that zinc ion may cause adverse effects in human development.

Environmental Protection Agency
July 27, 1990—55 FR 30798
Corrective Action for Solid Waste Management Units (SWMU's) at Hazardous Waste Management Facilities
Action: Proposed rule

The Environmental Protection Agency has proposed corrective action requirements under the Resource Conservation and Recovery Act (RCRA) for solid waste management units (SWMU's) at facilities that are applying for permits under section 3005(c) of RCRA.

The proposal defines requirements for conducting basic investigations, evaluating possible remedies, and designing implementation plans for RCRA facilities. It also establishes standards to authorize States to administer their own corrective action requirements. Additionally, the proposal amends current permit requirements and requirements for information on the closing of facilities.

Written comments on the proposed rule will be accepted until September 25, 1990. Comments should be sent in triplicate to the docket clerk (docket number F-90-CASP-FFFF) U.S. EPA, RCRA Docket (OS-305), 401 M Street, SW, Washington, DC 20460. Public hearings will be held on October 9, 1990 at the Hyatt Regency San Francisco, 5 Embarcadero Center, San Francisco, CA 94111, (415)-788-1234; and October 12, 1990 at the Omni Shoreham Hotel, 2500 Calvert Street, NW, Washington, DC 20008, (202)-234-0700.

For further general information, contact the RCRA/Superfund Hotline, Office of Solid Waste, U.S. EPA, Washington, DC 20460, (800)-424-9346. For specific information on the proposed rule, contact David Fagan, Office of Solid Waste (OS-341), U.S. EPA, 401 M Street, Washington, DC 20460 (202) 382-4740.

States Proposed Legislation and Regulations

Arkansas

Water Quality—This Department of Pollution Control and Ecology regulation revises the Arkansas Water Quality Standards. For more information, contact Doug Szenher, Public Affairs Supervisor, Department of Pollution Control and Ecology, 8001 National Dr., P.O. Box 9583, Little Rock, AR 72219. The comment deadline is September 6, 1990.

California

Air Quality—A. 2766 (Sher) authorizes fees to be imposed by a county, unified, or regional air pollution control district, and used to reduce air pollution. Prescribes the distribution of revenues from those fees in the south coast district, and also would impose certain duties on the Department of Motor Vehicles with respect to the collection of the fees, and the State Air Resources Board with respect to determining the efficacy of the air pollution reduction programs.

A. 3152 (Tanner) requires the State Air Resources Board and the State Department, in consultation with other agencies and an ad hoc advisory committee, to report to the governor and the Legislature by January 1, 1992, with recommendation for a plan to reduce or prevent public exposure to indoor air pollutants.

A. 3153 (Tanner) applies criminal penalties and certain additional civil penalties to violations of toxic air contaminant provisions of the State Air Resources Board.

A. 3189 (Tanner) requires the South Coast Air Quality Management District to adopt rules and regulations requiring the District to carry out powers and duties relating to air pollution control in the South Coast Air Basin; requires that emission offsets be secured by the applicant so as to bring about, and that any emissions reductions acquired from stationary sources operating within the air basin will result in, ambient air quality improvement.

A. 3783 (Campbell) applies a penalty to violation of a rule or regulation of an air pollution control district or air quality management district limiting emissions of toxic air contaminants identified by the state board; increases the civil penalties and fines.

A. 4059 (Wyman) states that pollution control districts and air quality management districts have the power to require any owner or operator of any nonvehicular air pollution emission source to describe the source and disclose data necessary to estimate emissions.

A. 4092 (Roybal-Allard) requires air pollution control officer to request specified information from a supplier of volatile organic compounds or hazardous materials. Makes it a misdemeanor for failure to comply.

S. 1770 (McCorquodale) creates the San Joaquin Valley Air Quality Management District; assumes the functions of the county air pollution control districts in those areas; specifies the duties and functions of the district with respect to the adoption of rules and regulations; permits the district to adopt a schedule of fees levied on sources of air pollution subject to district regulation.

S. 1817 (Roberti) enacts the Toxic Air Pollution Prevention Act of 1990; declares the intent of the Legislature to more effectively reduce pollution at its source; encourages state departments and agencies to promote the prevention of environmentally harmful releases into the air, land and water; requires specified facilities to conduct a pollution prevention audit and establish a plan to be submitted to the appropriate air pollution control district or air quality management district.

S. 2672 (Presley) allows increases at a stationary source in one air pollution control district or air quality management district to be offset by reductions in another district, whereby reductions in the emission of air contaminants may be banked and used to offset future increases in emissions.

A proposed CARB regulation revises the fee schedule under the Air Toxics "Hot Spots" Information and Assessment Act of 1987 and revises the list of substances contained in the Emission Inventory Criteria and Guidelines Regulations to correspond to the changes made in the fee schedule. The comment deadline is September 11, 1990 with hearings on September 13-14, 1990. For more information, contact Janette Brooks, Manager, Special Projects Section, Toxic Air Contaminant Identification Branch, Stationary Source Division, (916) 322-9148 or Public Information Office, (916) 322-2990, ARB, 1102 Q St., P.O. Box 2815, Sacramento, CA 95812.

Water Quality—S. 1816 (Roberti) enacts the Toxic Discharges Prevention Act of 1990, which requires the State Board, in consultation with the regional boards, to establish a program to prevent the generation of water contaminants; requires each discharger to conduct a pollution prevention audit and plan.

Hazardous Waste—A. 2595 (Tanner) requires each city within a county with a hazardous waste management plan to take a specified action, within 180 days after receiving written notification from that county that the county hazardous waste management plan has been approved and to implement the approved plan. Requires the Department, if the Department disapproves the county or regional hazardous waste management plan, to provide the county with reasons for disapproval.

A. 2834 (Quackenbush) authorizes the Department of Health Services, any local health officer, or any designated local public officer to enforce the standards and regulations adopted to implement the hazardous waste control laws. Requires the Department to apply the standards and regulations to the management of hazardous waste and deletes the authority to adopt additional standards and regulations.

Household Hazardous Waste—A. 2597 (Tanner) exempts hazardous wastes generated or disposed of by any public agency operating such a program or any person operating a household hazardous waste collection program under an agreement with a public agency.

A. 2641 (Wright) requires the State Department of Health Services to allow any city, county, or special district which operates a household hazardous waste program, or any person operating a household hazardous waste collection program under an agreement with a public agency, to allow small quantity commercial sources which comply with specified criteria to participate in that program.

Taxes—A. 3580 (Katz) authorizes a city, county, or city and county to levy a tax ordinance on the sale of aerosol paint containers and felt tip markers. Requires the local entity imposing such a tax to contract with the State Board of Equalization to administer and enforce the tax. Requires the tax to be collected by every retailer of a taxed item and requires the retailer to remit the tax to Board.

Building Codes—A. 3588 (Speier) requires the State Department of Health Services to develop nonbinding guidelines for the reduction of exposure to volatile organic com-

pounds from construction materials in newly constructed or remodeled office buildings, as specified, submit them to the Legislature, and file copies with the Department of General Services and the State Building Standards Commission, by January 1, 1992.

Toxic Substances—A. 1469 (Margolin) requires the Occupational Safety and Health Standards Board to revise the California Code of Regulations to include certain carcinogens and industrial processes listed by the International Agency for Research on Cancer, and substances for which the State Department of Health Services has issued a hazard alert regarding carcinogenicity, unless a substance or industrial process is covered by a separate comparable standard.

A. 1728 (Katz) enacts the Hazardous Materials Reporting and Use Reduction Act of 1989; requires the Environmental Affairs Agency to establish systems for collecting, storing, and distributing hazardous materials data to the public and among each state and local agency; requires each state and local agency which collects hazardous materials data to make the data available to the Agency, as specified, upon the request of the Agency.

A. 4160 (Katz) enacts the Children's Poison Protection Act of 1990; requires a toxic household product manufactured on and after January 1, 1992, that contains any of certain specified substances and sold in this state to include a bittering agent within the product, unless the product is packaged in child-resistant safety closures; requires manufactures of toxic household products that contain other specified substances to package their products with these child-resistant safety closures.

S. 65 (Kopp) includes public agencies, as defined and subject to the approval of the electors, within the Proposition 65 discharge or exposure prohibitions, against knowingly discharging or releasing a chemical known to the state to cause cancer or reproductive toxicity into water, without giving a specified warning.

S. 1627 (Torres) requires the State Department of Health Services to establish and maintain an occupational lead poisoning prevention program, as specified; requires a fee to be assessed on those employers involved in industries which present a potential source of occupational lead poisoning; requires the fee to be assessed and collected annually by the board, as prescribed.

A proposed rule adds additional chemicals known to the State to cause cancer, as required under the Safe Drinking Water and Toxic Enforcement Act of 1986. For more information, contact Dr. Steven A. Book, California Health and Welfare Agency, 1600 Ninth St., Rm. 460, Sacramento, CA 95814.

Occupational Safety and Health—A proposed rule revises the General Industry Safety Orders regarding occupational exposure to hazardous chemicals in laboratories, to incorporate the provisions of the federal standard (29#CFR 1910.1450). The comment deadline and hearing date is September 20, 1990. For more information, contact Steven Jablonsky, Executive Officer, California Occupational Safety and Health Standards Board, 1006 Fourth St., 3rd Floor, Sacramento, CA 95814-3372, (916) 322-3640.

Testing—A. 4243 (Jones) defines the term "regulatory purposes" as used in existing law which requires the issuance of certificates of accreditation to laboratories which perform various analyses, for regulatory purposes, of food, drinking water, waste water, hazardous wastes, or contaminated soils or sediments, in part, by referencing certain existing provisions of law which contemplate the use of laboratory analysis by a regulatory governmental agency in determining compliance with their requirement.

Aerosol/Graffiti—S. 2448 (Watson) permits any territory, whether incorporated or unincorporated, whether contiguous or noncontiguous, or whether within one or more counties, to be included in a district. Includes graffiti abatement as a specified purpose and enacts procedures for the establishment of graffiti abatement districts with specified powers for the purpose of abating graffiti. Authorizes these districts to impose a tax on the sale of marking substances or instruments.

Connecticut

Packaging—H. 5852 (Committee on Environment) concerns reduction of toxics in packaging; reduces the amount of heavy metals used in packaging or packaging materials.

Right-to-Know—H. 5880 (Committee on Labor/Public) concerns an employee's right to certain information concerning health hazards; provides employees with increased workers' compensation benefits when their employers fail to provide them with certain information concerning health hazards.

Air Quality—H. 5985 (Committee on Environment) increases the penalties for violations of air pollution laws; authorizes the Commissioner to issue orders to air sources requiring monitoring for the presence of potentially polluting air contaminants.

Indiana

Air Quality—This proposed regulation includes control requirements for surface coating operations in ozone attainment areas. For more information, contact the Department of Environmental Management, Second Floor, 105 South Meridian Street, Indianapolis, IN 46225, Attn: Timothy J. Method, Assistant Commissioner, Office of Air Management.

Iowa

Occupational Safety and Health—This proposed regulation relates to occupational safety and health rules for general industry; relates to occupational exposure to hazardous chemicals in laboratories, corrections, air contaminants, and welding/brazing. For more information, contact the Deputy Labor Commissioner, Division of Labor Services, 1000 East Grand Avenue, Des Moines, IA 50319.

Louisiana

Hazardous Waste—H. 1 (Cain) prohibits the treatment of certain commercial hazardous waste; provides for legislative findings; provides for capacity assurance programs required by federal law; provides for various definitions; provides for rules.

H. 1241 (Bolin) relates to land disposal of hazardous waste. Provides for hazardous wastes and residues which have been treated.

H. 1880 (Bolin) relates to the prohibition of land disposal of hazardous waste; provides with respect to exemptions from such prohibition.

Toxic Substances—S. 129 (Kelly) authorizes the Secretary of the Department of Public Safety and Corrections to authorize certain persons to enter, inspect, and examine the property and records of persons engaged in the transportation of hazardous materials, freight, and passengers.

Massachusetts

Underground Storage Tanks—H. 5944 (Committee on Natural Resources) relates to protecting the environment

through the establishment and administration of an underground storage tank cleanup program. Amended on House floor by substitution of H. 6095 (Committee on Ways and Means). This bill was amended on House floor by substitution of H. 6174 (Committee on Third Reading). H. 6174 went to Senate Committee on Ways and Means on July 27, 1990.

Toxic Substances—S. 1618 (Committee on Commerce/Labor) provides for the establishment of an occupational lead poisoning registry.

Michigan

Occupational Safety and Health—This proposal concerns occupational health rules for hazardous waste operations and emergency response; includes rules on safety and health programs, site controls, work practices and personal protective equipment, monitoring, informational programs, handling drums and containers, decontamination, emergency response, illumination, and sanitation at workplaces and operations conducted under the Resources Conservation and Recovery Act of 1976 and other hazardous chemical response activities. For more information, contact the Division of Occupational Health, Bureau of Environmental and Occupational Health, Department of Public Health, 3423 North Logan Street, P.O. Box 30195, Lansing, MI 48909, (517) 335-8250.

Minnesota

Underground Storage Tanks—A proposed rule establishes technical standards and safeguards necessary to protect human health, safety and the environment. Regulated substances include petroleum products as well as certain hazardous materials. For more information, contact Thomas P. Clark, Pollution Control Agency, Hazardous Waste Division, Tanks and Spills Section, 520 Lafayette Rd., St. Paul, MN 55155, (612) 643-3407.

Nevada

Air Quality—A proposed regulation adds new sections to the air pollution regulations concerning volatile organic compounds, internal combustion engines and procedures for changing permit restrictions. For more information, contact the Environmental Commission, 123 West Nye Lane, Carson City, NV 89710.

North Carolina

Air Quality—This proposed regulation requires all existing sources of emission to comply with applicable air quality emission standards at the earliest possible date; requires the installation of emission control devices in solvent metal cleaning facilities and surface coating establishments. The comment deadline is September 16, 1990. For more information, contact Thomas C. Allen, Division of Environmental Management, P.O. Box 27687, Raleigh, NC 27611-7687, (919) 733-3340. A second proposed rule pertains to approval procedures for air quality permits; sets forth which sources or activities are not likely to contravene any applicable ambient air quality or emission control standard and, therefore, are not required to obtain a permit. This comment deadline is also September 16, 1990 at the same contact.

Ohio

Underground Storage Tanks—This proposal pertains to leak detection and repair of underground storage tanks; sets attainment dates and compliance schedules for wastewater treatment and acrylonitrile transfer. For more information, contact the Environmental Protection Agency, Division of Air Pollution Control, Columbus, OH.

Oregon

Air Quality—This proposed regulation assures attainment of the National Ambient Air Quality Standard for Ozone by incorporating certain changes consistent with federal guidelines, including lowering the exemption point from small surface coating operations; changing monthly recordkeeping for small surface coaters to daily; removing generic exemption for stencil coating operations and allowing an exemption only for railroad car stencil coating, requiring RACT permanently for any source exceeding an applicable exemption point. For more information, contact Brian R. Finneran, Department of Environmental Quality, Air Quality Division, 811 SW 6th Avenue, Portland, OR 97204, (503) 229-6278.

Rhode Island

Packaging—S. 1805 (Watson/Goldberg) relates to toxic packing reduction act of 1990.

Toxic Substances—S. 2333 (Orabona) requires persons who purchase certain chemicals which may be used in metal finishing to have a chemical purchasing license.

South Carolina

Air Quality—This proposed regulation specifies the primacy of federal air pollution emission regulations and standards; revises emission regulations to meet the United States Environmental Protection Agency and Federal Clean Air Act requirements; addresses actual VOC emissions rather than potential emissions; updates and clarifies test procedures. For more information, contact Otto E. Pearson, Chief, Bureau of Air Quality Control, Department of Health and Environmental Control, 2600 Bull Street, Columbia, SC 29201.

Tennessee

This proposal pertains to occupational exposure to lead and other hazardous chemicals in laboratories. For more information, contact the Office of the General Counsel, Department of Labor, 5th Floor, 501 Union Building, 501 Union Street, Nashville, TN 37243-0655.

Virginia

Air Quality—This proposal incorporates by reference and provides the latest edition of one referenced document and incorporates newly promulgated federal New Source Performance Standards (NSPS), reference methods associated with these NSPS, and test methods associated with the National Emission Standards for Hazardous Air Pollutants (NESHAPS). Includes updates to Rule 5-5 which contains the list of newly promulgated federal NSPS being incorporated by reference and updates Rule 6-1 which contains the list of NESHAPS. For more information, contact Nancy Saylor, Department of Air Pollution Control, P.O. Box 10089, Richmond, VA 23240, (804) 786-1249.

Washington

Occupational Safety and Health—This proposed regulation revises and amends occupational safety and health regulations relating to a wide variety of subjects. Deletes and corrects technical and typographical errors. Amends the section on lead to include a new air pollution standard for the nonferrous foundry industry. Includes a new section on the use of hazardous chemicals in laboratories, provides for the

special needs of laboratories and includes sections on employee training and information, medical consultation and examinations, hazard identification, respirator use and recordkeeping. For more information, contact Marie E. Myerchin-Redifer, Department of Labor and Industries, General Administration Bldg., Mailstop HC-243, Olympia, WA 98504.

West Virginia

Hazardous Waste—The Division of Natural Resources has proposed regulations revising the Hazardous Waste Management Regulations and the Underground Storage Tank Regulations. For more information, contact Division of Natural Resources, State Capitol Complex, Bldg. 3, Rm. 712, Charleston, WV 25305.

Prewashing Commercially Supplied Cold-Rolled Steel Test Panels And Its Effect on Coating Adhesion

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Sherwin-Williams Company Research Center

The present study investigates whether precleaning commercially available cold-rolled steel test panels affects the adhesion and subsequent performance characteristics of coatings applied to them. X-Ray Photoelectron Spectroscopy (XPS) identified nitrogen containing species on the surface of the panels "as received" and confirmed that these could be removed by a simple cleaning procedure. Differences in adhesion characteristics before and after humidity and salt spray exposures were obtained for three organic coatings depending on whether they were applied to prewashed or untreated panels.

INTRODUCTION

When testing performance characteristics of organic coatings, an effort is normally taken to minimize variables in the experimental techniques which are used. Reducing variation in film thicknesses, application details, baking times, etc., in order to optimize the accuracy of results, is standard practice. One procedure commonly employed is the use of standard steel test panels for coatings evaluations. Such panels reduce the variability of the steel substrates themselves, particularly in terms of chemical composition and variations in surface properties. The former may affect corrosion properties of the substrate, while the latter may affect the bonding characteristics of the coating.

Many commercially supplied cold-rolled steel test panels are supplied wrapped in paper which has been impregnated with a volatile corrosion inhibiting compound.[1,2] In some cases, these panels are used by paint technologists without any cleaning pretreatment. This procedure assumes that any corrosion inhibiting species adsorbed on the surface of the test panels do not appreciably affect subsequent coating performance test data.

Some years ago, Buser[3] demonstrated differences in performance of phosphated and painted steel panels which could be attributed to the original steel precleaning procedure. He reported that conventional cold-rolled steel panels, although factory precleaned and packed in inhibitor paper, gave catastrophic salt spray results after phosphating and painting. Typical solvent cleaning methods made no improvement. Although commercial alkaline cleaners gave better results, wet abrasion was found to be the only cleaning method which significantly improved subsequent salt spray corrosion performance.

EXPERIMENTAL DESIGN

Analysis of Panel Surfaces

Commercially available low carbon cold-rolled steel (SAE 1010) panels from freshly opened packets were analyzed by X-ray photoelectron spectroscopy (XPS) using an SSL SS-100 spectrometer. An analysis spot size of 1000 μm diameter was used in the present work. Some panels were analyzed by XPS in the "as received" condition, whereas others were analyzed after a cleaning treatment. Various such treatments were investigated, including a warm (50-60°C) distilled water wash with gentle rubbing with paper towels, followed by methyl ethyl ketone (MEK) rinse and subsequent drying in a stream of warm air. Other cleaning treatments examined included simple organic solvent rinses using ethanol, propanol,

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and acetone, as well as ultrasonic cleaning procedures employing the same solvents (including water).

Coatings and Substrates

Three coatings were selected for study: a high bake enamel polyester/melamine with blocked sulfonic acid as a catalyst; a general purpose, ambient cure, polyurethane acrylic/isocyanate containing zinc napthanate as a catalyst; and an ambient cure, polyester/isocyanate polyurethane suitable for automotive applications containing dibutyltin dilaurate as a catalyst.

A single batch of each paint was used for these tests. Application and curing parameters were rigorously controlled. In order to minimize film thickness differences, a #44 wire-wound drawdown bar was used to apply the coatings to the front of the panels. The high bake enamel was cured at 163°C for 11 min, while the polyurethanes were cured under ambient conditions for a period of eight weeks prior to testing. Measured film thicknesses of the cured coatings were 2.0 ± 0.1 mils for the enamel and general purpose polyurethane and 1.3 ± 0.1 mils for the automotive polyurethane. All coated panels were prepared and tested in duplicate.

Panels used for coating tests were taken from the same packets as were the samples for the XPS analyses. The panels used were either in the as received condition, or washed by the warm water method as noted previously. Washed panels were stored in a desiccator prior to use (less than 24 hr). One end panel from each transit packet was studied separately from the other panels, since it was anticipated that these would have the highest concentrations of surface inhibitor complexes (due to their being in contact with the wrapping paper during transit).

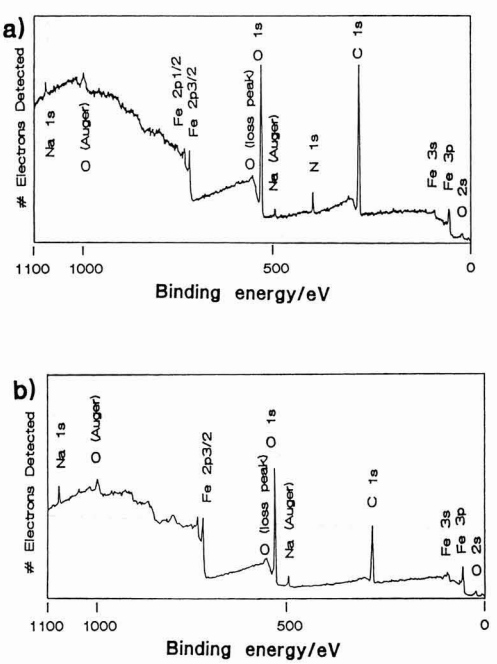

Figure 1—Low resolution survey spectra of commercially obtained cold-rolled steel test panels. (A) As received surface of an end panel removed from freshly opened transit pack. (B) Same as (A) except surface had been subjected to a warm water washing treatment described in the text

Coating Performance Tests

Procedures used were as follows:

DRY ADHESION TESTING: Dry adhesion testing was conducted by use of an Elcometer 106 "pull off" tester, according to ASTM D 4541-85 specifications, wherein metal disks are attached to the cured coating surfaces using cyanoacrylate glue. The spring loaded pull off tester was used to exert a force perpendicular to the plane of the film. The force applied was monitored and that just prior to adhesion failure was recorded.

HUMIDITY RESISTANCE AND SUBSEQUENT ADHESION TESTING: Humidity resistance was assessed by exposing panels for 336 hr in a humidity cabinet maintained under the conditions noted in ASTM D 2247-86. Adhesion tests were conducted thereafter using the standard cross hatch adhesion test method and evaluation procedures according to ASTM D 3359-83 (Method B).

SALT-SPRAY AND SUBSEQUENT ADHESION TESTING: Coated panels were scribed using a custom built milling machine manufactured by the Giordano Company.* On this unit, coated panels are clamped to a base board and a motorized milling wheel scribes through the paint to a preset depth at a fixed scribe width of 0.7 mm. In the present work, the scribe depth was selected to ensure exposed bare metal along the length of each scribe line. By this method, a reproducible damage region geometry is obtained. Immediately after scribing, panels were exposed for 168 hr in a salt spray test environment operating under ASTM B 117-85 conditions. After removal, panels were dried with a paper towel, and tape was used to test adhesion along the scribe marks as per ASTM D 3359-83 (Method A).

RESULTS AND DISCUSSION

Surface Analysis of Commercial Steel Substrate Panels

Low resolution "survey" spectra obtained by using XPS are shown in *Figure* 1 for the two extreme cases observed in this work. *Figure* 1(a) shows the surface spectrum for an end panel from a transit packet. Present in this spectrum are the elements C, N, O, Fe, and Na. *Figure* 1(b) shows the surface spectrum from the same panel after the warm water wash with mild rubbing using a paper towel, followed by the MEK rinse, and warm air-dry treatment. From this spectrum, it is apparent that the cleaning procedure does have an effect on the surface composition. The most obvious effect is the elimination of nitrogen species from the surface. Also apparent is a reduction in the extent of surface carbon species.

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By applying normal sensitivity factors to the peak area data,[4] the quantitative surface concentration of nitrogen on the end panels in the as received condition was calculated at approximately 4.8 atomic percent of the analyzed volume. Similar analyses of panels from the center of the packets revealed typical concentrations of the order of two to three atomic percent. A similar analysis for the carbon species suggested a reduction of the carbon from 56.1 atomic percent on the as received surface to 44.9 atomic percent after the cleaning treatment. High resolution carbon spectra indicated the presence of complex multifunctional carbon in both cases, rather than the simpler peak signal usually associated with adventitious carbon, which results from normal atmospheric contamination.

The cleaning treatment described previously was clearly successful in removing the surface nitrogen and also in removing some of the surface carbon, perhaps that associated with the nitrogen species. This pretreatment produced relatively insignificant changes to the other detected surface species (i.e., Fe, O, and Na). It appears, therefore, that other than the anticipated presence of iron and oxygen on the surfaces of commercially available panels, there also exists, even after cleaning, some surface carbon and sodium species. These species could possibly be present as a result of the production and cleaning procedures used during steel manufacturing and subsequent processing.

While the presence of surface species caused by the steel manufacturing procedures is assumed to result in complex surface chemical interactions, these surface effects would be expected to be reasonably consistent from panel batch to batch. However, the possibility that the water soluble nitrogen/carbon species may vary from packet to packet depending on the transport history of the packets may be significant. Perhaps even more significant is the conclusion that the surface chemistry may vary from panel to panel within a packet (depending on the position of a given panel), since panels within a single packet will presumably be used to compare performance within a given coating test series.

The other cleaning procedures investigated, whether ultrasonic or otherwise, using room temperature water (without mechanical rubbing), ethanol, propanol, or acetone were found to be less successful at removing the surface nitrogen species.

Although the exact nature of the corrosion inhibitor used to impregnate the transit wrapping paper is proprietary to the panel supplier companies, it is known that the composition of typical volatile corrosion inhibitors includes nitrogen species such as complex amines. For example, typical volatile corrosion inhibitors for use in impregnated transit wrapping papers include dicyclohexylamine nitrite and cyclohexylamine carbonate.[5]

Having established that some nitrogen residues would probably be present on all as received substrate surfaces, and having found a cleaning procedure which removed these species, the coating tests described were conducted to determine whether the presence of the residue would affect coating performance data. It was hypothesized that coating performance could be affected by the following two mechanisms: the surface nitrogen residue may be alkaline in nature, which could affect pH sensitive cure reactions, and the residue itself might act as a boundary layer, which could affect interactions within the coating/substrate interfacial region. The three coatings tested in this work were selected because of their anticipated varying degrees of sensitivity to alkaline substrate surface conditions during curing.

Table 1–Coating Film Dry Adhesion Pull-Off Strength (PSI) Obtained Using the ASTM D 4541-85 Method

	Washed	Unwashed
High bake enamel	225	75
	250	125
General purpose urethane	>175[a]	75
	>200[a]	100
Automotive urethane	350	200
	375	250

(a) Adhesive failure of cyanoacrylate glue. Actual coating adhesion was greater than this value.

Coating Evaluation Tests

DRY ADHESION TESTING: Dry adhesion data for the three coatings applied to both cleaned and as received steel panels are given in *Table* 1. Because the test was duplicated, two values are given for each condition. In each case the dry adhesion was improved when the coatings were applied to the cleaned substrates compared with equivalent data from as received surfaces. The results given for the as received panels are panels selected from the center regions of the transit packets. Observed dry adhesion was even less where the coatings were applied to the end panel facing the wrapping material.

To some extent, an alkaline substrate would be expected to reduce the effectiveness of the acid catalyst in the high bake enamel polyester/melamine coating and so affect the cure at the coating/panel interface. Conversely, the presence of an amine could be expected to catalyze most polyurethane reactions[6] and lead to a higher degree of cure. In all cases, the presence of a fugitive inhibitor species would be expected to reduce the interaction of the coating and panel, and thus, adversely affect the adhesion of the coating.

HUMIDITY RESISTANCE/ADHESION TESTING: All panels exhibited general blistering (typically up to approximately 1 mm diameter) after 336 hr in the humidity chamber. For the high-bake enamel panels, these blisters were permanent, irrespective of whether or not the substrate had been prewashed. Adhesion strength was too low to be measured accurately by the direct pull-off mehtod (i.e., < 50 psi). Using the cross hatch method (ASTM D 3359-83, Method B), there were no significant differences between the cleaned and as received panel data (giving ASTM ratings of $< 5\%$ removal). However, in the case of as received end panels being used, slightly poorer cross hatch adhesion was observed (ASTM rating of 5-15% removal).

In the case of the general purpose urethane, the blisters on the prewashed substrates disappeared after a few hours of

ambient exposure, whereas those on the unwashed panels were permanent. Cross hatch testing showed significantly improved adhesion for the prewashed panel (5-15% removal) compared with the as received panel (> 65% removal).

For the automotive polyurethane case, initially, the disappearance of the blisters on as received panels gave a suggestion of improved performance compared with prewashed panel substrates. However, the adhesion of all these coatings was so poor as to be unmeasurable by either the cross hatch test method or direct pull-off method. These films delaminated readily from all substrates. It was clearly apparent that less substrate corrosion had occurred on the untreated as received panels than on the washed panels. This observation appears to reinforce the suggestion that the transit package corrosion inhibitor does indeed adsorb onto panel surfaces. Moreover, these surface species may continue to be chemically active thereafter.

As a point of interest, this result also emphasized the need for a primer with automotive finishes since these coatings are not designed for direct to metal application.

SALT SPRAY/ADHESION TESTING: Following 168 hr of exposure to standard salt spray conditions, there were no visual differences apparent between as received and cleaned panel substrates for any of the three coatings studied. However, following tape adhesion testing done to ASTM D 3359-83 (Method A) specifications, consistent performance differences became obvious for all three coating systems depending on whether they were applied to as received or cleaned substrates.

For all three coatings, there were somewhat greater losses of adhesion visually apparent after tape removal from the as received panels, compared with adhesion losses observed from the cleaned panels. In all cases, adhesion losses were considerable, with general ratings for the cleaned panel substrate being 1A (removal from most of the area of the X under the tape), whereas from the as received substrates, the ratings were all OA (removal beyond the area of the X).

Possibly of more importance were the consistent observations that the revealed bare substrate surfaces after tape removal were clean and shiny on the cleaned substrates, but predominantly surface rusted on the as received substrates. These observations suggest that adhesion loss on the cleaned substrate was due to removal by tape, whereas as on the as received substrates, adhesion loss occurred during the salt spray exposure test period, thereby allowing surface corrosion to occur. Thus, the mode of degradation and final adhesion and corrosion performance varied depending on whether or not the substrate had been cleaned.

CONCLUSIONS AND RECOMMENDATIONS

(1) Surface analyses of commercially available cold-rolled steel test panels, wrapped in inhibitor impregnated packaging paper, revealed the presence of Fe, O, C, N, and Na species on all "as received" surfaces.

(2) Some of the carbon species present and all the detectable nitrogen species could be removed by a warm (50-60°C), distilled water wash with gentle mechanical rubbing, followed by an MEK rinse and air dry treatment. Solvent washes alone were unsuccessful in removing all the nitrogen species.

(3) The nitrogen species were variable in concentration on as received surfaces from approximately one to five atomic percent depending on the position of the panel within the packet, but were always measurable.

(4) The presence of the nitrogen species, and possibly some of the carbon species, appears to affect performance properties of three coatings tested in this work. Specifically, differences in dry adhesion and wet adhesion after exposure to high humidity or salt spray environments were obtained.

(5) Since the surface concentrations of nitrogen species were variable on as received panels, a recommendation to clean such panels would seem to be warranted, providing that the treatment used does not itself introduce further contaminants.

ACKNOWLEDGMENT

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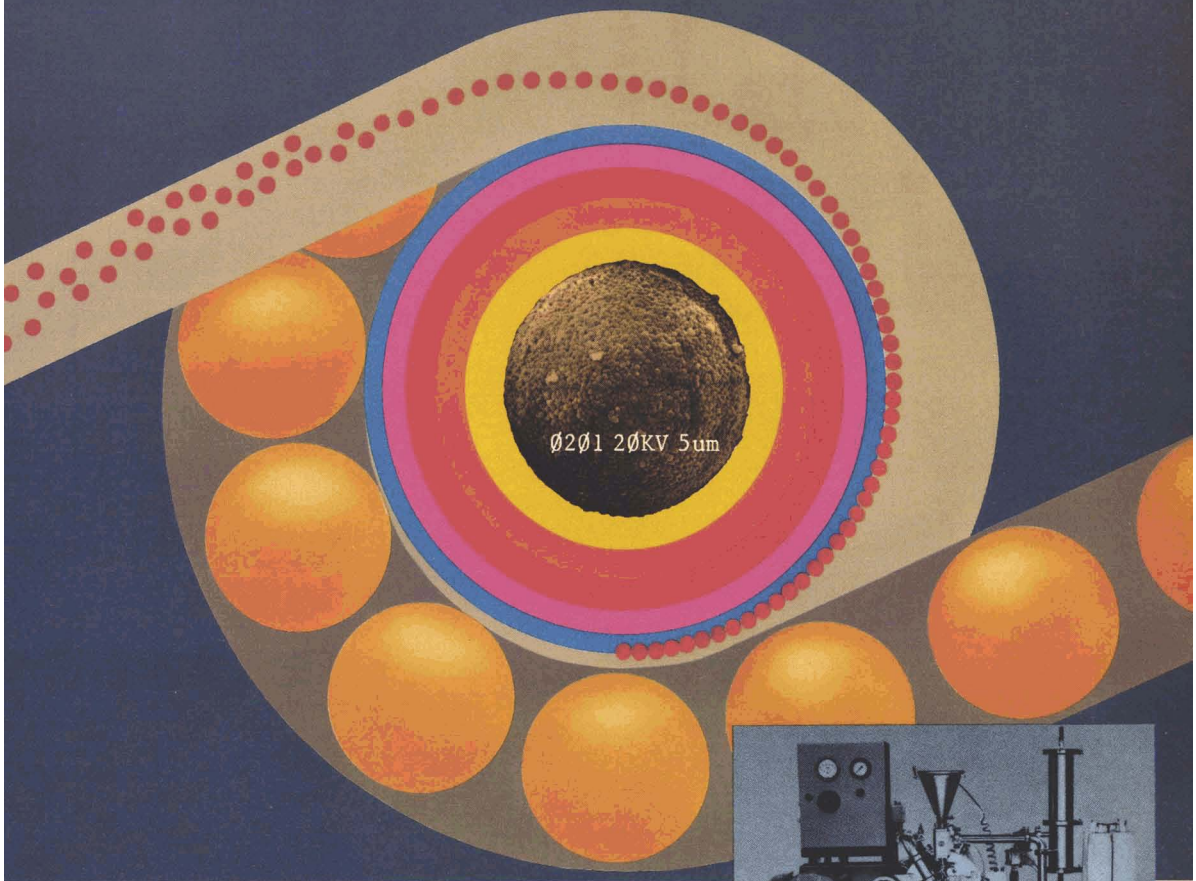

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High Performance Epoxy Resins For Container Coating Applications Based on *In-Situ* Advancement Technology

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Industry trends toward higher performance in container coating applications have shown a need for properties characteristic of high molecular weight phenoxy resins. The advantages of phenoxy resins include enhanced flexibility, toughness, and outstanding chemical and solvent resistance. Most disadvantages are related to the high viscosity of these high molecular weight resins. The high viscosity of these resins results in a higher solvent requirement to obtain suitable application viscosity. The increased solvent demand can also make it difficult to control film thickness. Because of the high viscosity, phenoxy resins often require higher bake temperatures and longer bake times than epoxy resins to obtain good adhesion. High performance experimental epoxy resins have been prepared which offer performance at much lower viscosity. In addition to performance characteristics of a phenoxy resin, these experimental resins also exhibit lower solvent demand, lower viscosity, improved wettability, higher solvent resistance, and outstanding flexibility.

INTRODUCTION

"Phenoxy resins" is the generic term used to describe the very high molecular weight polymers derived from bisphenols and epichlorohydrin or epoxy resins. These tough polymers are ductile and exhibit high tensile strength. Phenoxy resins have been used as films, packaging materials, coatings, and adhesives. Like epoxy resins, phenoxy resins are used for protective coatings, mainly due to the balance of properties, such as good adhesion, impact resistance, flexibility, and chemical and solvent resistance. Commercially, phenoxy resins were first introduced to the coatings industry in the early 1960s. Then, in the following 25 years, applications for this polymer were successfully established in the zinc-rich primers for automotive or maintenance coatings and in container/coil coatings.

Over the past few years in the container coatings industry, a growing trend has been the replacement of three-piece can technology with two-piece can technology. The two-piece technologies, for example, draw/redraw (DRD), are very demanding on the applied organic coatings. DRD is a process for making two-piece cans in which a circular blank is drawn through a die to form a circular cup and then redrawn through a second or third die to produce a can of desired dimensions. Since the

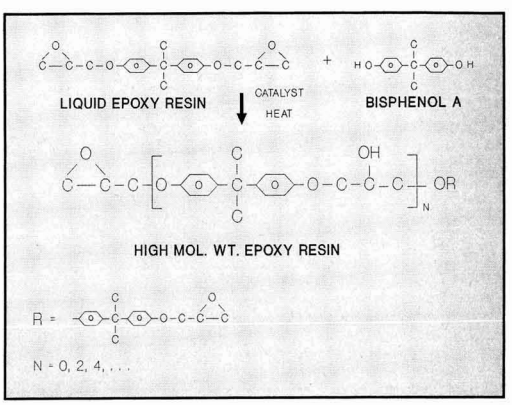

Figure 1—Preparation of high molecular weight epoxy resins

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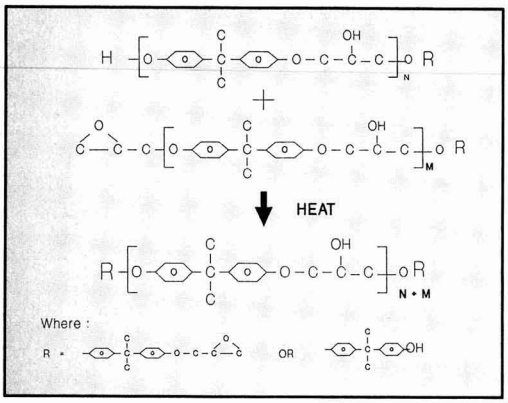

Figure 2—*In-situ* advancement reaction

Table 1—Characterization of Solid Epoxy Resin Types

Solid Epoxy Resin Type	Designation	"n" Value Range
9 Type Resin	D.E.R. 669E	16-27
7 Type Resin	D.E.R. 667	10-13
4 Type Resin	D.E.R. 664	5-6
Experimental Resin A	XU 71910.03	9-14
Experimental Resin B	XU 71909.04	15-23

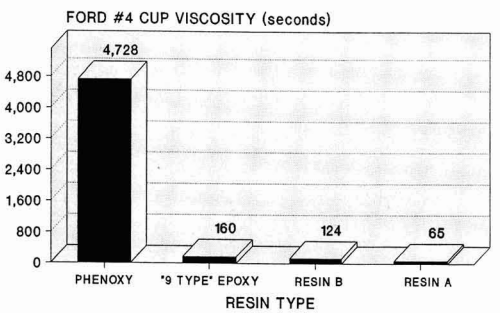

Figure 3—Varnish viscosity comparison at 30% solids

Table 2—Comparison of Resin Types

Resin Type	Mw	% Solids[a]
Phenoxy Resin	51,400	15.5%
9 Type Resin	18,300	25.5%
Experimental Resin B	16,600	29.8%
Experimental Resin A	10,000	30.8%

(a) Percent solids to give 100 sec Ford #4 cup viscosity.

DRD process uses precoated metal coil, there is an industry demand for more flexible can coatings to sustain the stress associated with the can formation process. In searching for the solution, phenoxy resins have been studied extensively in the container coatings industry, in the hope that the themoplastic characteristics of the phenoxy resin could satisfy the demand of flexibility. However, due to the extremely high melt viscosity, low solubility, and high cost, phenoxy resins are used only in certain applications with limited volumes.

The majority of phenoxy resins sold in the market today are mostly nonepoxy, high molecular weight poly(hydroxy ethers) with a molecular structure similar to bisphenol A based epoxy resins (see *Figure* 1). Also available in the market are some lower molecular weight phenoxy resins (n value range estimated at 40-70). Phenoxy resins with terminal epoxy groups also are available in the market,[1-3] and they normally give better flow characteristics than high molecular weight phenoxy resins due to their lower viscosity and better coating properties.

The *in-situ* reaction which produces phenoxy resins and high molecular weight epoxy resins is described in *Figure* 2. By altering the ratio of the two reactants, a variety of epoxy resins can be prepared ranging in weight average molecular weight (Mw) from 340 to over 100,000.[4-7] When the charge ratio of the two raw materials approaches unity in stoichiometry, ultra high molecular weight phenoxy resins are produced.

The "n value" ranges for three conventional epoxy resins widely used in the container coating industry are given in *Table* 1. The n value ranges for two experimental epoxy resins are also listed in *Table* 1 for comparison. Additional information on Resin A and Resin B is given in the Experimental section.

Generally speaking, as the molecular weight increases, improved coating properties are obtained.[8-11] However, there is a drawback, as shown by *Table* 2, that when the Mw is increased, the resin's viscosity also increases. Hence, more solvent is required to maintain a desired solution viscosity. This increased amount of solvent, unfortunately, is detrimental to the ability of the varnish system to conform to stringent VOC (volatile organic compound) regulations. Furthermore, the increased viscosity of the high molecular weight phenoxy resin could also cause deficiency in coating properties due to poor flowout characteristics.

The basic concept of this new coating system is to produce a coating with a high molecular weight, but without using any high molecular weight phenoxy resin. Instead, we use lower molecular weight oligomers of phenolic resins and epoxy resins to generate a high molecular weight phenoxy resin backbone, and a high performance cured surface coating simultaneously on the substrate during the bake cycle.[12-15]

EXPERIMENTAL

Materials

Tin free steel (TFS) substrates were used for the can coating evaluations. TFS, which is widely used in the industry, is chemically surface-treated to contain a mono-

layer of chromium oxide on the surface. Weirchrome™ TFS, which is available from Weirtec, was used in this study. The TFS had a weight of 65 lb/base box, with a nominal thickness of 0.0072 in. (0.19 mm). Gardner impact studies were evaluated using cold-rolled steel substrates. The panels were 24 gauge, unpolished cold-rolled steel and are available from Parker Chemical Company.

Resins

The phenoxy resin used in this study was a commercial phenoxy resin having a Mw of approximately 50,000. The resin used was UCAR™ Phenoxy Resin PKHH.

The "9 type" resin was a solid epoxy resin prepared by advancing the diglycidyl ether of bisphenol A with bisphenol A to an epoxide equivalent weight (EEW) of from 2,500 to 4,000. The Mw was approximately 18,000. The 9 type epoxy resin used in this study was D.E.R.™ 669E.

Resin B is essentially a difunctional epoxy and phenolic functional oligomeric resin system having a Mw of approximately 16,000. The experimental resin is prepared by reacting the diglycidyl ether of bisphenol A with bisphenol A using a suitable advancement catalyst. Resin B is designated XU 71909.04.

Resin A is essentially a difunctional epoxy and phenolic functional oligomeric resin system having a Mw of approximately 10,000. The experimental resin is prepared by reacting the diglycidyl ether of bisphenol A with bisphenol A using a suitable advancement catalyst. Resin A is designated XU 71910.03 and is available from The Dow Chemical Company.

Methylon™ 75108—Commercial converting resin consists of a mixture of allyl ethers of mono-, di-, and trimethylolphenol.

Byk™ 361 is a silicone resin used as a flow modifier.

Resin Characterization

Gel permeation chromatography was used to determine the molecular weight of advanced epoxy resins. Samples were analyzed using a Waters Model 201 liquid chromatograph and a DuPont Zorbax PSM60S + PSM1000S columns, each 25 cm long, with tetrahydrofuran as the solvent at 1 cc/min, using polystyrene for calibration of Mw.

Formulation of Varnishes

Solid epoxy resins were dissolved in a solvent blend of 90% ethylene glycol n-butyl ether/10% n-butanol to give a 30% solids resin solution. The resin solutions were formulated to give a solution containing 10% Methylon 75108, 1% phosphoric acid accelerator, and 0.05% silicone flow modifier, Byk 361. Ford #4 cup viscosity determinations at 25°C were made on the formulated varnishes at 30% solids for comparison of resin types. Additional solvent blend of ethylene glycol n-butyl ether/n-butanol was added to give a solution viscosity of 100 sec on the Ford #4 cup viscosity. The amount of additional solvent was noted so that percent solids for each formulation could be determined at an application viscosity of 100 sec on Ford #4 cup. The varnish samples were aged for at least 24 hr before applying to the substrate.

Procedure for Coating Substrates

All panels were rinsed with Aromatic™ 100 and baked at 400°F for 10 min to degrease. Drawdowns were made on TFS panels or cold-rolled steel panels using an appropriate wire wound rod according to a modified ASTM D-447 procedure. The panels were then baked in the oven at 400°F for 10 min to yield the appropriate dry film of 0.2 mils.

Film Thickness

Film thickness was determined by using a Fischer Multiscope. This tester determines film thickness by using magnetic properties of the steel substrate calibrated against a standard on the bare (film free) substrate. Each panel had an average of 15 measurements to determine the thickness of the panel. The range for acceptable coating thickness was approximately 0.15-0.25 mils.

Methyl Ethyl Ketone Resistance

Methyl ethyl ketone (MEK) double rubs were determined by rubbing the coating surface with a two-pound ball-peen hammer that had cheesecloth (eight plys) wrapped around the ball. The cheesecloth was saturated with MEK. No force other than the weight of the hammer and the force needed to guide the hammer across the coating was used. Counting was ceased when the coating surface was damaged.

Gardner Impact

Forward and reverse impact of coatings was performed according to ASTM D 3281. The panel was tested for adhesion, as previously described, starting at 160 in.-lb. If the panel failed, a lower inch-pound was tried until a pass was determined. A failure was denoted by appearance of rust when treated with acidic copper sulfate solution, after being tested for adhesion with Scotch 610 tape.

Wedge Bend Flexibility

Another method for measuring the flexibility was by evaluating wedge bends by ASTM D 3281-84. The bend was taped and pulled with Scotch brand 610 tape and treated with acidic copper sulfate solution to highlight the bare metal, and examined under an 8X microscope. The tests were run across the grain of the metal. The length of the failure was measured and the number of millimeters failure was reported as a measure of wedge bend flexibility.

Process Steam Resistance

Process steam resistance tests were performed on the coating to determine the permeability of the coating to water with pressure and heat. The coated panels were impacted with a mandrel to cause a stressed area and scribed with an X using a razor blade. These prepared specimens were placed into the autoclave and pressurized

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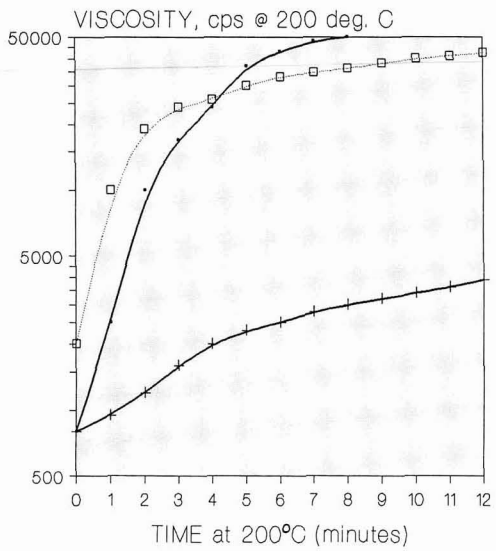

Figure 4—Viscosity build of exp. res. —■—: Resin A; —+—: 7 Type Resin; and —⊟— 9 Type Resin

to 250°F at 15 psi for 90 min. The panels were blotted dry and the coating scribed again in the prestressed area. Both the rescribed and post-scribed areas were tested for adhesion with Scotch 610 tape. Next, a solution of copper sulfate in 0.1 N hydrochloric acid was applied to the tested area to oxidize any resulting exposed bare metal, in order to more accurately observe adhesive failures. The coatings were then rated. Blush was determined by examining the panels after autoclaving and noting whether or not the coating had a tendency to cloud or whiten.

Crystal Violet Stain Test

Stain resistance was determined on the cured coating by applying one drop of a solution of 0.1% crystal violet in diethylene glycol n-butyl ether. The drop was allowed to stand for a period of 60 sec and then rinsed with isopropanol. A rating was determined by observing the intensity of the resulting purple stain.

Pencil Hardness

Pencil hardness was used to evaluate the hardness of the coating. ASTM Method D 3363 was used.

RESULTS

Experimental Resins A and B have much lower viscosity compared to conventional phenoxy resin. *Figure* 3 shows that at a comparable solids level (30%), there is a tremendous viscosity advantage to using the experimental resins. Ford #4 cup viscosity at 25°C ranged from 65 to 124 sec for Resins A and B compared to 4,728 sec for phenoxy resin and 160 sec for the 9 type epoxy resin. With experimental resins based on *in-situ* advancement technology, molecular weight build occurs during the bake cycle through reaction of the phenolic hydroxyls

Table 3—Process Steam Resistance Results (10% Phenolic Crosslinker)

Resin Type	Dry Adhesion	Wet Adhesion	Blush Test
Phenoxy Resin	Pass	Fail	Fail
9 Type Resin	Pass	Pass	Pass
Experimental Resin A	Pass	Pass	Pass
Experimental Resin B	Pass	Pass	Pass

with epoxy groups. The molecular weight build is accompanied by a similar build in viscosity. Proof of the viscosity build of the experimental *in-situ* advancement resins is given in *Figure* 4. The resins were formulated without the crosslinker and placed on an ICI cone and plate viscometer at 200°C for a period of 12 min. The graph shows that although Resin A had an initial viscosity similar to that of "7 type" epoxy resin, a very high viscosity build occurred with Resin A. After five minutes at 200°C, the viscosity of Resin A was even higher than that of 9 type epoxy resin. By allowing the advancement to occur on the substrate during the bake cycle, the performance of the coatings was greatly enhanced.

Initially, these experimental resins had lower molecular weight than phenoxy resins. As shown in *Table* 2, the experimental resins range in molecular weight from about 10,000 to 16,500 compared to about 50,000 for the phenoxy resin. Since these resins advance during the bake cycle to a higher molecular weight, one cannot predict film performance from the initial molecular weight, as is traditionally done with conventional solid epoxy resins. What is important is the performance of the finished coating after baking, rather than initial molecular weight. We have found that for optimum film performance, it is important to have lower molecular weight initially for excellent flow, superior substrate wetting, and lower solvent requirement. The low molecular weight resins may give better rheology and substrate wetting because of the lower inherent melt viscosity. Inspection of the metal substrate with an electron microscope reveals that the surface of the panel contains hills and valleys. It is believed that the low melt viscosity is beneficial in allowing

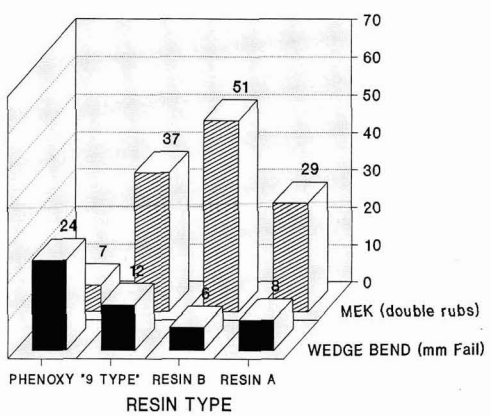

Figure 5—Flexibility and MEK resistance at 5% phenolic crosslinker

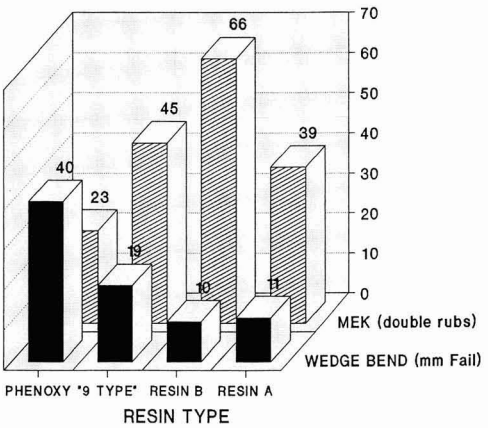

Figure 6—Flexibility and MEK resistance at 10% phenolic crosslinker

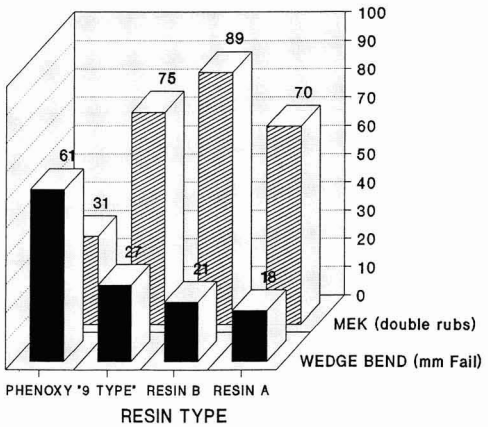

Figure 7—Flexibility and MEK resistance at 15% phenolic crosslinker

the resin to penetrate into the hills and valleys of the metal surface, to allow better substrate wetting, and thus, improved adhesion. *Table* 2 shows that at the same formulated viscosity of 100 sec Ford #4 cup, Resins A and B allow for a great savings in the solvent requirement. Phenoxy resin was formulated at around 15.5% solids in order to obtain this application viscosity. With the experimental resins, percent solids can be increased to between 29%-30.8% (see *Table* 2). This translates to an improvement in the VOC requirement of approximately 1.0 lb/gal. An additional economic savings is obtained with the ability to use less solvent. Obviously, environmental considerations also favor the experimental resins since there is less solvent emission.

The results of process steam resistance testing is given in *Table* 3. All systems passed dry cross hatch testing. The differences became apparent after subjecting the panels to treatment in the autoclave with 15 psi steam pressure for one hour. Complete delamination of the phenoxy coating occurred during wet adhesion evaluation. It was obvious that the pure phenoxy system was too viscous to adequately wet the substrate. Blush evaluation after autoclaving showed the pure phenoxy resin to be the only coating to blush. The experimental resins matched the dry adhesion, wet adhesion, and blush resistance of that of the 9 type epoxy resin. Gardner forward and reverse impact tests were run on all coating systems. As shown by *Table* 4, highest reverse impact resistance is obtained with coatings from Resin A, Resin B, and 9 type resin. These systems passed >160 in.-lb. All coating panels showed excellent forward impact.

All coating systems exhibited excellent stain resistance (*Table* 4), except the phenoxy resin.

Pencil hardness determinations are also shown in *Table* 4. Most coatings had a pencil hardness of 4H. A slightly lower pencil hardness value was obtained with the coating from Resin A.

The solvent resistance property of a coating can be improved if the polymer is modified to have a higher crosslink density. When modifications are made to improve solvent resistance, it generally results in a decrease in the flexibility property. Systems with a higher crosslink density are usually more brittle resulting in a decrease in film flexibility. When modifications are made to improve film flexibility, it generally results in a decrease in the solvent resistance property, because flexibilizers tend to have lower solvent resistance since they lower the crosslink density. *In-situ* advancement technology has the unique ability to improve both flexibility and solvent resistance performance at the same time. Both wedge bend flexibility and MEK resistance studies are shown in *Figure* 5. The coating systems in this graph were cured at 5% crosslinker level. *Figure* 5 illustrates the benefit that *in-situ* advancement technology can bring to the container coating industry. Resin B gave a significant improvement in both flexibility and solvent resistance properties compared to a standard epoxy resin or phenoxy resin. The best flexibility was found with Resin B which gave a wedge bend failure of only 6 mm compared to 12 mm for 9 type resin and 24 mm for the phenoxy resin. Also, the best solvent resistance was with Resin B, which had 51 MEK double rubs compared to 37 double rubs for 9 type resin and only seven double rubs for the phenoxy resin. Additional experiments were conducted to determine if this phenomenon was valid and true for other crosslinker levels. *Figures* 6 and 7 show that the unique ability of Resin B to improve both film flexibility and solvent resistance is also valid at 10% and 15% crosslinker levels. Evaluation at 20% crosslinker level also confirmed the trend. *In-situ* advancement technology offers the ability to give outstanding film flexibility and solvent resistance simultaneously.

The improvement in flexibility from *in-situ* advancement technology is thought to result mainly from im-

Table 4—Process Steam Resistance Results (10% Phenolic Crosslinker)

Resin Type	Forward Impact	Reverse Impact	Stain Test	Pencil Hardness
Phenoxy Resin	>160	145	Fail	4H
9 Type Resin	>160	>160	Pass	4H
Experimental Resin B ..	>160	>160	Pass	4H
Experimental Resin A .	>160	>160	Pass	3H

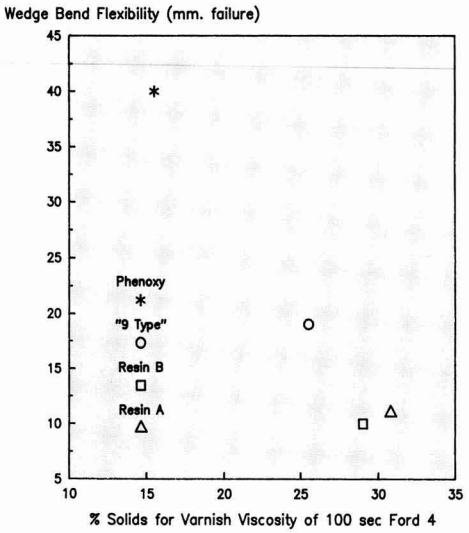

Figure 8—Percent solids vs flexibility (10% phenolic crosslinker)

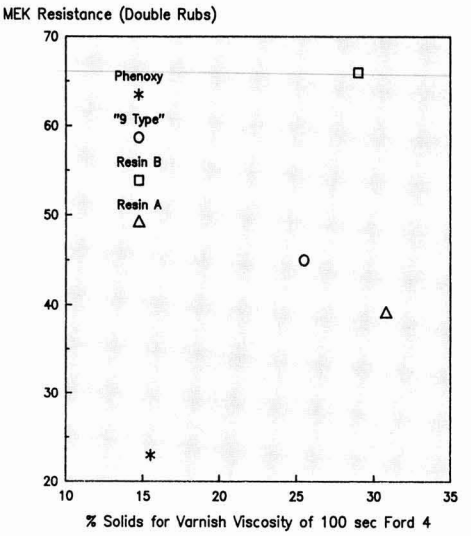

Figure 9—Percent solids vs MEK resistance (10% phenolic crosslinker)

proved adhesion. The *in-situ* advancement process allows for much better substrate wettability. The low viscosity lets the resin varnish penetrate into the cracks and crevices of the substrate. This results in much improved adhesion. The extremely high viscosity of the phenoxy resin contributes to poor wetting of the substrate, which results in adhesive failure during the wedge bend evaluation and resulting loss of flexibility.

The improvement in solvent resistance seen with *in-situ* advancement technology is thought to be due to the unique ability to build molecular weight *in-situ* during the bake cycle. Higher molecular weight oligomers inherently have better solvent resistance,[11] because low molecular weight species are more susceptible to solvent attack.

The lack of solvent resistance of the phenoxy resin is thought to be due to two factors. The reduced mobility of the phenoxy system due to extremely high melt viscosity may contribute to a non-uniform crosslink density, creating regions which may be undercured and susceptible to solvent attack. It is believed that with *in-situ* advancement of less viscous oligomers on the substrate during the bake cycle, there is improved mobility and the system has time to develop a more uniform crosslink before becoming immobilized. This might also contribute to a more effective use of the crosslinker. The other factor is thought to be due to a less complex reaction scheme for the phenoxy resin. Because of a lack of epoxy functionality, the system must rely only on the reaction between aliphatic hydroxyls on the backbone of the polymer. The *in-situ* advancement system has a more complex reaction scheme. Epoxy oligomers and oligomers having phenolic hydroxyls react to build molecular weight. Epoxy groups may further react with hydroxyls of the crosslinker to provide additional crosslinking.

A plot of percent solids versus flexibility is given in *Figure* 8. The plot was given to show the value of *in-situ* advancement technology. Low wedge bend failure and high percent solids are desirable in a coating system. The plot shows the improvement in both flexibility and percent solids imparted when experimental resins are employed.

A plot of percent solids versus MEK resistance is given in *Figure* 9. The plot was given to show the value of *in-situ* advancement technology. High MEK double rubs and high percent solids are desirable in a coating system. The plot shows the improvement in both solvent resistance and percent solids imparted when Resin B is used.

SUMMARY

Experimental *in-situ* advancement systems have been developed to offer an alternative to the use of an expensive phenoxy resin to upgrade the performance of conventional epoxy resins for solvent-borne can coating applications. The basic concept of this new coating system is to produce coatings with a high molecular weight without using any high molecular weight phenoxy resin. Instead, lower molecular weight oligomers of phenolic resin, epoxy resin, and hydroxyl crosslinking agent are used to generate a high molecular weight phenoxy resin backbone and high performance coating simultaneously on the substrate during the bake cycle. Since lower molecular weight oligomers have lower initial viscosity, less solvent is required to meet formulation viscosity requirements. This technique gives the benefit of "the best of both worlds," because less solvent is required for the low molecular weight oligomers, and yet, excellent film performance is obtained because the oligomers advance during the bake cycle to behave as high molecular weight phenoxy resins. In summary, the improved performance is believed to be due to two major factors: the excellent flow-out characteristics because of the low initial viscosity, and the ability of these oligomers to advance to high molecular weight during the bake cycle.

These coating systems exhibit lower viscosity, lower solvent requirement, better substrate wetting, excellent adhesion, improved solvent resistance, and superior flexibility when compared to conventional phenoxy resins.

ACKNOWLEDGMENTS

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Studies on the Sequential Adsorption Of Alkyd Resin on Anatase TiO_2 And Iron Powder

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Studies on sequential adsorption have been carried out with an alkyd resin as adsorbate and anatase TiO_2 and iron powder as adsorbents at two different concentrations. Two sets of experiments were performed: in the first set, the alkyd solution was first equilibrated with a pigment and subsequently the supernatant solution was equilibrated with iron powder in a mineral spirit-xylene (1:1 v/v) solvent system, which was selected on the basis of a resin-solvent interaction parameter (χ); in the second set of experiments this order was reversed. After each equilibration, the supernatant solution was analyzed by size exclusion chromatography to determine the type of molecular species preferentially adsorbed on the pigment and iron powder.

The adsorption of the polymeric binder species on the TiO_2 pigment was found to be concentration dependent. At lower concentrations, high molecular weight species preferentially adsorb, while the preference shifts towards lower molecular weights at higher concentrations. The metal powder adsorbs mostly oligomers and low molecular weight species at both concentrations. Fractionation of the polymer does take place when it is equilibrated with pigment, but no such phenomenon is noticed with iron powder.

INTRODUCTION

Polymeric materials which are used as binders in coating formulations are heterogenous with respect to the size of their molecules and the number of pendant functional groups they possess. Such polymeric moieties, when allowed to come in contact with the pigment particles during the dispersion process, and subsequently, with the metal after their application on its surface as a protective coating, can interact in two ways in a sequential manner. One can envision interactions in which the pigment and metal show preferences for different types of molecular species present in the polymer. A knowledge of such sequential adsorption behavior of polymeric materials can throw light on the performance of the organic coatings, as the adsorption of the polymer by pigment particles determines the fineness of dispersion, and subsequent adsorption from the remaining species by the metal determines the adhesion of coatings to the substrate.

There have been considerable studies on the preferential adsorption of various molecular species present in a heterogenous polymer onto the pigment surfaces,[1-10] but very little is known about the preference the metal shows towards the molecular species present in it. This paper describes adsorption studies which have been carried out with solution of the alkyd in a selected solvent system, with anatase TiO_2 pigment and iron metal powder as adsorbents. The experiments also have been carried out in sequential order, first by exposing the solution to pigment particles, and after equilibration, transferring supernatant solution containing unadsorbed species to the iron powder for further equilibration. The process also has been carried out in the reverse order, that is, first exposing the solution to iron powder, and later the unadsorbed species to pigment particles to determine whether iron powder also adsorbs similar species which are adsorbed by the

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Table 1—Molecular Weight Averages and Polydispersity of Alkyd Resin and Its Fractions

Alkyd Resin	$\bar{M}_n$	$\bar{M}_w$	MWD
Original	2007	6325	3.15
Fraction I	12000	16058	1.34
Fraction II	10500	14500	1.38
Fraction III	8500	12600	1.48
Fraction IV	6200	8400	1.35

pigment. Size exclusion chromatography was used for monitoring the adsorption processes at each stage.

EXPERIMENTAL

Materials

ALKYD: Alkyd resin of 66% oil length, prepared by the standard monoglyceride process using linseed oil, glycerine, and phthalic anhydride, had an acid value of 10.2 and a hydroxyl value of 39.4. The resin was fractionated by the fractional precipitation method using toluene as the solvent and methanol as the non-solvent. Four fractions were collected and their molecular weight averages and polydispersity ($\bar{M}_n$, $\bar{M}_w$, MWD) were determined (*Table* 1).

PIGMENT: TiO_2 (anatase), specific gravity 3.84 (g/cm^3), and surface area as calculated from the adsorption of nitrogen following the Brunauer-Emmett-Teller procedure was 12 m^2/g.

IRON POWDER: The electrolytic grade, identified as α-iron by x-ray diffraction had specific gravity 7.3 g/cm^3, and surface area 0.76 m^2/g.

SOLVENTS: Used were xylene, toluene, methanol, and tetrahydrofuran (THF) all of analytical grade, and mineral spirits (distilled, boiling range 150-175°C).

Table 2—Alkyd-Solvent Interaction Parameter (χ)

S. No.	Solvent System	Intrinsic Viscosity [η]	Interaction Parameter (χ)
1	Xylene	0.0682	0.411
2	Mineral spirits	0.0539	0.486
	Xylene: mineral spirits (v/v)		
3	3 : 1	0.0654	0.418
4	1 : 1	0.0624	0.456
5	1 : 3	0.0584	0.483

METHOD

Selection of Solvent System For Adsorption Studies

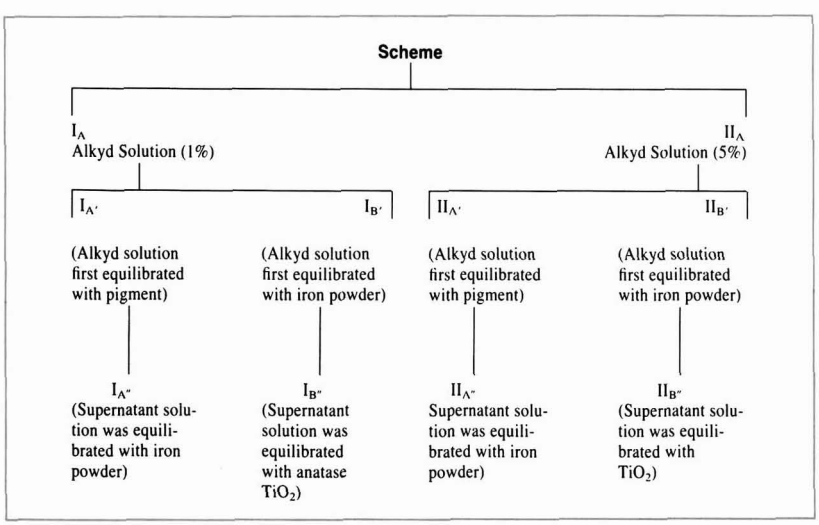
The degree of interaction of the solvent with the resin, given by the interaction parameter (χ), plays a vital role in the adsorption of resin onto the substrates. The selection of the solvent system for the adsorption studies was done by measuring χ for alkyd fractions with two solvents, that is, mineral spirits and xylene and their three blends. This was obtained by measuring the solution viscosities of different alkyd fractions using a Ubbelhode capillary viscometer having an AVS/N system for automatic recording of flow time to an accuracy of 0.01 of a second. The intrinsic viscosity [η] of the resin fraction in a given solvent was obtained using Huggin's equation:

$$\eta_{sp}/C = [\eta] + K_H [\eta]^2 C$$

where, η_{sp} = specific viscosity, [η] = intrinsic viscosity, and K_H = Huggin's constant.

The resin-solvent interaction parameters were obtained from the plots derived from the following Stockmayer-Fixman equation:

$$[\eta]/\bar{M}w^{1/2} = K_\theta + 0.51\ \phi\ B\bar{M}w^{1/2}$$



Scheme 1

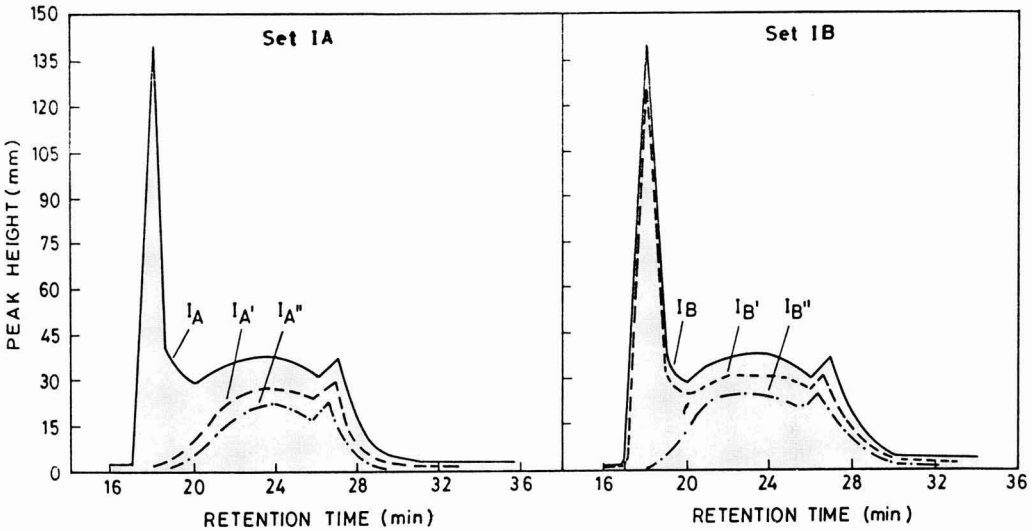


Figure 1—Peak height vs retention time (one percent solution): I_A, I_B—original alkyd; $I_{A'}$, $I_{B'}$—supernatant solution after first equilibration; and $I_{A''}$, $I_{B''}$—supernatant solution after second equilibration

where, ϕ = Universal constant (2.87×10^{21}), K_θ = a short range interaction parameter, and B = a long range interaction parameter. The magnitude of resin-solvent χ was calculated from B by the following relation,

$$B = \frac{2\bar{v}^2(0.5 - \chi)}{N_A V_1}$$

where, v = specific volume of the resin, V_1 = molar volume of the solvent, and N_A = Avogadro's number. The χ values for the five solvent systems are listed in *Table* 2.

On the basis of the χ value, the solvent blend consisting of xylene-mineral spirits (1:1 v/v) was used for carrying out adsorption studies, as it satisfied the conditions required for the adsorption.

Adsorption Studies

Adsorption experiments were conducted as follows: 50 mL of solution of an unfractionated alkyd of known concentration in a xylene-mineral spirit blend (1:1 v/v) was mixed into an adsorption flask (100 mL volume) containing 5 g of adsorbent (anatase TiO_2/iron powder), which was dried at 200°C for a period of 24 hr prior to its use. The flasks were stoppered, mounted on a shaker, and agitated gently until the contents reached adsorption equilibrium, which was found to take place in 48 hr in a thermostat controlled at 30 ± 0.5°C. The contents of the flask were separated by centrifuging (6000 rpm) at 4°C.

Experiments were conducted at two different concentrations, one below adsorption saturation capacity (ASC) and the other above ASC, as distinct differences were noticed in the adsorbed molecular weight species in these regions.[9] For convenience, two concentrations, that is, 1 g/100 mL and 5 g/100 mL were chosen because 2.50 g/100 mL was found to be the equilibrium concentration corresponding to the adsorption saturation capacity,[9] and sequential experiments on adsorption were conducted which adopted *Scheme* 1.

Size exclusion chromatography was used to monitor the process of adsorption at each stage. A known volume

Table 3—Molecular Weight Averages of the Species Present in the Blank, Supernatant Solution and In the Adsorbed Layer in Set I Experiments

	Blank			Supernatant Solution			Adsorbed Layer		
Set I	$\bar{M}_n$	$\bar{M}_w$	MWD	$\bar{M}_n$	$\bar{M}_w$	MWD	$\bar{M}_n$	$\bar{M}_w$	MWD
I_A[a] ...	2007	6325	3.15	—	—	—	—	—	—
$I_{A'}$[b] ...	2007	6325	3.15	1663	3818	2.30	6428	8560	1.33
$I_{A''}$[c] ...	1663	3818	2.30	1743	3950	2.26	954	2565	2.69
$I_{B'}$[b] ...	2007	6325	3.15	2230	10623	4.76	1200	3800	3.16
$I_{B''}$[c] ...	2230	10623	4.76	1039	3934	3.79	6945	12865	1.85

(a) I_A—Original alkyd.
(b) $I_{A'}$ and $I_{B'}$—Supernatant solution after first equilibration.
(c) $I_{A''}$ and $I_{B''}$—Supernatant solution after second equilibration.

Table 4—Molecular Weight Averages and MWD of the Species Present in the Blank, Supernatant Solution and In the Adsorbed Layer in Set II Experiments

	Blank			Supernatant Solution			Adsorbed Layer		
Set II	$\bar{M}_n$	$\bar{M}_w$	MWD	$\bar{M}_n$	$\bar{M}_w$	MWD	$\bar{M}_n$	$\bar{M}_w$	MWD
II_A[a] ..	2007	6325	3.15	—	—	—	—	—	—
$II_{A'}$[b] .	2007	6325	3.15	2248	10400	4.62	3465	6945	2.00
$II_{A''}$[c] .	2248	10400	4.62	2460	11800	4.80	945	3962	4.19
$II_{B'}$[b] .	2007	6325	3.15	2500	12400	4.96	2056	6258	3.04
$II_{B''}$[c] .	2500	12400	4.96	2100	10625	5.05	8826	13250	1.50

(a) II_A—Original alkyd.
(b) $II_{A'}$ and $II_{B'}$—Supernatant solution after first equilibration.
(c) $II_{A''}$ and $II_{B''}$—Supernatant solution after second equilibration.

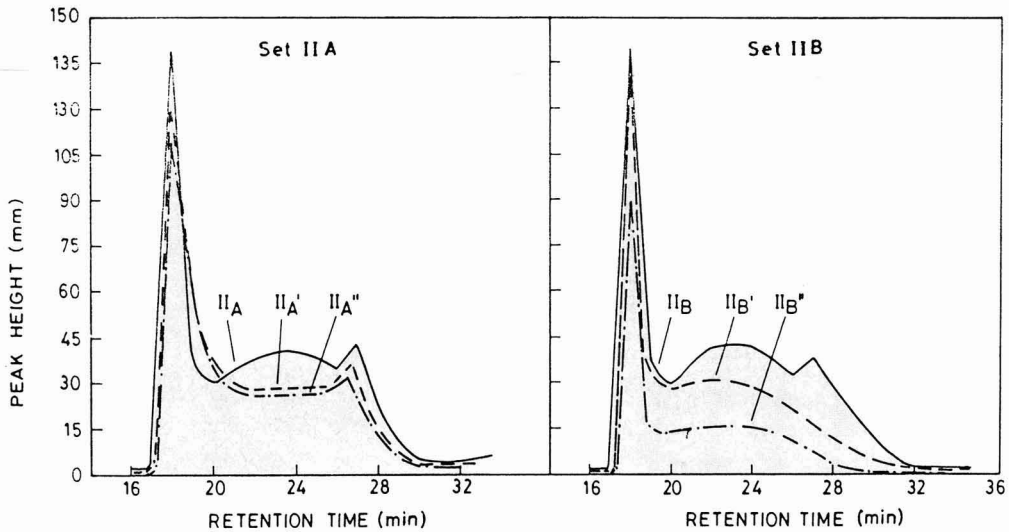


Figure 2—Peak height vs retention time (five percent solution): II_A, II_B—original alkyd; $II_{A'}$, $II_{B'}$—supernatant solution after first equilibration; and $II_{A''}$, $II_{B''}$—supernatant solution after second equilibration

of the supernatant solution obtained at every stage of equilibration was evaporated to dryness under vacuum. The isolated resin was made into a one percent solution in THF and subjected to size exclusion chromatographic analysis using a GPC model ALC/GPC 204 Water Associates, with μ-styragel columns of 10^3, 500, 500, and 100 A° pore sizes connected in series, with THF as the eluting solvent at a flow rate of 1 mL/min. Calibration was made by using polypropylene glycol supplied by Waters Associates. The molecular size distribution of the alkyd resin,

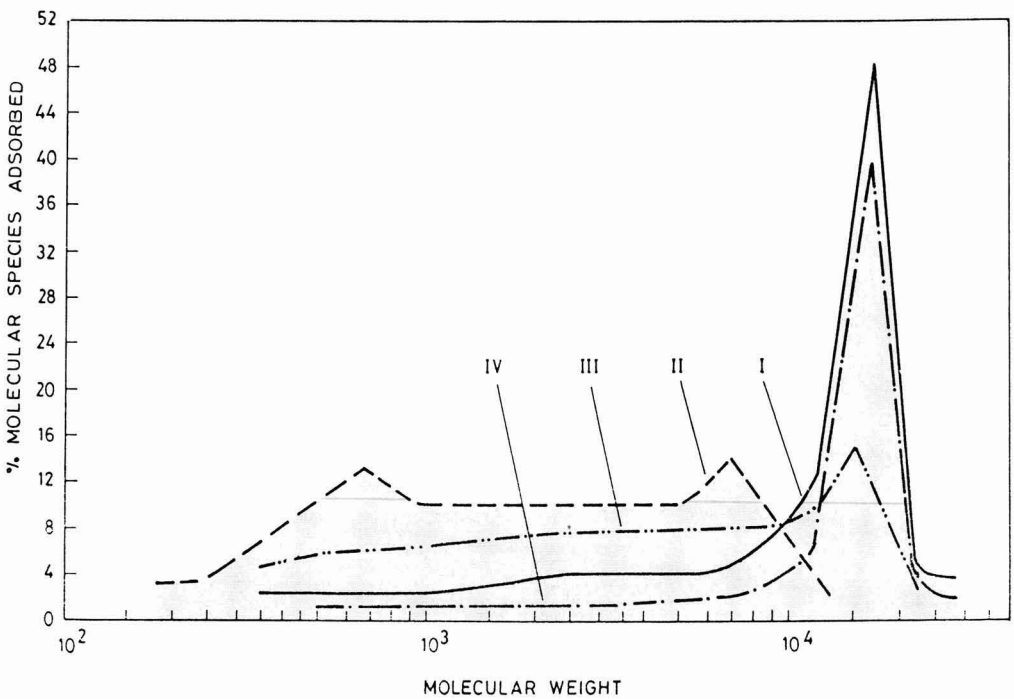


Figure 3—Percent molecular species adsorbed from one percent solution vs molecular weight: Set IA: adsorbed layer on pigment-I and adsorbed layer on metal-II; and Set IB: adsorbed layer on metal-III and adsorbed layer on pigment-IV

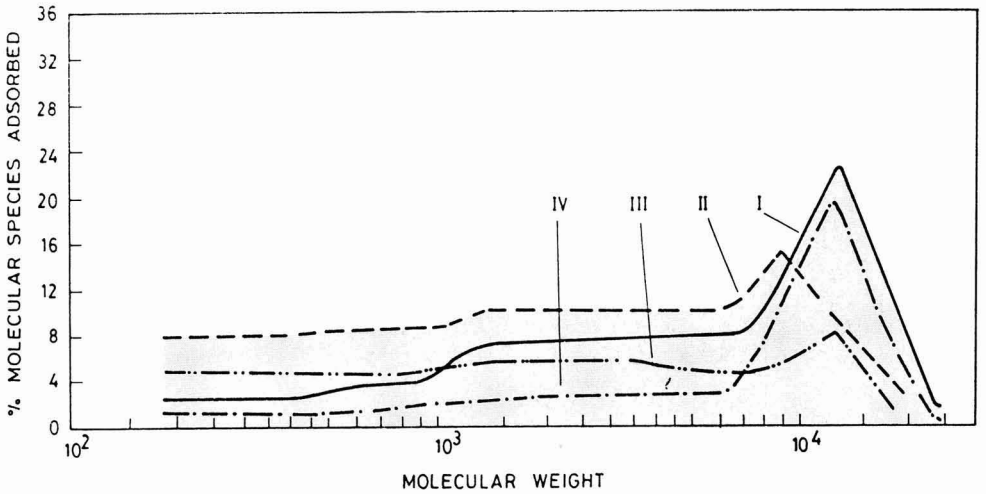


Figure 4—Percent molecular species adsorbed from five percent solution vs molecular weight: Set IIA: adsorbed layer on pigment-I and adsorbed layer on metal-II; and Set IIB: adsorbed layer on metal-III and adsorbed layer on pigment-IV

and the resin present in the supernatant solution and in the adsorbed layer (obtained from the difference in heights of the chromatograms of original solution and residual solution) are given in *Tables* 3 and 4. The peak heights of the original and residual solution chromatograms after each equilibration step are given in *Figures* 1 and 2. The percent molecular species adsorbed on the pigment and iron powder at two different concentrations are given in *Figures* 3 and 4.

RESULTS AND DISCUSSION

The solvent system, mineral spirits-xylene (1:1 v/v) whose χ is 0.456 (*Table* 3), was selected for adsorption studies, as it was found to be intermediate in its behavior between θ-solvent and a very good solvent, thus facilitating the adsorption process.

Adsorption experiments were conducted at two concentrations, one below and the other above ASC, as the type of molecular species adsorbed by the pigment particles in these ranges of concentration showed distinct differences in adsorption with respect to the molecular species. The distribution curves presented in *Figures* 1 ($I_{A'}$, $I_{B''}$) and 2 ($II_{A'}$, $II_{B''}$) show some interesting features. The most striking one is the presence of a relatively large amount of low molecular weight materials in the residual resin at low equilibrium concentrations, which indicates that the higher molecular fractions have been depleted from the original solution due to the adsorption on the pigment surface (*Figure* 1: $I_{A'}$, $II_{B''}$). This shows that, at low equilibrium concentration, the higher molecular weight species have a strong affinity for the pigment surface. This could be attributed to the higher concentration of polar pendant groups and olefinic unsaturation in larger molecular species compared to smaller molecules. At higher equilibrium concentrations, polymer-polymer interactions predominate over polymer-pigment interactions, which restricts the attachment of a high molecular fraction to the pigment. Hence, the preference shifts gradually to lower molecular weight fractions (*Figure* 2: $II_{A'}$, $II_{B''}$) with increasing solution concentration. More detailed information about the adsorbed species can be obtained from the distribution curves of the adsorbed resin shown in *Figures* 3 (I, II) and 4 (I, IV). These curves were obtained from the differences present in molecular size distribution of the original alkyd resin and the residual resin after adsorption.

In the other set of experiments, where the alkyd solution was first equilibrated with metal powder, mostly low molecular fractions were found to be preferentially adsorbed. The species in this region consisted of oligomers corresponding to 1,100-6,400 molecular size along with those whose molecular weights correspond to phthalic acid, phthalic acid half esters, monoglycerides, etc. [*Figures* 3 (II, III) and 4 (II, III)]. The presence of high molecular fractions (7,600-28,000) and a decrease in the percentage of low molecular fractions in the residual solution after equilibration with iron powder confirmed that low molecular weight species adsorb preferentially on iron metal [*Figures* 1 ($I_{A''}$, $I_{B'}$) and 2 ($II_{A''}$, $II_{B'}$)].

The results of the molecular weight distribution of the adsorbed species on the pigment and on metal powder indicate that fractionation takes place during adsorption on pigment, but not on metal powder (*Table* 3). However, at higher concentrations, the degree of fractionation is found to be decreased (*Table* 4).

CONCLUSIONS

Adsorption of different molecular weight species of resin onto pigment particles is concentration dependent, that is, at concentrations below ASC, high molecular

weight species are preferentially adsorbed, and at higher concentration, the preference shifts to low molecular weight materials. Further, in dilute solution, fractionation does take place during the adsorption on pigment, whereas at higher concentrations, the fractionation takes place only to a lesser extent.

The iron powder, though, picks up molecular species throughout the range present in the solution, it does so with a lesser proportion of high molecular weight species at both the concentrations. Also, the degree of fractionation of the adsorbed species of resin is not appreciable.

ACKNOWLEDGMENT

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REVIEW PAPER

Health, Safety, and Environmental Legislation In the UK and Europe

Kenneth R. Smith
Cray Valley Products Ltd.*

The long-expected legislative pressures to force British companies to reduce VOC's has still not materialized, although there are positive signs that it is now on the way.

Meanwhile, the British coatings industry has had to contend with a series of new laws, many of European Community origin, which have progressively tightened controls on a broad front. This started in earnest with the Health and Safety at Work, etc., Act 1974, to which were added several other Acts and Amendments, one of the most recent being the Control of Substances Hazardous to Health Regulations, which came into force in 1989. These specifically require control and monitoring of harmful substances in the atmosphere, and, together with a European Council Directive on air pollution in 1984, could well signal a renewed drive to low VOC coatings in Europe.

INTRODUCTION

The first thing that a European visitor to the Paint Industries' Show, held annually in the United States, will notice is the emphasis on low VOC systems. Although there is certainly a great deal of interest in Europe in reducing organic emissions, and indeed some legislation, so far there has not been any vigorous move towards extremely restrictive controls. The United Kingdom, in particular, has tended to avoid statutory controls, preferring to use persuasion in association with more general rules. This has been fairly successful in some areas—notably large industrial plants—but some other European countries, such as Germany, have taken a tougher line. The impending harmonized European legislation on pollution will have the effect of bringing all members of the community up to the level of the best.

Of course, in the UK and Europe, considerable success has been achieved with some "low VOC" systems, such as powder coatings, electrodeposited water-based systems, and certain high solids and solventless systems. Invariably, however, there have been other attractions in economic terms, leading ultimately to a less expensive painted article. Indeed, the key to acceptance of low VOC systems in Europe has been to show such an advantage, with absolutely no adverse effects on performance! Arguably, this approach has been taken about as far as it can, and only strict legislative controls will significantly further reduce the emission of VOCs in Europe.

Meanwhile, other health, safety, and environmental issues have not been neglected, and the UK paint industry has had to contend with a stream of new legislation over the last 15 years, much of it in the form of UK enactments of European Directives.

UK AND EUROPE

It is readily apparent, from the previous statements, that there is an increasingly strong involvement by the UK in the European Community (EC),[1] of which it is a member. The Community was initiated in 1952-58, with the formation of the European Coal and Steel (1952), Economic, and Atomic Energy (1958) Commissions, the latter two under the Treaty of Rome. In 1967, these were combined to form one single Commission of European Communities, with one Council.

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The EC comprises four basic institutions, namely: European Council of Ministers, which makes major decisions; European Commission, which is made up of 14 members, and makes minor decisions; European Parliament, which is an elected body of representatives from member states; and European Court of Justice, which upholds European Law.

This organization has powers only in certain areas, such as agriculture, and commercial and industrial competition, but the latter is taken to include matters of health, safety, and the environment, because different national systems can lead to an imbalance in financial burdens imposed.

The Single European Act of 1987[2] modified the Rome Treaty, and called for a high degree of harmonization of national laws by 1992. This has given rise to a flurry of activity in the areas of taxes and duties, health and safety and environmental matters, and "standards." In the latter area, the Council of Europe (a body separate from the EC, which includes more members) is issuing new "EN"[3] Standards to replace, in many cases, existing BS,[4] ISO,[5] and other standards. After 1992, there should be few remaining barriers to trade among member states, and customs checks for people traveling between EC states will become a thing of the past, as internal frontiers disappear.

The EC has issued many so-called Directives in the previously mentioned areas, which are binding on all member states, although with some flexibility in the form which national enactments may take. Failure to produce national legislation in accordance with a Directive can and does result in legal action being taken against the offending state through the Court of Justice.

Therefore, there is generally little point in European states pushing through their own rules in advance of a European Directive, which could force them to change again. The result is that the bulk of national legislation in the health, safety, and environmental area is tied to European Directives, with a few exceptions.

HEALTH AND SAFETY AT WORK ETC. ACT OF 1974 (HSW ACT)[6]

This UK Act is a very broad and far-reaching piece of legislation which set out to consolidate earlier complex and scattered laws on this subject. It was not, in fact, the result of a European Directive, although some have been subsequently enacted by the use of Statutory Instruments falling within the sphere of the HSW Act. It was the result of a Governmental Commission headed by Lord Robens in 1970-72,[7] which concluded that a completely new and rational approach was needed to overcome the apathy which surrounded many health and safety matters at that time.

It essentially places a clear duty on any manufacturer to protect his employees and any others who might be adversely affected by his operations, while also placing some responsibility on the employee.

Under these broad terms, employers must control the handling, storage, and transportation of dangerous chemicals, as well as emission of noxious or offensive substances into the atmosphere. They must provide safe plants and systems of work, backed up with sufficient information and training. They must provide a policy statement on health and safety, recognize union safety representatives, and form safety committees. Furthermore, they must ensure that their products are safe when properly used.

Because of the all-encompassing nature of this Act, it is not surprising that so much other legislation falls beneath its umbrella.

CLASSIFICATION, PACKAGING, AND LABELLING OF DANGEROUS SUBSTANCES REGULATIONS (1984) (CPL)[8]

This is an example of a major piece of legislation which was instigated in Europe, but which was enacted in the UK as an offshoot of HSW. This made sense because HSW itself already called for the provision of the necessary health and safety information of a product—without waiting to be asked for it. The resulting emphasis on Health and Safety Data Sheets, commendable though it was, did not always impart the information in the most desirable way.

Therefore, a group of European Directives on the subject of hazard labelling, which appeared beginning in 1967,[9] was implemented in the CPL Regulations. The 1984 version of the Regulations took note of the Solvent[10] and Paint[11] Directives also. These directives require all manufacturers to label any substance considered hazardous in a specified manner. For paint manufacturers, calculations for determining the primary hazard of the complete formulation are given, using hazard information for individual component substances listed in an "Authorized and Approved List"—commonly known as the "blue book"—which accompanies the CPL Regulations.[12] Any unlisted substance cannot, however, be assumed to be safe to use, and there are guidelines in terms of LD50 or corrosivity definitions, etc., for classifying these too. Furthermore, the regulations require the naming of more than specified amounts of substances classified as toxic, harmful, corrosive, or irritant, on the label. The label has to carry standard symbols (pictograms) which correspond to the classification used, plus the name and address of the supplier, and the correct risk and safety phrases as directed by the approved list.

The CPL Regulations also cover needs for conveyance labelling, as opposed to supply labelling, that is, label-information most affecting transportation, as opposed to handling of the formulation itself. Thus, the "hazard diamonds" of long standing in the UK are retained, and may be included with the UN number, on one composite supply/conveyance label. Also included in the CPL Regulations is advice on package classifications for conveyance of those substances in the blue book.

Needless to say, this has involved the industry in considerable expenditure and effort, although a new General Preparations Directive is now imminent, which will supplant the Paint and Solvent Directives and provide a unified approach to the labelling of all preparations (i.e., compositions of more than one substance). This could force many companies to start all over again.

It should be pointed out, though, that there is no move as yet to provide the sort of detailed information on product labels that is being demanded in the United States, nor to include warnings of possible links between solvents and brain damage.

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS (1988) (COSHH)[13]

This is one of the most recent missives to hit the chemical industry, having taken effect on October 1, 1989, with full implementation taking place by the end of 1989. It again arises from a desire at the European level to rationalize previous piecemeal controls, with emphasis on the way dangerous substances are actually used, rather than on the dangerous properties themselves. The latter is more the concern of CPL Regulations, so in a sense, COSHH may be regarded as an extension of those regulations.

Thus, COSHH uses the CPL Regulations list as an indicator as to the hazardous nature (together with exposure limit listings elsewhere).[14] Anything there classified as toxic, harmful, corrosive, or irritant, and, anything that gives rise to appreciable dust levels in air, are covered by COSHH.

At the same time, COSHH also is related to HSW, Section 6, which requires the provision of adequate information to employees, and this need is reasserted in this paper. It requires that employers fully assess the risk to their employees of any operation which they undertake, in terms of hazardous materials. This must involve the examination of all safety data for materials used, as provided by their suppliers, and the relationship of this to likely exposure of any workers involved in the plant, at any stage. A judgement must then be made by one competent to do so, as to the level of monitoring and preventative measures likely to be needed. It is particularly necessary to show that exposure to substances for which maximum exposure levels[14] are quoted never exceeds the stated figure. Indeed, the best practicable means must be used to keep these as far below this limit as possible. Other substances for which occupational exposure standards are quoted must be simply monitored to ensure that they do not exceed this level.

"Engineering" controls of employee contacts with hazardous substances are preferred, personal protective equipment being used only where there is really no alternative—perhaps temporarily—or as a back-up safeguard.

If the initial assessment—which in many cases will itself involve some preliminary monitoring—suggests that exposure levels of more than 20% of the limit value may occur, then further monitoring would be indicated.

Where personal protective equipment is used as part of control procedures, it must be of British Standard approved design for the intended use, and be regularly inspected for efficiency. Indeed, all parts of the control system must be subjected to routine, recorded maintenance and checking to ensure that safe conditions are being maintained.

As in HSW, employee responsibility is not ignored, and it is a legal requirement that employees use the protective systems provided.

Full records of control system checks and monitoring must be retained for five years, and any health surveillance results (which are required in some specified circumstances) for 30 years.

Once again, these regulations impose a considerable amount of effort and expense on manufacturers, but undoubtedly they will have the desired effect of reducing employee (and others) contact with hazardous materials.

Most plants of reasonable size are implementing monitoring systems based on desorption tubes, for a combination of personal (tube attached to the operative in his breathing zone) and location (tube kept at a fixed position in the plant) monitoring. These tubes absorb vapor by a diffusion process, and the volatiles are subsequently driven off by heating and analyzed by an appropriate method. Of course, there are substances which are not easy to monitor in this way, by virtue of great reactivity (e.g., isocyanates, anhydrides) or volatility. Dusts also need to be treated differently.

NOTIFICATION OF NEW SUBSTANCES REGULATIONS (1982)[15]

This is yet another "tag-on" case, this time arising as a Sixth Amendment to the EC Directive which led to CPL Regulations.[16]

The original intention was somewhat grandiose, one of establishing a database of all toxicity information for all known substances. Instead, an initial inventory of "known" substances, representing those on the European market from 1971 to 1981, was compiled as the European Core Inventory or "ECOIN."[17] Additions subsequently made by industry submissions resulted in a longer listing, known as the European Inventory of Existing Chemical Substances or "EINECS," and this was adopted as a listing of "known substances."[18]

Those not so listed were now "new substances," and could not be marketed generally before they were registered through a process of premarketing notification. Such registration also leads to the substance being given a CAS number, if it does not already have one, and this procedure is generally analogous to the American TSCA[19,20] system. As with the EPA system, new substances must undergo extensive physical and toxicological testing if a quantity greater than one ton per annum is expected to be sold.

As part of the notification procedure, the supplier has to provide proposals for classification, packaging, and labelling—fitting in neatly with the CPL Regulations system.

One important difference between EINECS and TSCA should be noted—EINECS does not require polymers to be registered. In view of the very wide range of polymer compositions currently included on one CAS Number, the European system seems much more sensible in this regard. The only control on polymers in Europe is that the component monomers must be registered. Having said that, there is some concern in Europe about the nonregistration of low molecular weight polymers or oligomers, and it could well be that polymers below a stated molecular weight will become notifiable. This approach was

adopted in Denmark, and appears to represent the best compromise between the European and American systems.

CONTROL OF POLLUTION

A variety of laws relating to pollution in the UK were drawn together in the Control of Pollution Act of 1974,[21] which also strengthened statutory provisions that prevailed at the time. It comprises four parts, dealing with land, water, noise, and atmosphere pollution.

Two classes of waste under the "land" category are defined. So-called "controlled" waste comprises household, commercial, and industrial waste for land disposal, subject to written area disposal plans. A disposal license also must be obtained before disposing of such waste on land. The other category is "special waste," which is defined in the Control of Pollution (Special Waste) Regulations (1980)[22] and covers certain dangerous substances, including highly flammable materials. These substances must be disposed of in other ways, usually incineration, and must not be deposited in landfill sites. Producers and carriers must keep records of all such activities.

Part two of the Act deals with water pollution. In this category, trade effluents are subject to prior notification to local water authorities, who can enact by-laws to control the pollution of the waterways, or make separate agreements with plant owners, as they see fit.

The third part, relating to noise, repealed the Noise Abatement Act of 1960, and makes provision primarily for the prevention of "nuisance" noise. More specific legislation was the subject of a European directive,[23] which was to be enacted by member states by January 1990.

Air pollution, the subject of the final part of the Control of Pollution Act, continued to rely on pre-existing laws, such as the Alkali and Works Regulations (1906)[24] and the Clean Air Acts of 1956 and 1968,[25] but empowered local authorities to collect and publish data on air pollution in their areas.

In 1987, the importance of air pollution control was recognized by the transfer of control of the Industrial Air Pollution Inspectorate from the Health and Safety Executive (HSE) to the Department of the Environment, which also was merged into a newly formed HM Inspectorate of Pollution. Use of the best practical means to prevent escape of noxious vapors from regulated works is obligatory under these regulations, and is enforced under the HSW Act by prohibition or enforcement notices.

The 1956 and 1968 Acts specify "scheduled" and "nonscheduled" works according to the nature of the plants. The former are controlled by the National Inspectorate, the latter by local authorities. The scheduled works are further described in the Health and Safety (Emissions into the Atmosphere) Regulations (1983),[26] which also list "noxious or offensive substances" to be controlled.

The latest moves on this front, in response to a 1984 EEC Directive[27] on air pollution from industrial plants, propose a two-tier system of scheduled works, which will bring more plants into the scheduled category. The second (Part B) scheduled group would, like nonscheduled plants, be under the control of local authorities, but with provision of stronger enforcement powers and more specific guidance on emission limits.

It was thought that a rigid system of controls more akin to the U.S. system could emerge, but this now seems less likely. Meanwhile, however, other European countries are beginning to take a tougher line, Germany in particular being in the forefront of the "Green" movement in this context. It is expected that 1992 will bring further pressures for all European countries to take an equally tough line.

It was reported in 1983 that solvents constituted 40% of all VOC emissions from Western Europe (which totalled four million tons). Of these solvent emissions, 60% were hydrocarbons, 40% oxygenated types, and the total equalled VOC emissions from road transport. France was endeavoring in 1986 to reduce solvent emissions from paints by 25%, the Dutch Government in 1987 demanded a reduction of 50%, and Greece has set a 25-30% reduction target for the Athens area to reduce so-called "Athens smog." This is all indicative of the general mood in Europe relating to emission controls, which is certain to result in continuing pressure for improvements in this area.

CONCLUSIONS

There is no doubt that the formation of the European Community has provided a spur to the rationalization and strengthening of regulations in the health, safety, and environmental areas in Europe. The gathering of public support for "green" matters will ensure that this trend continues—especially in relation to pollution—and it is only a pity that more effort has not been expended in rationalizing on a worldwide basis in some areas, such as safety-labelling.

It is inevitable that there will be increasing pressures for environmentally-friendly paint systems, and this will have a profound effect on the industry in the years ahead.

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CLEVELAND ..... MAY

Awards Night

Fifteen Past-Presidents of the Society attended the meeting and were honored by the membership.

Three special Society awards were presented.

The Award of Appreciation was presented to Madelyn Harding, of Sherwin-Williams Company, who was given a commemorative plaque in honor of receiving the Award. Ms. Harding is a Past-President of the Society and served as Chairman of the Finance Committee.

The Dr. Frank Selden Award winner was Victor G. Sandorf, of Coatings Development Company. Mr. Sandorf was Co-Chairman of the 75th Anniversary Celebration Committee and played a considerable role in the success of this special event. The Selden Award is presented to the member who has rendered signal service to the Society.

The Award of Merit went to DeVilla Moncreif, of Sherwin-Williams Company. Mr. Moncreif is Chairman of the Educational Committee and is responsible for the success of the Annual Educational Symposium. He also has visited local high schools and colleges promoting the coatings industry. This Award is given to an individual who has shown outstanding leadership in the Society, as well as the community.

Technical Committee Chairman Freidun Anwari, of Coatings Research Group, Inc., presented Al Blazek with a $100 check and a commemorative plaque for winning the coatings related theme at the Northeast Ohio Science Fair. The project was entitled "What Is Color?." Mr. Anwari was the advisor on the project.

Incoming President Richard J. Ruch, of Kent State University, presented Immediate Past-President Ilona Nemes-Nemeth, of Sherwin-Williams Company, with her Past-President's Pin and thanked her for a year of dedicated service to the Society. This marked the last meeting for Ms. Nemes-Nemeth, who has been transferred to South Carolina and no longer will be a resident member of the Society.

The meeting's speaker was Joseph Nagyvary, of Texas A&M University. Dr. Nagyvary's topic was "THE CHEMISTRY OF THE STRADIVARIUS."

The speaker began by explaining that his interest in the Stradivarius violins was originally a hobby. However, over the last few years, the violins have become his principle area of investigation.

Dr. Nagyvary gave a history of the violin, particularly those made by the Italian violin maker Antonio Stradivari. Mr. Stradivari made over 1200 violins during his life, however only one of those remains in mint condition—the "Messiah." The speaker stated that the varnish is perfect with no sign of restoration.

Dr. Nagyvary explained that the heavy coat of varnish applied on Stradivari instruments is very turbid. He said that French restorers sanded away at least 50% of the

original (turbid) varnish, which was raw and looked like orange peel, and then laid down a layer of French varnish.

A brief explanation of the physics and acoustics of the instrument was presented.

Dr. Nagyvary described different varnishes and compared the compositions of the French transparent varnishes to the turbid appearance of the Italian varnishes.

The speaker said that he managed to pry a 20 microgram chip away from a Stradavari owner, who swore him to secrecy, to do some elemental analysis on a true Stradavari varnish. Comparisons between the French and Italian varnishes were made using light and electron micrography. Dr. Nagyvary reported that the morphological differences which were revealed were startling.

He stated that while the French varnish is a very uniform solution, the Italian and German varnishes are true composites, that is, they are composed of several different yet distinct particles. The majority of the particles are less than one micrometer in diameter.

Dr. Nagyvary said enough material was obtained to do an elemental analysis using energy dispersive x-ray spectroscopy. The results showed that varnishes of that era were composed of antimony, barium, sulphate, kaolin, calcite, feldspars, gypsum, mica, iron oxide, corundum (ground ruby), and zinc oxide carbonate.

The main components are calcite (calcium carbonate), rose quartz, colored Venetian glass, potassium feldspar, and gypsum. Also present were some minor components which could be used to identify geographical locations or cities.

Dr. Nagyvary stated that with this information, a great deal more is known about the different varnish types. He said that most Italian varnishes are highly filled. The binder comprises 50% of the varnish, with the other 50% being filler. Due to the small sample size, some of the components of the binder could be identified, but not their relative amounts.

Q. Did you mean that the surface of the varnish is cracked and crazed?

A. Yes, there are literally millions of micro cracks all over the surface. Some also are visible to the naked eye. We feel the cracks are important to the overall acoustical behavior of the violin. Unfortunately, when the French restorers revarnished the violins, several of the cracks were sealed.

Q. Is the inside of the violin varnished?

A. No, the inside was not varnished. However, some form of juice was applied to it. We are not entirely sure what this material is.

BEN J. CARLOZZO, *Secretary*

KANSAS CITY ..... MAY

Education Night

President Mark Algaier, of Hillyard Chemical, recognized the Society Past-Presidents in attendance, including: Nick F. Dispensa, of Davis Paint Company; Roger Haines, of Tnemec Company, Inc.; Steven D. Johnson and Terryl F. Johnson, of Cook Paint & Varnish Company; and Gene Wayneberg, of Tnemec Company, Inc.

A 25-Year Pin was presented to Thomas Hutsler, retired, for his 25 years of dedicated service to the Society.

Unable to attend the meeting, but also recognized for being a member of the Society for 25 years was John R. Griswald, of Charles Paint Research, Inc.

Robert Horn presented the night's technical presentation on the KCK's "HAZMAT" program.

H. JEFF LAURENT, *Secretary*

NORTHWESTERN ..... MAY

25-Year Presentation

Sherman I. Garnett, retired, was presented with a 25-Year Pin, marking his quarter-of-a-century dedication to the Society.

DANIEL W. DECHAINE, *Secretary*

PACIFIC NORTHWEST PORTLAND SECTION ..... MAR.

"Alkyd Resins"

John Daller, of Miller Paint Company, Inc., reported that OSPIRG presented a bill in the state legislature which would require at least 50% of packaging material to be recycled.

The meeting's speaker was Bud Lee, of Dow Chemical Company. Mr. Lee gave a talk on "COUPLING SOLVENT EFFECTS ON WATER-REDUCIBLE ALKYD RESINS."

JOHN WESTENDORF, *Secretary*

PHILADELPHIA ..... MAY

"Total Quality Management"

The following members were unanimously elected to the Society Board of Directors: President—Christopher H. Huhn, of Arizona Chemical Company; Vice President—Peter C. Kuzma, of VIP Products Corporation; Secretary—William J. Fabiny, of Sermagard Coatings; Treasurer—Brian O'Connor, of McWhorter, Inc.; Assistant Treasurer—Robert D. Thomas, of M.A. Bruder & Sons, Inc.; Senior Member-at-Large—Barrett C. Fischer, of Van Horn, Metz & Company, Inc.; Junior Member-at-Large—Howard J. Salmon, of Clement "Coverall" Company; Senior Past-President—Lawrence J. Kelly, of Eastech Chemical Company; Junior Past-President—Orville E. Brown, M.A. Bruder & Sons, Inc., and Alternate Society Representative—Donald F. Denny, of E.W. Kaufmann Company.

Elected to serve as committee chairmen are: Educational—Richard D. Granata, of Lehigh University; Membership—A. Marshall Jones, of Van Horn, Metz & Company, Inc.; and Technical—Julio Aviles, of Kronos, Inc.

Wayne A. Kraus, of Hercules Incorporated, will continue to serve as the Society Representative to the Federation's Board of Directors.

The meeting's first speaker was Thomas C. Gibson, of Du Pont Company, whose topic was "TOTAL QUALITY MANAGEMENT."

The speaker addressed the concerns about the future of total quality management and where it might fit in. According to Mr. Gibson, during the last several years, emphasis has been placed on controlling the processes and systems necessary to achieve good end-product quality. He stated that standards have also changed.

There are three fundamental improvement activities, explained the speaker. The first one is finding out about customer values and needs and refocusing operating systems and processes accordingly. The second fundamental improvement activity is to search for and eliminate costly operating failures. The third fundamental improvement activity is to continually involve more people in upgrading the quality of products.

According to Mr. Gibson, leadership is the principal driving force for the improvement activities to take place. He stated that strong leadership is vital, but that training in improvement activities also is important.

Methods to identify improvement activities were discussed, including: direct customer surveys; market opportunities analysis; feedback through salesmen; customer complaint analysis; work process analysis; cost of quality analysis; and benchmarking.

According to Mr. Gibson, the main barriers to success are managers and supervisors who doubt feasibility and practicality of the effort. According to the speaker, some typical leadership duties are: properly training various levels; auditing Quality Action Team performance; recognizing teams; and rewarding successful teams.

The meeting's second speaker was Daniel R. Baker, of McWhorter, Inc. Mr.

Baker discussed "STATISTICAL PROCESS CONTROL IN AEROSOL FILLING."

The statistical process control systems used to accomplish the results that McWhorter has realized are bag weight, fill weight, and aim point. The company used the vendor certification program and a value shared incentive program.

According to Mr. Baker, inbound bag weights are checked. He suggested reducing the variation products by controlling the incoming variation. Every inbound shipment has five bags checked at random, with under amounts being reduced from the bill. Also, any bag over an accepted weight is not accepted. RMCV is reduced with better control of tinting, hiding, gloss, etc., with less batch adjustment and greater yields.

The speaker said that fill weights also are checked. Mr. Baker stated that most paint manufacturers tend to overfill their packages by 2-4%. He explained that overfilling severely impacts profitability. A statistical process control system can aid a manufacturer in adjusting fill weight to just over the target weight. Mr. Baker said that assignable sources of variation, which include set-up procedure, overadjustment, settling, air supply, and line speed, must be targeted.

The final statistical process control system is aim point. According to the speaker, during this step, the one specification that has the most effect is checked. He stated that the center of the specification is the target. A measurement system is used to determine how well the target is met. All products are plotted together and then analyzed to see manufacturing's ability to reproduce the technical aspects of a formula and possible problems in the formula.

Mr. Baker stated that vendor certification and vendor performance determine who receives the business. The system is designed to know who in the vendor pool has the best probability for consistent quality and service performance.

In conclusion, the speaker explained that the value shared system enables the concept to filter down to the plant where the product is made. As more customers are satisfied, the business grows, and with more profit, it makes quality control easier.

Q. What if you do not have the necessary support from top management?

A. A total quality management project is very tough without this support. Frankness and openness are keys to persuading the leadership. Giving the leadership good data, and identifying where you think major improvements can be made, especially if it is in your own area, and then showing successes really helps to solidify that support.

PETER C. KUZMA, *Secretary*

Elections

CDIC

Associate

Leiby, Dean M—Degussa Corp., Akron, OH.

DETROIT

Active

Bales, Jennifer—Dow Corning, Midland, MI.
Bloom, Barry—Akzo Coatings, Troy, MI.
Cabell, Aloys III—Akzo Coatings, Warren, MI.
Evans, Kimberly A.—Dow Corning, Midland.
Goodell, Carol E.—E.I. du Pont de Nemours & Co., Inc., Troy.
Hess, John C.—Chrysler Motors, Troy.
Kornacki, Michael P.—BASF, Detroit, MI.
Wojcik, Ronald T.—Akzo Coatings, Troy.

Associate

Cameron, Chuck—CIBA-GEIGY Corp., Madison Heights, MI.
Fesenmeyer, Chris H.—Rohm and Haas Co., Grosse Pointe Park, MI.
O'Driscoll, Anthony J.—CIBA-GEIGY Corp., Madison Heights.

GOLDEN GATE

Active

Simpson, Timothy E.—DJ Simpson Co., S. San Francisco, CA.

KANSAS CITY

Active

Moore, Steven L.—Kansas Paint & Color, Wichita, KS.
Rosiere, Ray E.—Kansas Paint & Color, Wichita.

NEW YORK

Active

Nabar, Shreerang, N.—Morton International, N. Brunswick, NJ.
Paltz, Arthur B.—Morton International, N. Brunswick.
Patel, Naresh B.—Mark-Tex Corp., Englewood, NJ.
Pisapia, John—Morton International, N. Brunswick.
Rendek, Stephen M.—North American Paint Corp., Wanamassa, NJ.
Sikora, James J.—Mark-Tex Corp., Englewood.

Associate

Guzzo, Michael V.—Royale Pigments and Chemicals Inc., Paramus, NJ.
Licciardello, Rosario A.—Cyprus Industrial, Mount Laurel, NJ.
Vasconcellos, Mark A.—Hüls America Inc., Piscataway, NJ.

TORONTO

Active

Mohammed, Wahid—Aimco Solrec Ltd., Milton, Ont.

People

The Specialty Minerals Group of Pfizer Inc., New York, NY, has appointed **Richard L. Loudon** as Product Manager—Lime and Limestone, and **Elizabeth Galan** as Market Development Manager—Polymers.

Mr. Loudon has been with the company for nine years and was a former instructor-navigator for the U.S. Air Force. He is a member of the Philadelphia Society.

Ms. Galan is in charge of market development of Pfizer's talc, limestone, and precipitated calcium carbonate product lines for the polymer industry.

Both Mr. Loudon and Ms. Galan will report to **Cas W. Kleczko**, Group Marketing Manager for Pfizer Specialty Minerals.

Ms. Kleczko is a member of the New York Society.

DataLogiX Formula Systems, Inc., Valhalla, NY, has announced that **Lori Ann Gaudioso** has been named Manager of Marketing Communications. She will be responsible for managing the company's advertising and promotional efforts and will work closely with the Vice President of Marketing in the areas of public relations and channels marketing. Ms. Gaudioso brings experience in the computer software industry to the position.

Stamat, Inc., Dallas, TX, has announced that **Bobby L. "Bob" Pugh** has joined the company as a Sales Representative. He will be directly responsible for equipment and chemical sales in west and south Texas, as well as selected accounts in Houston, TX, and the Dallas/Fort Worth areas. Mr. Pugh has 14 years experience in sales to the coatings, ink, plastics, and other related industries.

Terry L. Anderson has been named Research Director, Automotive OEM Central Research Laboratory of the Coatings & Colorants Division, BASF, Southfield, MI. He is responsible for all laboratory activities in polymer research, resin development, and fundamental coatings research. Mr. Anderson formerly served as Director of Polymer Research and Resin Development.

Also, **Hans Streitberger**, formerly a main department head of BASF Lacke + Farben, Muenster, West Germany, has become Technical Director, Automotive OEM Coatings. His responsibilities include all technical programs supporting automotive OEM new product development and introduction, and for technical service to the Automotive OEM Coatings Business Unit.

R.L. Loudon

L.A. Gaudioso

K.E. Trautwein

V. Dugger

Frank W. Dunne Company, Oakland, CA, has announced three appointments within the company. **Kendall E. Trautwein** has been named Technical Director. Prior to joining Dunne, he was a Commercial Products Development Specialist for Sherwin-Williams Company. Mr. Trautwein is a Past-President of the Golden Gate Society.

Martin Berry was appointed Systems and Accounting Manager. He previously was a Controller for 10 years and brings more than 16 years of experience to the position.

Dave Cardana will serve as Senior Chemist, working to develop new products and to improve existing lines. He has 23 years of experience in the coatings industry. Mr. Cardana previously served as a Research Chemist and Production Manager.

S.P. Morell & Company, Scarsdale, NY, has named **Jim McKeon** as Technical Representative responsible for northern New England and upstate New York. Prior to joining S.P. Morell, Mr. McKeon was Regional Sales Manager for Monsanto and Neville Chemical Company.

Teri A. Kummer has been named an Ink Specialist for color measurement and control products by the Macbeth Division of Kollmorgen Instruments Corporation, Newburgh, NY. Prior to joining Macbeth, Ms. Kummer worked for Flint Ink Corporation where she managed the printing research lab.

Gerald F. O'Connor has been promoted to Director of Logistics and Planning for the Cylinder Operations Division of Airco Gases, Murray Hill, NJ. His duties include consolidation planning of the company's cylinder operations, as well as managing the newly formed Cylinder Control Group. Prior to joining Airco, Mr. O'Connor worked for Liquid Carbonic as a Plant Manager.

Vel Dugger, Sales Representative for 3M Construction Markets, has been named the Painting & Decorating Contractors of America (PDCA), Carolina Council, 1989 Member of the Year. The award was presented at the PDCA Carolina Council Annual Meeting in Raleigh, NC. Ms. Dugger is a member of PDCA's Charlotte, NC Chapter and is the first woman to receive the Award.

Reichhold Chemicals, Inc., White Plains, NY, has announced the appointment of **John S. Gaither** as President of its Emulsion Polymers Division. He succeeds **Eugene Elzy** who resigned. Mr. Gaither previously was President of the company's Reactive Polymers Division. He joined Reichhold Chemie AG in Vienna, Austria, in 1967.

Colin A. Russell has been named the 1990 winner of the Dexter Award for his "outstanding contributions to the history of chemistry." Dr. Russell, a Professor of History of Science and Technology at the Open University, London, England, was presented with a plaque and a $2,000 honorarium at a luncheon, on August 28, during the American Chemical Society (ACS) meeting in Washington, D.C.

Established in 1956 by Dexter Chemical Corporation, the Award is administered by the History of Chemistry Division of the ACS.

Dr. Russell is the author of 12 books in chemistry, as well as numerous articles in chemical journals.

Prior to the luncheon, Dr. Russell presented a paper before the Division entitled "Records of Chemistry: Combustion or Conservation." The paper was subtitled "An Unsentimental View of Chemical Archives."

John Weaver, retired from the Sherwin-Williams Company and currently Chairman of ASTM's Committee D-1, was one of nine Denison University Alumni Citation Award winners honored by the university.

The award, the highest given by the Society of the Alumni, was presented in recognition of outstanding achievements and services that reflect honor upon Denison University.

While an undergraduate, Dr. Weaver served as Associate Editor of the campus newspaper, was a member of the Yearbook staff, and was President of the Chemistry Society. Also, he served as Secretary and Treasurer of the Sigma Alpha Epsilon fraternity. Dr. Weaver graduated from Denison in 1930 with a degree in Chemistry.

He received a Master's Degree in Chemistry in 1933 and a Doctorate in Chemistry in 1935 from the University of Cincinnati.

Dr. Weaver began his career with Sherwin-Williams in 1936, serving as a Chemist, Project Coordinator, and Managing Director until his retirement in 1974. He continued to work for the company as a Consultant until 1979.

In 1974, Dr. Weaver embarked on a second career when he joined the faculty of Case Western Reserve University as an Adjunct Professor of Macromolecular Science. Currently, he works for the university as a Consultant and Lecturer, particularly in the paint technology field.

Dr. Weaver has been a member of ASTM since 1944 and is Chairman of Committee D-1 on Paint. He was elected an Honorary Member of ASTM in 1976 by its Board of Directors. Presently, he is helping to set technical standards for industry regarding causes of lead poisoning of inner-city children.

In 1969, he was awarded the George Baugh Heckel Award by the Federation of Societies for Coatings Technology. In 1983, Dr. Weaver was the recipient of the Cleveland Society for Coating Technology's Distinguished Service Award. He was selected by the Standards Engineering Society and ASTM for the Robert J. Painter Award for Meritorious Service in 1987.

A lifelong volunteer for Denison University, Dr. Weaver has served as President of the Cleveland Alumni Club, a Counselor-at-Large of the Alumni Board, and Fund Chairman of his 50th reunion class.

Dr. Weaver is a member of the honorary scientific society of Sigma Xi.

Three new appointments have been announced within the Electron Optics Division of Carl Zeiss, Inc., Thornwood, NY.

Karleen Davis has been promoted from District Sales Manager—Midwest to Scanning Electron Microscope Product Manager. Ms. Davis has extensive analytical SEM experience.

Larry Williams and **Frank Coccia**, formerly District Sales Managers for the Electron Optics Division, have been promoted to Regional Sales Managers. Mr. Williams will be the new Western Regional Sales Manager and Mr. Coccia will be the Eastern Regional Sales Manager for the Division.

Matthew R. Rhodes has been appointed an Application Specialist for electrochemical analysis and detection systems for EG&G Princeton Applied Research, Princeton, NJ. His duties include investigation of new applications and application research, and the development and evaluation of new hardware and software products and upgrades. Prior to joining EG&G, Dr. Rhodes was a post-doctoral Research Assistant with the Department of Chemistry, University of North Carolina, Chapel Hill.

Douglas G. Boller has been appointed Director of the New Products Division within the Chemical Group of Degussa Corporation, Ridgefield Park, NJ. He has overall responsibility for the development, marketing, sales, and technical services of a wide variety of fine and specialty chemicals and organic intermediates sold to the pharmaceutical, textile, and coating industries. Mr. Boller previously served as Marketing Director within the New Products Division.

Ashland Chemical, Inc., Columbus, OH, has named **Peter F. Loscocco** Public Relations Supervisor responsible for the company's product publicity. He will participate in a variety of internal and external communications activities. Mr. Loscocco, who joined Ashland in 1987, will report to **D. Brent McGinnis,** Director of Public Relations.

In another move, Ashland promoted **Pamela A. Fitzpatrick** to Public Relations Coordinator. Her duties include coordinating employee publications, special events, and company meetings. Ms. Fitzpatrick also will report to Mr. McGinnis.

Ken Arthur has been appointed Vice President, Sales, for the Consumer Coatings Group of Valspar Corporation, Minneapolis, MN. His duties include responsibility for the Enterprise, Colony, and Magicolor product lines. Mr. Arthur came to Valspar when it acquired Enterprise Paint Company in 1986.

Three technical sales representatives covering territories from Texas to New York were announced by the Chemical Products Division of Cargill, Inc., Minneapolis, MN.

Gregory J. Weyers has been promoted to Technical Sales Representative for Coating Resins in parts of Ohio, Pennsylvania, and New York. **Rodney J. Hicks** has been named Sales Representative for Coating and Unsaturated Polyester Resins in the Southeast with additional responsibility for the support of distributors' sales efforts in Philadelphia, PA, Baltimore, MD, and eastern Virginia. **Steve Cardwell** has joined Cargill as Technical Sales Representative for Coatings and Unsaturated Polyester Resins in Missouri, Kansas, and Arkansas.

H. Eugene McBrayer, of Exxon Chemical Company, was elected Chairman of the Board of the Chemical Manufacturers Association (CMA) at the group's Annual Meeting. He succeeds **Robert D. Kennedy,** of Union Carbide

Frank P. Popoff, of Dow Chemical Company, was elected Vice Chairman of the Board. **John W. Johnstone Jr.**, of Olin Corporation, was elected Chairman of the Executive Committee.

Robert A. Roland was reelected President of the Association.

Newly elected or reelected to the Board of Directors were: **Cyril C. Baldwin Jr.**, of Cambrex Corporation; **J. A. "Fred" Brothers,** of Ashland Oil, Inc.; **John D. Burns,** of Vista Chemical Company; **Robert D. Cadieux**, of Amoco Chemical Company; **Earnest W. Deavenport Jr.**, of Eastman Chemical Company; **Ernest H. Drew,** of Hoechst Celanese Corporation; **Bob G. Gower,** of Lyondell Petrochemical Company; **Peter R. Heinze,** of BASF Corporation; **Glen H. Hiner,** of GE Plastics; **Jon M. Huntsman,** of Huntsman Chemical Corporation; **Conrad S. Kent**, of Akzo Chemical Inc.; **Truman L. Koehler,** of Sandoz Corporation; **H. William Lichtenberger,** of Union Carbide; **J. Robert Lovett,** of Air Products and Chemicals; **Thomas Marshall,** of Aristech Chemical Corporation; **Seymour S. Preston III,** of ATOCHEM North America, Inc.; **Davis B. Richardson**, of Shell Chemical Company; **F. Quinn Stepan,** of Stepan Company; **S. Jay Stewart**, of Morton International, Inc.; **Bill M. Thompson,** of Phillips Petroleum Company; **Heinn F. Tomfohrde III,** of GAF Chemicals Corporation; and **William Wishnick**, of Witco Corporation.

Karen Mederich brings 10 years of customer service to her new position in the Customer Service Center of Fitz Chem Corporation, Elmhurst, IL. In this capacity, Ms. Mederich will handle and process all customer orders and warehouse shipments.

In a restructuring move, Mearl Corporation, New York, NY, announces the assigning of personnel to new geographical areas of responsibility at the company's sales and marketing offices.

Frank J. Piser, formerly Marketing Manager, has been appointed General Manager, Global Sales and Marketing. **Ponce de Leon** has been named Sales Manager for all of the company's operations in the Eastern Hemisphere, including all of Europe, Africa, Asia, Australia, and New Zealand. **Manuel Voight** has been appointed Sales Manager and is responsible for activities in the Western Hemisphere, encompassing the U.S., Canada, Mexico, and Central and South America.

In other personnel moves, the following changes were effected: **Charles Yuster,** Global Manager, Cosmetic Products; and **Stanley Novinski,** Global Manager, Industrial Products.

All operations at the New York office will be under the direction of **Fred J. LoFaso,** Vice President, Global Sales and Marketing.

Univar Corporation has named **Bessie Lee** Senior Project Manager for the Environmental Affairs Department. She will oversee remediation projects for the firm's U.S. subsidiary, Van Waters & Rogers Inc. Ms. Lee will be based in the San Jose, CA area office and handle projects throughout the western region.

In other moves, Van Waters & Rogers has appointed **Ken Weems** to Northwest Area Manager; **Ben Whittle** to Western Regional ChemCare Manager, replacing **Bob Crandall**, who recently was named Director of Sales and Marketing for the Hazardous Waste Management Service; **Chris Gantz** to Branch Manager of the Riverside, CA, branch office; and **Richard C. Tomczak** to the newly created position of Pacific Northwest Industry Specialist—Coatings, Ink & Adhesives.

Mr. Tomczak is a member of the Golden Gate Society.

Robert K. Parkman has been appointed Director of Corporate Services for Lilly Industrial Coatings, Inc., Indianapolis, IN. He will be responsible for data processing, environmental safety, risk management, and human resources. Mr. Parkman, a member of the Cleveland Society, will report to **J. Robert Pickering**, Chief Executive Officer.

Helmut Altmann has been appointed Vice President, Finance and Administration for Schering Berlin Polymers Inc., Dublin, OH. He most recently served as Executive Assistant to the Vice Chairman and Chief Financial Officer of Schering AG, Berlin, West Germany.

Also, **John Durig** has been named Vice President, General Manager—Resins. He has over 15 years experience in the technology and marketing of resins. Mr. Durig formerly held the position of Marketing and Sales Manager for the Polymers & Additives Group of Sherex Chemical Company (from which Schering Berlin Polymers was formed).

W. Peter Woodward has been appointed Vice President of Quality Plus, the new quality improvement process, for Kerr-McGee Chemical Corporation, Oklahoma City, OK. His duties will include development and implementation of Quality Plus throughout the company. Mr. Woodward has been with Kerr-McGee for 18 years.

In other news, **Brian W. Clowe** has been promoted to Marketing Manager of Electrochemicals, replacing Mr. Woodward. Mr. Clowe previously served as Marketing Manager of Boron Products. He joined Kerr-McGee in 1971.

Joseph M. Rezell has been named Development Manager of Coatings/Kraton® Polymers for Shell Chemical Company, Houston, TX. Mr. Rezell will be responsible for the marketing of Kraton Polymers in the coatings and graphic arts industries. He is a member of the Northwestern Society.

Also, Shell has appointed **Bruce W. Toig** as its Manager of Adhesives, Sealants & Coatings/Kraton® Polymers. A 14-year veteran, Mr. Toig's primary responsibilities will be marketing Kraton Polymers in the adhesives and sealant industries.

Betz MetChem, Horsham, PA, has promoted **James P. McIntyre** and **James S. McNeill** to Directors of Technical Marketing in charge of utilities and surface preparation, respectively.

Mr. McIntyre joined Betz in 1978 as a Project Engineer and also has worked as Engineering Manager and Director of Utilities.

Mr. McNeill will be responsible for surface preparation. He joined Betz in 1973 and has held several positions since this promotion.

Parker+Amchem, Madison Heights, MI, has appointed **David L. Button** to General Manager, Parker+Amchem Canada. In this position, he will direct all operations of the company and oversee the manufacturing, marketing, sales, and technical support functions of the firm's Canadian operations. Mr. Button joined the company in 1968 and has held a variety of positions since then, including Director of Marketing and Technical Support, South America (Brazil), Sales Director for the Cold Forming Group, and Sales Manager for the Automotive Group.

EG&G Princeton Applied Research, Princeton, NJ, has appointed **Cynthia Ann Nienart** as Application Specialist for corrosion and impedance measurement systems. Prior to joining EG&G, Ms. Nienart was an Applications Chemist with Beckman Instruments. In addition to investigating new applications and application research involving the firm's corrosion and impedance measurement systems, Ms. Neinart will provide technical support to customers, and will participate in the development of new hardware and software products.

Janet Dane has been appointed Marketing Administrator by William Zinsser & Company, Inc., Somerset, NJ. She will work on the paint and wallcovering primers, shellac-based specialties, and other surface preparation product lines. Ms. Dane's responsibilities will be to assist the Marketing Director with new product introductions, educational and "how-to" product literature, and in-store displays.

John A. Mullendore has been named Vice President, Export and Biocides for Angus Chemical Company, Northbrook, IL. He is responsible for the nitroparaffins business in new market areas and identifying new product opportunities in the Far East, Asia Pacific, India, and Latin America. Mr. Mullendore returns to Angus Chemical after serving as Director of International Sales for Angus Chemie GmbH in Europe.

McWhorter, Inc., Carpentersville, IL, has announced the promotion of **Nancy Reynolds** to Account Manager. She will be responsible for Portland, OR, British Columbia, Canada, and the states of Washington, Idaho, Wyoming, and Montana. Ms. Reynolds has 16 years of experience, having previously worked as a Customer Service Representative for The McCloskey Corporation. She is a member of the Pacific Northwest Society.

Liquid Carbonic, Chicago, IL, has named **Robert S. Johnson** National Accounts Manager. In his new position, he will be responsible for sales training and pricing programs for national accounts and other sales support activities. Mr. Johnson joined Liquid Carbonic in 1978 as a Chemist, and most recently served as West Central Regional Manager.

Sun Chemical Corporation, Fort Lee, NJ, has announced the appointment of **Kenneth C. Collins** Director, Corporate Purchasing, to Vice President, Corporate Purchasing. He is responsible for the worldwide purchasing and traffic activities of Sun Chemical. Mr. Collins has been with the company for 26 years, over which time he has held a number of increasingly responsible positions.

Obituary

Dermont G. "Duke" Cromwell, retired Technical Director for 39 years for Sinclair Paint Company, died July 9.

Mr. Cromwell was a Past-President (1970-71) and Honorary Member of the Los Angeles Society. He also served as Society Representative to the Federation's Board of Directors (1982-84) and was a recipient of the Society's Outstanding Service Award. Mr. Cromwell was a member of the Los Angeles Society for over 25 years.

SSPC 90, on December 2-7, in Nashville, TN To Feature Seminars, Tutorials, and Exhibits

The 1990 National Conference and Exhibition of the Steel Structures Painting Council, SSPC 90, will be held on December 2-7, at the Opryland Hotel, Nashville, TN. The event will mark the 40th anniversary of SSPC.

Highlighting the technical program will be 11 seminars, 13 tutorials, committee meetings, an exhibition, outdoor exhibits and equipment demonstrations, and a painters' competition.

Seminar sessions are geared toward addressing specific industries or areas of technology. The seminars included in the preliminary program are: "Advances in Technology and Practice"; "General Coatings Technology"; "Hazardous Materials Handling and Disposal"; "Tank Linings"; "Coatings for Water and Waste Treatment Facilities"; "Advances in Low VOC Coatings"; "Painting in Fabricating Shops"; "Painting Chemical Plants"; "Advances in Surface Preparation"; "Bridge Coatings Forum"; and "Performance Evaluation and Durability."

Some of the scheduled tutorials fall within two curricular classifications—core courses and specialized courses. These tutorials will fulfill requirements toward certification as a Coatings Specialist. Tutorials to be presented include: "Inspection Instruments Workshop"; "Paint Failure Analysis"; "Specifications for New Construction"; "SSPC Painting Contractor Certification Program"; "Maintenance Painting"; "Quality Control and Safety for Contractors"; "Coating Film Formation and Protection Mechanisms"; "Surface Preparation Methods and Standards"; "Contracting Methods"; "Coating and Repairing Concrete"; "Lead Paint Removal and Disposal"; "Properties and Performance of Low VOC Coatings"; and "Resolution of Coating Failures."

Three of the tutorials will be conducted twice. Certificates will be issued to those who complete these tutorials.

Forty-one of the nearly 60 advisory committees or task groups working on new or revised standards or guides in four technical and three administrative areas will meet during SSPC 90.

The exhibit will consist of 196 booths and 10 outdoor exhibits or equipment demonstrations.

The painters' competition is a new addition to the program. It will feature teams of industrial painting contractors who will compete to determine who are the most proficient applicators of protective coatings. The winners will be honored during the conference.

For additional information, write SSPC 90, Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213-2683.

Ralph Stanziola to Lecture On Color Technology

Applied Color Systems (ACS), Inc., Princeton, NJ, has announced the dates and locations for its fall "Color Technology" seminars.

The seminar is designed to focus on practical color problem solving in industrial applications with an eye towards providing fresh insights on new techniques. Topics to be covered include: colorimetry and factors affecting color; spectrophotometry and metamerism; colorant characteristics and elements of formulation; color differences; and Kubelka-Munk Turbid Media Theory application.

Ralph Stanziola, President of Industrial Color Technology and recipient of the 1981 Armin J. Bruning Award of the Federation of Societies for Coatings Technology, is the seminar lecturer.

The seminar schedule is as follows: October 10-11—Newark, NJ; November 7-8—Atlanta, GA; and November 28-29—St. Louis, MO.

For more details on the fall ACS "Color Technology" seminars, write ACS, Inc., P.O. Box 5800, Princeton, NJ 08543.

Dates and Locations Announced for Du Pont Seminars

Du Pont Safety and Environmental Resources, Wilmington, DE, has scheduled four industrial seminars during the remainder of the year.

The seminars are designed for safety professionals, line supervisors, operations managers, and research and engineering managers.

"Managing Safety: Techniques That Work for the Safety Pro" is scheduled for: September 18-20—Atlanta, GA; October 31-November 2—Las Vegas, NV; and November 13-15—Philadelphia, PA.

The seminar "Managing Safety: Techniques That Work for Line Supervisors" is slated for: September 25-27—Baltimore, MD; October 16-18—Vancouver, B.C., Canada; October 23-25—Wilmington; November 13-15—Calgary, Alberta, Canada; November 27-29—Las Vegas; and December 11-13—Nashville, TN.

"Managing Safety: Techniques That Work for Operations Managers" will be conducted: September 25-26—Chicago, IL; October 16-17—Williamsburg, VA; October 30-31—San Antonio, TX; and November 27-28—Toronto, Ont., Canada.

Additional information is available from Safety Seminars, Du Pont Safety and Environmental Resources, Montgomery Bldg., Rm. 274, P.O. Box 80800, Wilmington, DE 19880-0800.

Also, Du Pont Quality Management Services has established two one-day workshops to help managers and their staffs, supervisors, and quality professionals improve the quality of work systems and processes.

"Fundamentals of Continuous Improvement" is slated for: October 25—San Francisco, CA; November 15—Wilmington; and December 5—Orlando, FL.

The seminar on "Leadership of Continuous Improvement" will be conducted: October 24—San Francisco; November 13—Wilmington; and December 4—Orlando.

For more details, contact Marg Frank, Du Pont Quality Management Services, Linden Park, Rm. 468, P.O. Box 6091, Newark, DE 19714-6091.

ASTM Schedules Symposium on Water in Exterior Walls

The "Water in Exterior Building Walls: Problems and Solutions" symposium sponsored by ASTM standards-writing Committee E-6 on Performance of Building Constructions, will be held on October 25-26, at the Hyatt Regency Dearborn, Dearborn, MI.

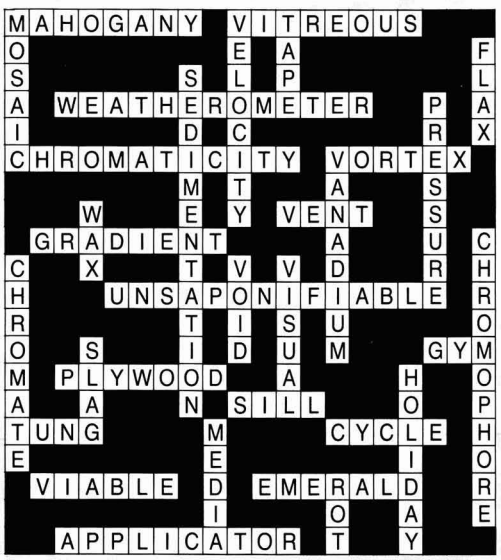
The conference will cover the causes of water infiltration into building walls, the consequences of uncontrolled water entry, and methods for evaluating and controlling water penetration.

ASTM membership is not a prerequisite for attending the symposium.

For a program booklet, including registration and hotel information, contact David Bradley, ASTM, 1916 Race St., Philadelphia, PA 19103-1187.

The "Water in Exterior Building Walls" symposium will be held in conjunction with Committee E-6's standards development meeting on October 21-25.

More details are available from Symposium Chairman Thomas A. Schwartz, Simpson Gumpertz & Heger Inc., 297 Broadway, Arlington, MA 02174.



Solution to August's *"CrossLinks"*

Kent State Schedules Fall Coatings Short Courses

Kent State University (KSU), Kent, OH, has announced its fall slate of coatings courses. The classes are sponsored by the Coatings Division of the Chemistry Department.

The coatings-related courses are: "Industrial Painting: Application Methods"—October 2-3; "Introduction to Coatings Technology"—October 15-18; and "Accelerated and Natural Weathering Techniques for Coatings and Polymers"—November 7-9.

The "Industrial Painting" class will cover current methods of paint application, and customer problems and solutions.

Newcomers to the coatings industry will benefit from the "Introduction" course. The class will cover the progress of coatings from an art to a science. Raw materials and their functions in architectural and industrial finishes, as well as factors that influence the composition, performance, and formulations of coatings will be discussed.

"Accelerated and Natural Weathering" is a new course and will highlight methods to predict the service life of coatings and polymers. Topics include the variation of accelerated and exterior testing, and a correlation between natural weathering with several spectroscopic methods, in particular FTIR and fluorescent UV.

For more information on the KSU fall slate of coatings courses, contact Carl J. Knauss, KSU, Chemistry Dept., Kent, OH 44242.

Literature

Analysis System

An expandable electrochemical analysis system for the analysis of plating baths, coatings, and corrosion resistance is the subject of literature. Basic system components consist of a potentiostat and a personal computer expanded through application software and additional instrumentation. For more details, write EG&G Princeton Applied Research, P.O. Box 2565, Princeton, NJ 08543-2565.

Plastics Directory

Literature introduces a new annual directory of experts and consultants in the plastics/polymer industry. Experts are listed by specialty topics and detailed background information is provided on each expert. For more information about *Plastics Consultant* write Maro Communications Inc., P.O. Box 44092, Tucson, AZ 85733.

Anionic Wetting Agent

An anionic wetting agent is the subject of a technical product release. The wetting agent reportedly can be used in any aqueous system where surface contamination or film imperfections present problems such as crawling, craters, fisheyes, and pinholes. For more information about Troysol™ LAC, contact Marie Marabuto, Customer Service, Troy Chemical Corp., One Avenue L, Newark, NJ 07105.

Multitasking Software

A product bulletin highlights multitasking software for rheometers. The software enables users to operate several different rheometers simultaneously, or in the background, while performing other personal computer functions. Contact Laura Migliore, Bohlin Reologi, Inc., 2540 Rte. 130, #105, Cranbury, NJ 08512 for further information.

Spectrophotometer

A portable spectrophotometer is the subject of a new, six-page, four-color brochure. The literature uses full-size screens to show color measurement functions with pass/fail indications, and includes samples of applications. The MiniScan™ publication is available from HunterLab, Hunter Associates Laboratory, Inc., 11491 Sunset Hills Rd., Reston, VA 22090.

NMR Software

A technical bulletin focuses on NMR software to run on personal computers. Included on the software are routines for Fourier transforms, integration, split screen operation, plotting, etc. Contact Connie Johnson, Bruker Instruments, Inc., Manning Park, Billerica, MA 01821 for data on the WIN-NMR software.

Liquid Autosampler

A new, completely automated autosystem gas chromatograph which features a built-in 82-position autosampler is the focus of product literature. The system has three speeds of injection and five gas chromatographs are programmed through the keyboard. More details on the Autosystem Gas Chromatograph are available from Perkin-Elmer Corp., 761 Main Ave., Norwalk, CT 06859-0012.

Pick Impellers

Impellers designed to disperse tough, fibrous materials and solid materials is the subject of literature. The impellers are made in sizes ranging from 4 in. to 32 in. in diameter, and the standard material is corrosion-resistant 304 stainless steel. For details on the Pick Impellers, contact Walt Stoufer, Morehouse Industries, Inc., 1600 W. Commonwealth Ave., Fullerton, CA 92634-3620.

Relief Valves

A new catalog featuring corrosion-resistant relief valves for industry is in print. The two-color literature describes and illustrates molded, angle, and in-line pattern relief valves for use with corrosive and ultrapure liquid applications. For a copy of "Chemical Resistant Relief Valves Catalog RV," write Plast-O-Matic Valves, Inc., 430 Rte. 46, Totowa, NJ 07512.

Bulk Container

A product release highlights a new, rugged, single-trip intermediate bulk container. The 275-gallon, translucent, high-density polyethylene blow-molded bottle in a 1/4-in. thick, welded steel mesh cage for packaging liquids including chemicals, pharmaceuticals, foods, and inks is detailed. Information on the Sonobulk™ container is available from Ron Rakey, Sonoco Products Co., Intermediate Bulk Container Div., 100 Alex St., Lavonia, GA 30553.

Automatic Head Space Sampler

A new, 12-page brochure detailing the specific use of an automatic head space sampler for determining volatile components by headspace gas chromatography is now available. The publication provides a full description and explanation of the operation of the sampler for various applications, as well as detailing its technical specifications and capabilities. To obtain a brochure on the Automatic Head Space Sampler model HS 250, contact Janet DeVita, Sales Promotion Manager, Fisons Instruments, 24911 Avenue Stanford, Valencia, CA 91355.

Polymer Study

A new, multi-client techno-economic marketing study which examines the latest marketing, technical, and economic development of "Polymers in Electronics" is available. The report encompasses an array of technologically advanced markets and materials including printed circuit boards, image and solder resists for PCB, microelectronics, electromechanical devices, encapsulants, electronic/communication wire and cable insulation, magnetic and laser recording devices, fiber optics, conductive polymers and compositions, piezoelectric devices, and polymeric electrets. For a free brochure and Table of Contents, write Skeist Inc., 375 Rte. 10, Whippany, NJ 07981.

Activated Carbon

A product bulletin which describes a pelletized activated carbon is in print. The publication includes illustrations and information on properties and specifications. Write Calgon Carbon Corp., P.O. Box 717, Pittsburgh, PA 15230 for a copy of "Xtrusorb™ 600 and 700, Pelletized Activated Carbons."

Aqueous Dispersions

A new brochure which covers an entire line of dispersions for water-based systems for the coatings and printing industries is available. The publication provides information on dispersion availability by color, resistance to bleed in, heat and light fastness, accompanied by color chips to get the exact type and color necessary for any application. Write Sun Chemical, Dispersion Div., 3922 Bach-Buxton Rd., Amelia, OH 45102 for the literature.

Crosslinker

A new crosslinker for exterior powder coatings is the focus of a recently released data sheet. The crosslinker is the first of a line of hydroxyalkyl amide crosslinkers designed for use in high performance powder coating formulations, created specifically for crosslinking carboxyl-functional polymers in electrostatic spray applications. For further information on Primid® XL-552, contact Joseph T. Sullivan, Marketing Communications Manager, Coatings, Rohm and Haas Co., Independence Mall West, Philadelphia, PA 19105.

Dispensing System

A new, IBM-based low volume dispensing system is featured in literature. The computer-automated fluid handling system is specifically designed to meet the accuracy requirements of small color batches of up to six gallons and provide dispensing of color formulas. For more data on the Low Volume Dispensing System, contact Ken Boyle, Product Manager, Applied Color Systems, P.O. Box 5800, Princeton, NJ 08543.

Mixer/Reactor

A horizontal mixer/reactor for operation at various speeds is the focus of a new product release. At low or sub-critical speeds the machine is designed to function as a blender with the mixing elements pushing the material according to the counter-current principle in an axial and radial direction to ensure intimate mixing of all ingredients. For further information on the Turbulent Mixer/Reactor, write Draiswerke, Inc., 3 Pearl Ct., Allendale, NJ 07401.

Hygrometer/Thermometer

A technical data sheet introduces a wall-mount hygrometer/thermometer. The dual scale (°F, °C) digital (LED readout) hygrometer/thermometer is designed to measure temperatures (-20° to 70°C, 0 to 160°F) and relative humidity (20-100%). Details on the hygrometer/thermometer are available from KTA-Tator, Inc., 115 Technology Dr., Pittsburgh, PA 15275.

Measuring Gauge

An eight-page brochure which features a hand-held gauge designed for fast and accurate measuring of plated thru-hole copper before etch is in print. The illustrated publication provides a true-to-size graphic of the gauge as well as its mechanical and electrical specifications. For a copy of the brochure detailing the PTH 100 hand-held guage, contact Chris Horvath, CMI International, 2301 Arthur Ave., Elk Grove Village, IL 60007.

Monomer

Literature introduces a new monomer designed to meet the industry's need for higher performance in VOC-compliant resins and coatings formulations. The monomer has a molecular weight of 144, and a glass transition temperature of 7°C. Contact Russel Mills, Dow Chemical U.S.A., 2040 Dow Center, Midland, MI 48674 for data on the hydroxybutyl acrylate.

Surfactants

A new guide on a complete line of surfactants for more than 50 different application areas is the topic of technical literature. The guide categorizes the chemical agents in household, personal, and industrial; agricultural; oil field; paints and coatings; and emulsion polymerization sections. Typical properties and functions for each surfactant are also provided. Write Surfactants Dept., Organics Div., Witco Corp., 520 Madison Ave., New York, NY 10022-4236 for a copy of the surfactant product guide.

Interpenetrating Polymer Networks

A line of resins for interpenetrating polymer networks (IPN) to produce high performance industrial finishes is the subject of recently released literature. The IPN system incorporates urethane and epoxy technology, and may be applied by electrostatic spray due to controlled conductivity of the base resin system. Details on IPN resins are available from Naomi L. King-Smith, Denomi Corp., P.O. Box 41535, Minneapolis, MN 55441.

Software

A product bulletin that introduces a personal spectroscopy software package for use with a multimode scanning spectrophotometer has been issued. The system reportedly allows the user to operate virtually all available functions through interaction with picture-icons rather than keyboard-entered text. Information on the UV-2101PC UV-VIS spectrophotometer is obtainable from Shimadzu Scientific Instruments, Inc., 7102 Riverwood Dr., Columbia, MD 21046.

Phenoxy Resin

A new modified phenoxy resin developed for coatings used in flexible and rigid packaging is the subject of recently released literature. The resin is designed to provide flexibility, and complies with FDA regulations which allows it to be used in formulating protective coatings for food packaging. Further information on UCAR® PKHM-301, including formulations and performance data, can be obtained from Union Carbide Chemicals and Plastics Co. Inc., UCAR Coatings Resins, Dept. L4489, 39 Old Ridgebury Rd., Danbury, CT 06817-0001.

Safety Kit

A new safety kit designed to help supervisors conduct effective, interactive safety meetings for their work groups is the focus of literature. The kit is a complete training program which provides step-by-step guidelines to prepare and lead productive safety meetings. For further data on the Safety Unit Meeting Kit, write Meeting Kit, Du Pont Safety and Environmental Resources, P.O. Box 80800, Wilmington, DE 19880-0800.

Coating System

A product data sheet introduces a coating system designed to deliver a uniform, high quality coating with minimal overspray and waste. The system provides a rectangular spray pattern, contains an external liquid applicator, and operates multiple spray heads from a single power supply. Details on the Ultra-Spray™ coating system are obtainable from Ultrasonic Systems Engineering, Inc., 15 Gage St., P.O. Box 2262, Kingston, NY 12401.

Weather Instruments

Literature introduces two fully programmable instruments for weathering and lightfastness testing. These tools are designed to provide flexibility and accuracy to accelerated exposure testing. Details on the Ci35A Xenon Weather-Ometer® and Fade-Ometer® can be obtained from Atlas Electric Devices Co., 4114 N. Ravenswood Ave., Chicago, IL 60613.

Bleaching Process

A new technological development in the bleaching of paper is the subject of a technical bulletin. The process replaces elemental chlorine with ozone in the bleaching sequence which reduces the total amount of chlorinated organics, including dioxin and chloroform. For additional details, write Union Camp Corp., 1600 Valley Rd., Wayne, NJ 07470.

Toxicological Investigations

A pamphlet which describes recent toxicological investigations of lead and chromium compounds is available. The studies show that reduced solubility lowers the bioavailability; silica encapsulation is the method used to reduce the solubility. For a copy of "Putting Risk into Perspective," contact David Waldron, Vice President, Sales & Marketing, Cookson Pigments, Inc., 256 Vanderpool St., Newark, NJ 07114.

Operating Software

New operating software designed to expand the capabilities of rheological test systems by increasing their flexibility and range of test routines is the focus of literature. The software offers users total computer control, and all test parameters are entered at, and monitored through, an IBM or IBM-compatible personal computer. For details on Recap III operating software, write Rheometrics, Inc., One Possumtown Rd., Piscataway, NJ 08854.

Aerator Impeller

A new surface aerator impeller which runs at high speeds at no increase in power or torque requirements is the subject of literature. The impeller is liquid level sensitive, and oxygen transfer efficiency is provided through adjustable horsepower draw. Details on the Lightnin R335 surface impeller are available from Betty Felix, Mixing Equipment Co., 135 Mt. Read Blvd., Rochester, NY 14603.

Book Review

POLYMER CHEMISTRY
An Introduction—Second Edition

By
Malcolm P. Stevens

Published by
Oxford University Press
2001 Evans Rd.
Cary, NC 27513 (1990)
xvii + 633 Pages, $45.00

Reviewed by
Thomas J. Miranda
Whirlpool Corp.
Benton Harbor, MI

This second edition of an introductory text in *Polymer Chemistry* is most welcome. This book is extremely readable and contains numerous examples of monomer and polymer synthesis. As a teaching tool, the author has provided exercises at the end of each chapter enabling the volume to serve as college level text the volume ideally suited for a college level text. In addition, this book serves as an excellent source for numerous topics in polymer chemistry.

Polymer Chemistry is divided into three sections. The first part treats polymer structure and covers basic principles, molecular weight and polymer solutions, chemical structure and properties, polymer morphology and the evaluation, characterization, and analysis of polymers.

Part two treats vinyl polymers and the mechanisms of polymerization including coordination, cationic, radical, and group transfer polymerization. Reactions of polymers including degradation concludes this section.

The third part is devoted to nonvinyl polymers covering step growth and ring opening polymerization, polyethers, and other condensation polymers including formaldehyde condensates of phenol, melamines, and urea. Also treated are inorganic polymers and miscellaneous polymers including carbodiimides, and heterocyclic polymers. This section concludes with a treatment of natural polymers, proteins, and nucleic acids.

This text is highly recommended as a course text, reference book, and as a required addition to one's polymer library.

Coming Events

FEDERATION MEETINGS

For information on FSCT meetings, contact Federation of Societies for Coatings Technology, 492 Norristown Rd., Blue Bell, PA 19422 (215) 940-0777, FAX: (215) 940-0292.

1990

(Oct. 29-31)—68th Annual Meeting and 55th Paint Industries' Show. Convention Center, Washington, D.C.

1991

(Nov. 4-6)—69th Annual Meeting and 56th Paint Industries' Show. Convention Center, Toronto, Ontario, Canada.

1992

(Oct. 21-23)—70th Annual Meeting and 57th Paint Industries' Show. McCormick Place, Chicago, IL.

1993

(Oct. 27-29)—71st Annual Meeting and 58th Paint Industries' Show. World Congress Center, Atlanta, GA.

SPECIAL SOCIETY MEETINGS

1991

(Feb. 6-8)—Southern Society. 18th Annual Water-Borne, Higher-Solids, and Powder Coatings Symposium. Co-sponsored by the Department of Polymer Science at the University of Southern Mississippi (USM). New Orleans, LA. (Robson F. Storey and Shelby F. Thames, Co-Organizers, WBHS&PC Symposium, Dept. of Polymer Science, USM, Southern Station, P.O. Box 10076, Hattiesburg, MS 39406-0076).

(Feb. 18-20)—Western Coatings Societies' 20th Biennial Symposium and Show. Hilton Hotel, San Francisco, CA. (Patricia Stull, Pacific Coast Chemicals, 2424—4th St., Berkeley, CA 94710).

(Mar. 13-15)—Dallas and Houston Societies. Southwestern Paint Convention. Dallas, TX.

(Apr. 3-6)—Southern Society Annual Meeting. The Peabody Hotel, Memphis, TN. (Vernon Sauls, McCullough & Benton, P.O. Box 272360, Tampa, FL 33688).

(May 2-4)—Pacific Northwest Society. Annual Symposium. Meridien Hotel, Vancouver, British Columbia, Canada. (John P. Berghuis, Kronos Canada, Inc., 3450 Wellington Ave., Vancouver, B.C., Canada V5R 4Y4).

OTHER ORGANIZATIONS

1990

(Sept. 13-15)—Canadian Paint and Coatings Association's 78th Annual Convention. Sheraton Hotel, Winnipeg, Manitoba, Canada. (CPCA, 9900 Cavendish Blvd., Ste. 103, St. Laurent, Quebec H4M 2V2, Canada).

(Sept. 16-22)—20th FATIPEC Congress. Acropolis, Nice, France. (Jacques Roire, A.F.T.P.V., 5 rue Etex, 75018 Paris, France).

(Sept. 17-18)—Second North American Tinplate Conference. Cosponsored by the American Iron and Steel Institute and the Tin Information Center of North America. Hyatt Regency O'Hare, Rosemont, IL. (William B. Hampshire, Conference Chairman, Tin Information Center of North America, 1353 Perry St., Columbus, OH 43201).

(Sept. 20-21)—"Towards a Greener Coatings Industry." Symposium sponsored by the Manchester Section of the Oil & Colour Chemists' Association (OCCA). University of Salford, England. (Terry Wright, OCCA, Priory House, 967 Harrow Rd., Wembley, Middlesex, England HA0 2SF).

(Sept. 23-25)—Finishing '90 Exposition & Conference. Co-sponsored by Society of Manufacturing Engineers (SME) and the Association for Finishing Processes of SME. Dr. Albert B. Sabin Convention Center, Cincinnati, OH. (Carol Valykeo, Event Public Relations, SME, One SME Dr., P.O. Box 930, Dearborn, MI 48121-0930).

(Sept. 24-25)—"Powder Coatings" Symposium. Sponsored by the Paint Research Association (PRA) in Association with Chilworth Technology, Southampton. (PRA, 8 Waldegrave Rd., Teddington, Middlesex TW11 8LD, England).

(Sept. 24-26)—Midwest Corrosion Conference in conjunction with 1990 North Central Regional Meeting of the National Association of Corrosion Engineers. Hyatt Regency, Dearborn, MI. (Jerry Wenzel, Program Chairman, Michigan Consolidated Gas Co., 3200 Hobson, Detroit, MI 48201).

(Sept. 24-27)—Anaheim Manufacturing Productivity Conference. Sponsored by The Society of Manufacturing Engineers (SME), Hyatt Regency Alicante, Garden Grove (Anaheim), CA. (Lisa Machnacki, SME, Conference Dept., One SME Dr., P.O. Box 930, Dearborn, MI 48121-0930).

(Sept. 25-27)—Finishing '90. Exhibition sponsored by Turret Group plc. Telford Exhibition Center, Telford, Shropshire, England. (Nigel Bean, Turret Group plc, 171 High St., Rickmansworth, Herts, WD3 1SN).

(Sept. 25-27)—Fabtech West '90. Conference and Exhibition co-sponsored by the Fabricators & Manufacturers Association (FMA) Int'l. and Society of Manufacturing Engineers (SME). Anaheim Convention Center, Anaheim, CA. (SME, One SME Dr., P.O. Box 930, Dearborn, MI 48121 or FMA, 5411 E. State St., Rockford, IL 61108).

(Sept. 26-28)—Haztech International Conference and Exhibition. Sponsored by the Institute for International Research. Brooks Hall, San Francisco, CA. (Rachelle Scheinbach, Executive Director, Institute for International Research—Bellevue, 13555 Bel-Red Rd., Bellevue, WA 98009).

(Oct.1-5)—61st Introductory Short Course on the Basic Composition of Coatings. Sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (Norma R. Fleming, Sr. Continuing Education Coordinator, UMR, 119 M.E. Annex, Rolla, MO 65401-0249).

(Oct. 2-3)—"Industrial Painting: Application Methods." Short course sponsored by Kent State University (KSU). Kent, OH. (Carl J. Knauss, Director, Cooperative and Continuing Education, Chemistry, KSU, Kent, OH 44242).

(Oct. 2-4)—Haztech International Conference and Exhibition. Sponsored by the Institute for International Research. David L. Lawrence Convention Center, Pittsburgh, PA. (Rachelle Scheinbach, Executive Director, Institute for International Research—Bellevue, 13555 Bel-Red Rd., Bellevue, WA 98009).

(Oct. 9-11)—Powder Coating '90. Technical Conference and Exhibition sponsored by Powder Coating Institute. Cincinnati Convention Center, Cincinnati, OH. (Gardner Management Services, 6600 Clough Pike, Cincinnati, OH 45244-4090).

(Oct. 10-12)—"Chemistry and Properties of High Performance Composites: Designed Especially for Chemists"; "High Performance Polymers: Chemistry, Properties, and Applications"; and "Fundamentals of Adhesion: Theory, Practice, and Applications." Short courses sponsored by State University of New York. Pearl River Hilton, Pearl River, NY. (Institute of Materials Science, State University of New York, New Paltz, NY 12561).

(Oct. 14-18)—"Corrosion Engineering of the Future." Seminar sponsored by the National Association of Corrosion Engineers (NACE) and the U.S. Armed Forces. Richmond, VA. (Gary Wiatrek, Membership Services Coordinator, NACE, P.O. Box 218340, Houston, TX 77218).

(Oct. 14-19)—ISA/90. Conference and exhibition sponsored by The Instrument Society of America (ISA). New Orleans, LA. (Brian Duckett, ISA, 67 Alexander Dr., P.O. Box 12277, Research Triangle Park, NC 27709).

(Oct. 15-19)—"Introductions to Coatings Technology." Short course sponsored by Kent State University (KSU). Kent, OH. (Carl J. Knauss, Director, Cooperative and Continuing Education, Chemistry Dept., KSU, Kent, OH 44242).

(Oct. 17-19)—Airpol '90. Seminar sponsored by National Association of Corrosion Engineers (NACE). Galt House, Louisville, KY. (NACE, Education and Training, P.O. Box 218340, Houston, TX 77218).

(Oct. 25-26)—"Water in Exterior Building Walls: Problems and Solutions." Symposium sponsored by ASTM. Dearborn, MI. (Thomas A. Schwartz, Symposium Chairman, Simpson Gumpertz & Heger, Inc., 297 Broadway, Arlington, MA 02174).

(Oct. 30-31)—"Prepainted Metal: A Manufacturing Solution for the '90s." Seminar cosponsored by The National Coil Coaters Association (NCCA) and The Society of Manufacturing Engineers (SME). Hyatt Regency, Oak Brook, IL. (NCCA, 1900 Arch St., Philadelphia, PA 19103 or SME, One SME Dr., P.O. Box 930, Dearborn, MI 48121-0930).

(Oct. 31-Nov. 1)—"How Environmental Regulations in the United States Control the Paint and Coatings Industry." Course co-sponsored by the University of Oxford, Department of External Studies, and the University of California, Berkeley, Continuing Education in Engineering, University Extension. Oxford, England. (CPD Unit, University of Oxford, Department for External Studies, 1 Wellington Square, Oxford OX1 2JA, England).

(Oct. 31-Nov. 2)—103rd Annual Meeting of the National Paint and Coatings Association (NPCA). Washington, D.C. (NPCA, 1500 Rhode Island Ave., N.W., Washington, D.C. 20005).

(Oct. 31-Nov. 2)—"Advances in Polymer Colloids (Emulsion Polymers): Polymerization, Characterization, and Applications." Short course sponsored by State University of New York (SUNY). Orlando, FL. (A.V. Patsis, Institute of Materials Science, CSB 209, SUNY, New Paltz, NY 12561).

(Nov. 1-2)—"Measuring Paint Volatile Organic Compounds (VOC)." Training course sponsored by ASTM. Holiday Inn-Washington, Washington, D.C. (Kathy Dickinson, ASTM, 1916 Race St., Philadelphia, PA 19103).

(Nov. 4-9)—Euro/Surfas '90. 11th Surface Treatment Exhibition. Barcelona, Spain. (Euro/Surface '90 Surface Treatment, Avda. Reina M.ª Cristina, s/n., 08004 Barcelona, Spain).

(Nov. 6-8)—HazMat/West '90. Technical Conference and Exhibition sponsored by *Hazmat World Magazine*. Long Beach Convention Center, Long Beach, CA. (Tower Conference Management Co., 800 Roosevelt Rd., Bldg. E, Ste. 408, Glen Ellyn, IL 601-37-5835).

(Nov. 7-9)—"Accelerated and Natural Weathering Techniques for Coatings and Polymers." Short course sponsored by Kent State University (KSU). (Carl J. Knauss, Director, Cooperative and Continuing Education, Chemistry Dept., KSU, Kent, OH 44242).

(Nov. 9-11)—43rd Annual National Decorating Products Show. Sponsored by the National Decorating Products Association (NDPA). Indiana Convention Center, Indianapolis, IN. (Lillian Smysor, NDPA, 1050 N. Lindbergh Blvd., St. Louis, MO 63132-2994).

(Nov. 11-17)—"Basic Coating Inspection." Session I of the International Coating Inspector Training and Certification Program. Sponsored by the National Association of Corrosion Engineers (NACE), Sheffield, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Nov. 12-14)—"Fundamentals of Adhesion: Theory, Practice, and Applications." Short course sponsored by State University of New

York (SUNY). Orlando, FL. (A.V. Patsis, Institute of Materials Science, CSB 209, SUNY, New Paltz, NY 12561).

(Nov. 13-16)—ASTM Committee B-8 on Metallic and Inorganic Coatings meeting. San Antonio, TX. (George A. DiBari, International Nickel Co., Park 80 West—Plaza Two, Saddle Brook, NJ 07662).

(Nov. 25-30)—"Basic Corrosion." Course sponsored by the National Association of Corrosion Engineers (NACE), London, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Nov. 25-30)—"Corrosion Control in Oil and Gas Production." Course sponsored by the National Association of Corrosion Engineers (NACE), London, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Nov. 26-28)—ASE '90. The Fourth International Conference and Exhibition on Adhesives, Sealants, and Encapsulants. Amsterdam, The Netherlands. (ASE '90 Administration Office, Network Exhibitions & Conferences Ltd., Printers Mews, Market Hill, Buckingham MK18 1JX, United Kingdom).

(Dec. 2-7)—SSPC '90. Conference and Exhibition sponsored by the Steel Structures Painting Council (SSPC). Opryland Hotel, Nashville, TN. (SSPC, 4400 Fifth Ave., Pittsburgh, PA 15213-2683).

(Dec. 3-5)—"Electrochemical Techniques for Corrosion Measurement." Fifth Annual Symposium sponsored by EG&G Princeton Applied Research. St. Louis, MO. (Ruth Rearick, EG&G Princeton Applied Research, P.O. Box 2565, Princeton, NJ 08543).

(Dec. 3-7)—"Fundamentals of Chromatographic Analysis." Short course sponsored by Kent State University (KSU). Kent, OH. (Carl J. Knauss, Director, Cooperative and Continuing Education, Chemistry Dept., KSU, Kent, OH 44242).

(Dec. 9-14)—"Polymer Chemistry: Principles and Practice." Course sponsored by The American Chemical Society (ACS). Virginia Tech, Blacksburg, VA. (ACS, Dept. of Continuing Education, Meeting Code VPI9003, 1155 Sixteenth St., N.W., Washington, D.C. 20036).

1991

(Jan. 28-30)—"Concrete: Surface Preparation, Coatings and Linings, and Inspection Techniques." Symposium sponsored by National Association of Corrosion Engineers (NACE). J.W. Marriott Hotel, Houston, TX. (NACE Education and Training Dept., P.O. Box 218340, Houston, TX 77218).

(Feb.)—Inter-Society Color Council Williamsburg Conference. Williamsburg, VA. (Louis A. Graham, Lou Graham & Associates, Inc., 1207 Colonial Ave., Greensboro, NC 27408).

(Feb. 3-8)—"Protective Coatings and Linings." Course sponsored by the National Association of Corrosion Engineers (NACE), London, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Feb. 3-8)—"Cathodic Protection: Theory and Data Interpretation." Course sponsored by the National Association of Corrosion Engineers (NACE), London, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Feb. 17-20)—14th Annual Meeting of The Adhesion Society, Bellview Biltmore Hotel, Clearwater, FL. (Howard M. Clearfield, IBM T.J. Watson Research Center, P.O. Box 218, M/S 38-145, Yorktown Heights, NY 10598).

(Feb. 17-22)—"Basic Coating Inspection." Session I of the International Coating Inspector Training and Certification Program. Sponsored by the National Association of Corrosion Engineers (NACE), Sheffield, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Feb. 17-22)—"Intermediate Coating Inspection." Session II of the International Coating Inspector Training and Certification Program. Sponsored by the National Association of Corrosion Engineers (NACE), Sheffield, England. (NACE Europe, P.O. Box 251, Guildford, Surrey, GU1 3DJ, United Kingdom).

(Mar. 4-8)—Corrosion/91 sponsored by the National Association of Corrosion Engineers (NACE). Cincinnati, OH. (NACE, Conference Manager, P.O. Box 218340, Houston, TX 77218).

(Mar. 11-15)—62nd Introductory Short Course on the Basic Composition of Coatings. Sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (Norma R. Fleming, Sr. Continuing Education Coordinator, UMR, 119 M.E. Annex, Rolla, MO 65401-0249).

(Mar. 19-21)—"farbe + lack 91." The First Congress Exhibition for the Coating, Printing Inks, Adhesives, and Sealants Industry. Sponsored by *farbe + lack*. Nuremberg Exhibition Grounds, West Germany. (Klaus Geissler, Manager, Events Division, Curt R. Vincentz Verlag, Postfach 62 47, 3000 Hannover 1, West Germany).

(Mar. 25-29)—22nd Introductory Short Course on Paint Formulation. Sponsored by University of Missouri-Rolla (UMR), Rolla, MO. (Norma R. Fleming, Sr. Continuing Education Coordinator, UMR, 119 M.E. Annex, Rolla, MO 65401-0249).

(Apr. 3-5)—Hazardous Materials Management Conference and Exhibition/Central (HazMat/Central '91). O'Hare Exposition Center, Rosemont, IL. (Tower Conference Management Co., 800 Roosevelt Rd., Bldg. E—Ste. 408, Glen Ellyn, IL 60137-5835).

(Apr. 22-25)—The Euro-Asian Interfinish Isreal 1991. Conference sponsored by the Metal Finishing Society of Isreal. Herzlia, Isreal. (Secretariat, Ortra, Ltd., 2 Kaufman St., Tel-Aviv 61500, Isreal).

(May)—ASTM Committee B-8 on Metallic and Inorganic Coatings meeting. Atlantic City, NJ. (George A. DiBari, International Nickel Co., Park 80 West—Plaza Two, Saddle Brook, NJ 07662).

(June 12-14)—SURCON '91, "Developments in the Science of Surface Coatings." Moat House International Hotel, Stratford-upon-Avon, England. (Simon Lawrence, CIBA-GEIGY Pigments, Hawkhead Rd., Paisley, Renfrewshire PA2 7BG, Scotland).

(June 19-21)—First International Symposium on Environmental Effects on Advanced Materials. Sponsored by National Association of Corrosion Engineers (NACE). Catamaran Resort Hotel, San Diego, CA. (NACE Customer Service Dept., P.O. Box 218340, Houston, TX 77218).

(July 7-12)—Seventh International Conference on Surface and Colloid Science (ICSCS). Sponsored by the International Association of Colloid and Interface Scientists, Université de Technologie de Compiègne, France. (M. Clausse, Secretariat of the 7th ICSCS, c/o Wagons-Lits Tourisme, B.P. 244, 92307 Levallois-Perret Cedex, France).

(Sept. 10-12)—North American Hazardous Materials Management Conference and Exhibition. Sponsored by *HazMat World* magazine. Cobo Hall, Detroit, MI. (Tower Conference Management Co., 800 Roosevelt Rd., Bldg. E, Ste. 408, Glen Ellyn, IL 60137-5835).

(October)—ASTM Committee B-8 on Metallic and Inorganic Coatings meeting. Philadelphia, PA. (George A. DiBari, International Nickel Co., Park 80 West—Plaza Two, Saddle Brook, NJ 07662).

(Oct. 2-4)—Hazardous Materials Management Conference and Exhibition/South (HazMat/South). Sponsored by *HazMat World* magazine. Georgia World Congress Center, Atlanta, GA. (Tower Conference Management Co., 800 Roosevelt Rd., Bldg. E, Ste. 408, Glen Ellyn, IL 60137-5835).

1992

(Feb. 23-26)—Williamsburg Conference, "Comparison of Color Images Presented in Different Media." Co-sponsored by the Inter-Society Color Council and the Technical Association of Graphic Arts, Colonial Williamsburg, VA. (Milton Pearson, RIT Research Corp., 75 Highpower Rd., Rochester, NY 14623).

Advertisers Index

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'Humbug' from Hillman

Saul Spindel, an experienced layman and our highly respected New York Society Representative, adds to our necessary medical knowledge with:

Medical Terminology for the Layman

Artery ..... The study of fine painting
Barium ..... What you do when the patient dies
Benign ..... What you will be after you are eight
Caesarean Section ..... A district in Rome
Colic ..... A sheep dog
Congenital ..... Friendly
Dilate ..... To live longer
Fester ..... Quicker
G.I. Series ..... Baseball game between soldiers
Hangnail ..... Coat hook
Minor Operation ..... Coal Digging
Nitrate ..... Lower (or higher) than day rate
Node ..... Was aware of
Post Operative ..... A letter carrier
Protein ..... In favor of young people
Serology ..... A study of English knighthood
Tablet ..... A small table
Tumor ..... An extra pair
Urine ..... Opposite of you're out
Varicose Veins ..... Veins very close together

A crowd stood around the 100-foot diving tower at the fairgrounds waiting for the featured performer. Finally, a feeble old man walked out, leaning on a cane.

"Good Evening," he said into the microphone, "I am 99 years old and I am going to amaze you. I'll climb up to the top of that tower and dive into this teeny, tiny tub of water. Are you ready?"

"Oh, no, don't do it!" gasped members of the audience.

"Okay," said the little old man, "Next show at 10 o'clock!"

The little boy came crying home to his mother that the neighbor boy had hit him.

"Did you hit him back?" she asked.

"No," sobbed the youngster, "I hit him first."

Never buy anything with a handle on it. It means work.

A pessimist we know says that it's not true that he always believes the worst is going to happen. It's just that if the worst does happen, it will happen to him.

—The Lion

Quickies from the 1974 *Farmers Almanac*

—The lunar astronauts could be said to be the only ones to climb down the ladder to success.

—Taxpayer: A government worker with no vacation, no sick leave, and no holidays.

—It may be true that man does not live by bread alone—but look at those getting along on crust.

—The reason some people are overweight is because there are times when they just go starch craving mad.

—A politician is an operator who takes money from the rich and votes from the poor and promises both sides protection from each other.

—Small boy's definition of a conscience: "Something that makes you tell your mother before your sister does."

—One thing about early marriages is that they shorten the generation gap.

And from the same issue—woman at insurance counter at airport: "I used to buy flight insurance, but it doesn't seem to make any difference."

—A boring relative visited a nephew and his family, staying throughout the day. When at last she started to leave, she asked her nephew's small son, "Well, Jimmy, are you going to walk me to the bus stop?" "I can't ma'am. As soon as you leave we're going to eat!"

—Prejudice is a time saver; it enables you to pass judgement without getting the facts.

—The trouble with telling a good story is that it always reminds the other fellow of a dull one.

Boasting his car could be induced to
Turn on a dime if reduced to,
He stretched his luck
In front of a truck . . .
Ten cents doesn't do what it used to!

We close this column with some comforting observations from Humbug's favorite sage, Bob Ahlf.

- Then God created project leaders and gave them dominion over man.
- May you hear warm words on cold nights.
- You have to let a seal have a bite of fish once in a while.
- It's tough to need a hug when you're afraid to let people touch you.

—Herb Hillman
Humbug's Nest
P.O. Box 135
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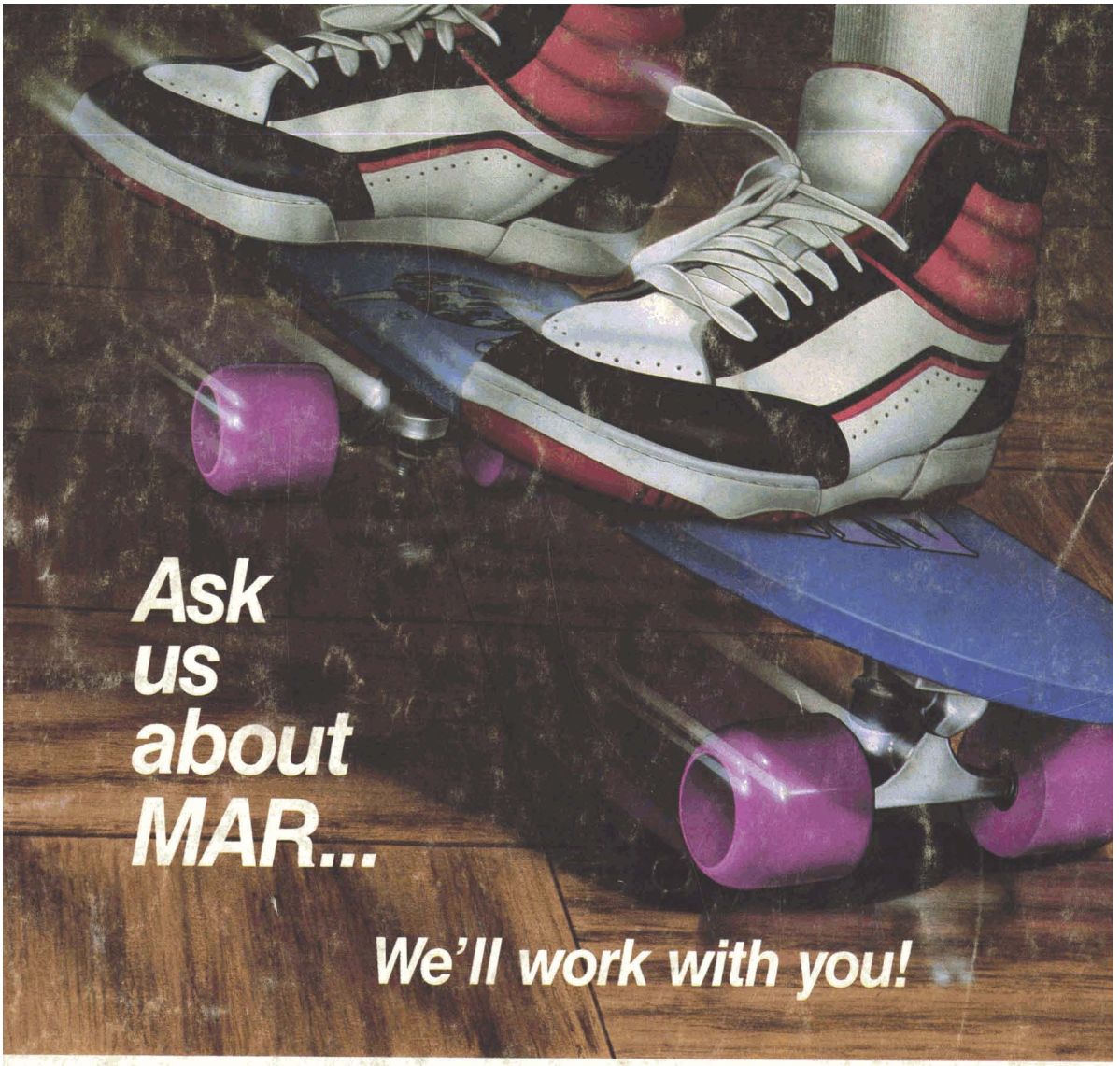

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