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AUGUST 1982

jct JOURNAL OF COATINGS TECHNOLOGY

60TH ANNUAL MEETING
Federation of Societies for Coatings Technology
1922 1982
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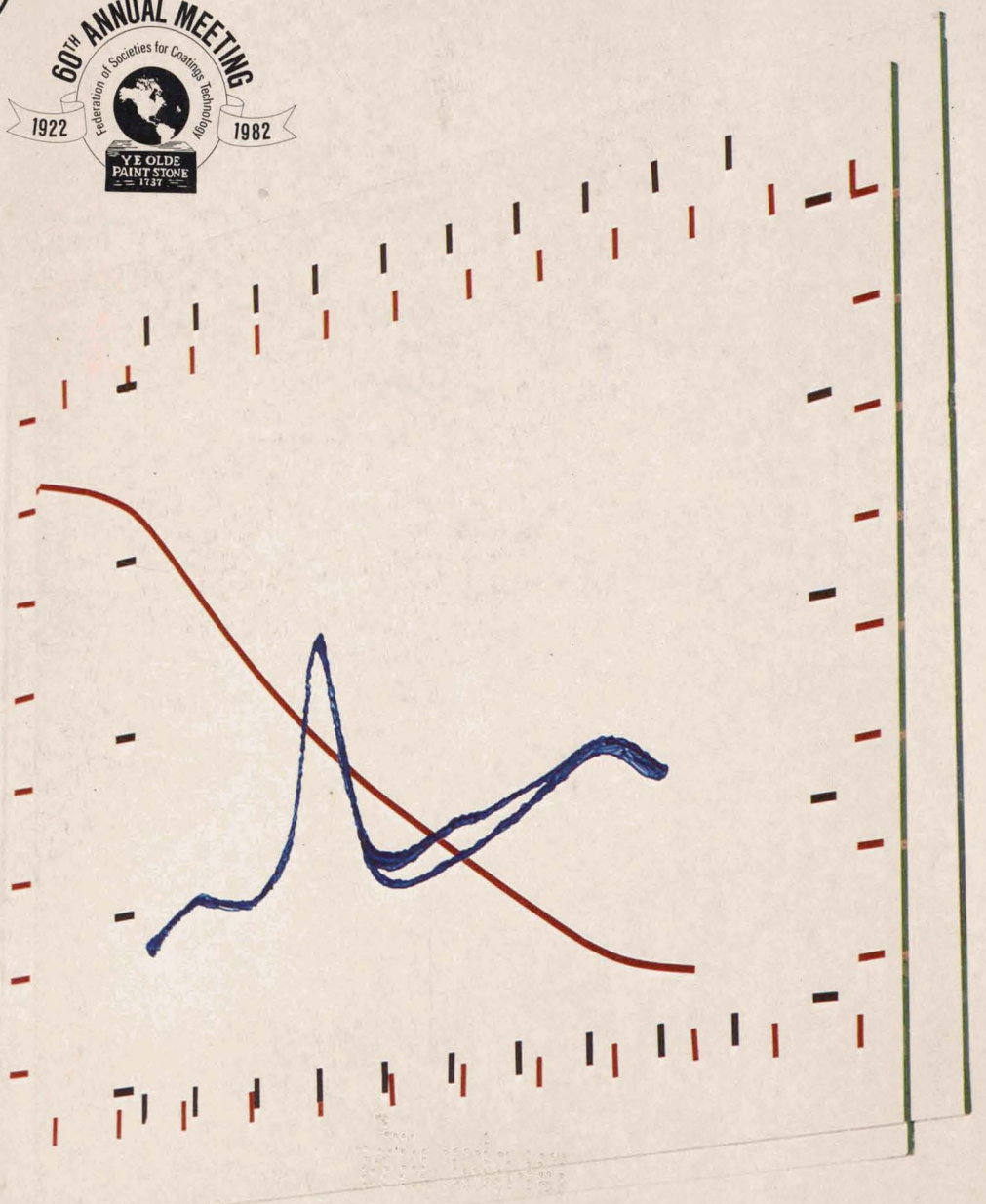
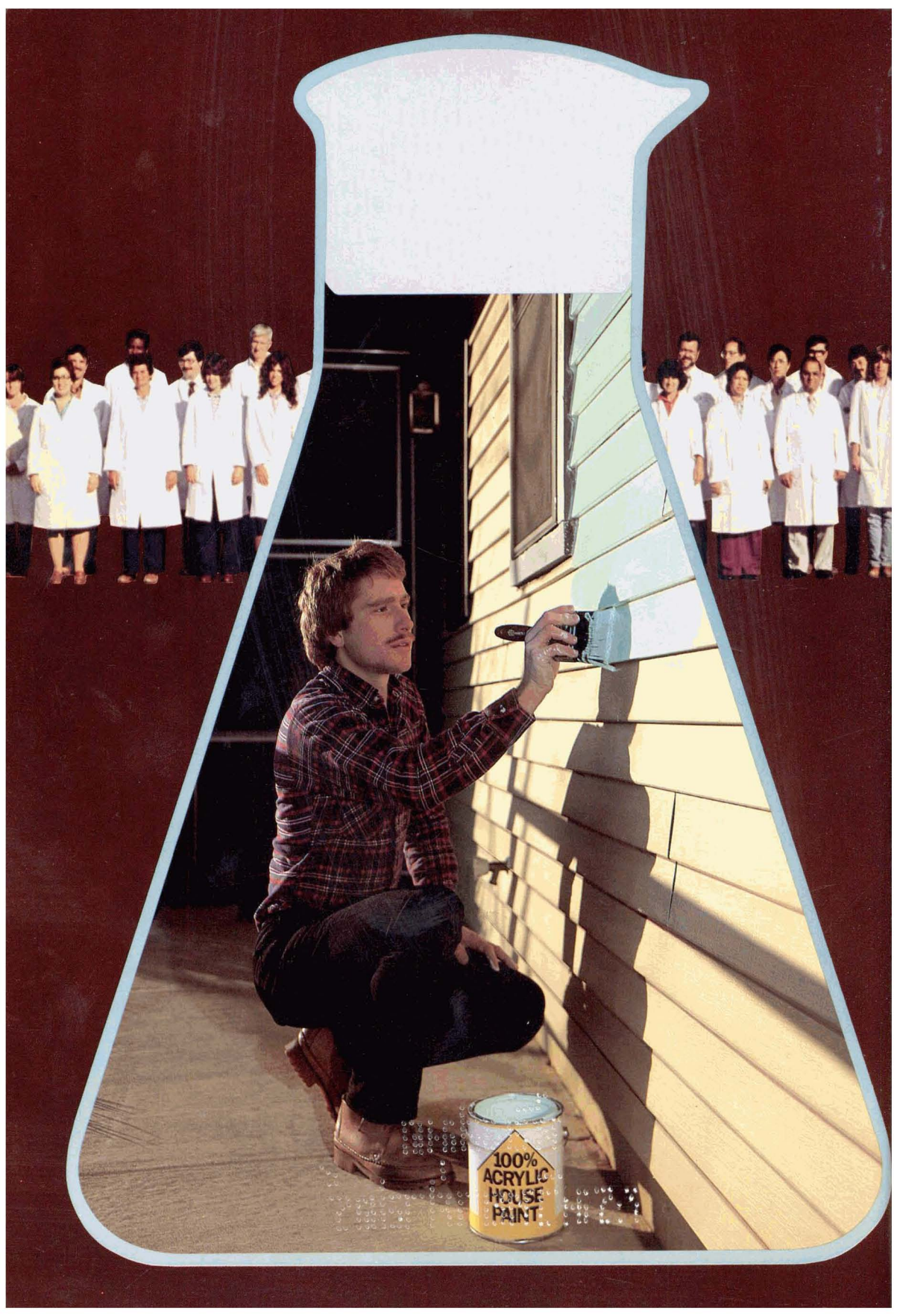


The Glass Transition: What's the Point?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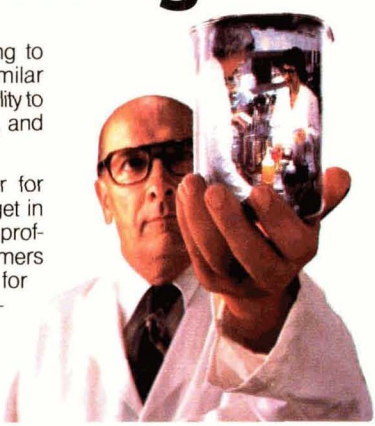

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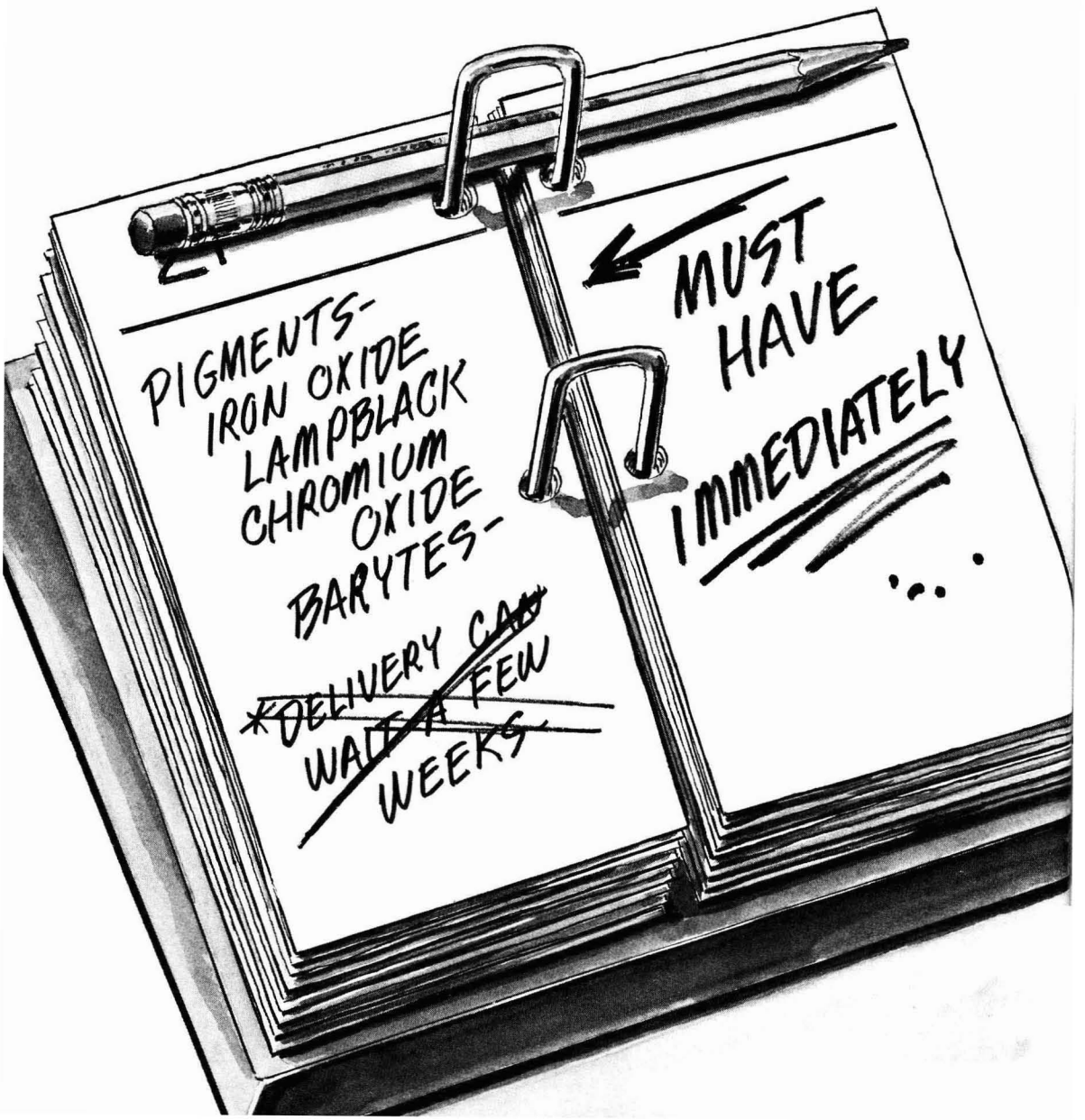

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Comment

Committee Work—A Case of Quid Pro Quo

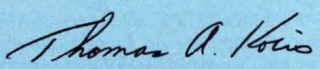
The advent of another Annual Meeting is a reminder that it is also time for seeking out likely prospects to serve on Federation committees for the coming year.

A check of the committee rosters listed in the Year Book underscores the continuing commitment of a goodly number of members to this vital area of activity, one which over the years has contributed so much to advance the educational and technical objectives of the Federation.

And committee work can be personally rewarding, offering as it does the opportunity to serve with one's peers from various segments of the industry and from all parts of the country. These personal benefits accrue in direct proportion to the individual commitment—the more you put in the more you get out.

Good help is hard to find, and committee chairmen (and women) are always on the lookout for volunteers willing to lend a hand.

So, if you're interested in taking part and contributing your expertise, contact the Federation office and make your interest and availability known. It could be the beginning of a mutually rewarding relationship, for you, the Federation, and the industry.



T. A. Kocis
Contributing Editor

Terryl F. Johnson, of Kansas City; Joseph A. Bauer, of Louisville; Are Nominated To Federation Officer Positions, 1982–83

Terryl F. Johnson, of Cook Paint and Varnish Co., Kansas City, MO, has been nominated for the position of President-Elect of the Federation of Societies for Coatings Technology. Mr. Johnson, currently Treasurer, is a Past-President of both the Kansas City Society and Kansas City PCA. He served as Society Representative to the Federation Board of Directors for eight years. Mr. Johnson has been with Cook since 1947. He is a graduate of the University of Missouri.

Joseph A. Bauer, of Porter Paint Co., Louisville, KY, has been nominated for the office of Treasurer. Mr. Bauer is a Past-President of the Louisville Society and has been Society Representative to the Federation Board of Directors since 1973. He has served on numerous committees at both the Society and Federation levels, including the Federation Executive Committee. Mr. Bauer joined Porter Paint in 1952. He is a graduate of the University of Louisville.

T.F. Johnson

J.A. Bauer

A.C. Boyce

J.T. Vandeberg

The current President-Elect, A. Clarke Boyce, of Nacan Products Ltd., Toronto, Ont., Canada, will assume the Presidency at the close of the 1982 Annual Meeting.

The Nominating Committee also submitted the names of candidates for Board of Directors/Executive Committee positions.

Board of Directors as Members-at-Large—(two-year term; two to be elected):

M. Coffino

Morris Coffino, of D.H. Litter Co., Inc., New York, NY. He is a Past-President of the New York Society which presented him with the Roy H. Kienle Award and the PaVac Award, the Society's highest honor. Mr. Coffino has been chairman of the Federation's American Paint Journal Award and Program Committees and Vice-Chairman of the Technical Advisory Committee.

R.C. Albrecht

Rudolph C. Albrecht, of The Enterprise Companies, Chicago, IL. He is a Past-President of the Chicago Society and Chairman of the Yearbook Committee. Mr. Albrecht received the Chicago Society's Outstanding Service Award in 1980.

(Continued on page 9)

OWN A PIECE OF HISTORY

A member has donated three volumes of Joseph J. Mattiello's definitive series, "Protective and Decorative Coatings," to the Federation.

The volumes are for sale, and the proceeds will go to assist the work of the Ad Hoc Committee on Paint History, chaired by Joseph Boatwright, of the Cleveland Society. The committee is developing source materials for a book on paint, from the earliest times to the present.

The Mattiello volumes are:

Volume II—"Raw Materials: Pigments, Metallic Powders, and Metallic Soaps"

Volume IV—"Special Studies: Wetting, Grinding Color, Consistency, Hiding, Adhesion, Permeability, and Film Structure, Livering, Microscopy. Vacuum Technology, Emulsions, and UV Adsorption of Drying Oils"

Volume V —"Analysis and Testing Methods"

These important works are offered for a donation of $150 to the committee. Inquiries should be addressed to the Federation headquarters office in Philadelphia.

Dr. Seymore Hochberg to Become Executive Director Of Paint Research Institute, January 1, 1983

Dr. Peter V. Robinson, President of the Paint Research Institute, has announced that Dr. Seymore Hochberg, Industrial Consultant and former Research Fellow with the DuPont Co., has been appointed Executive Director of PRI. He will assume his new duties on January 1, 1983, and will serve as a Consultant to PRI until that date.

Dr. Hochberg, who recently retired from DuPont following a 36-year career at the Marshall Laboratory in Philadelphia, succeeds Dr. Raymond R. Myers, who will retire as Research Director of PRI at the end of this year.

Dr. Hochberg was involved in many facets of research on coatings with the DuPont Co. Some of his significant technical accomplishments were:

(1) Invention and exploitation of fine-media grinding using sand.
(2) Development of manufacturing processes and industrial markets for the waste streams of adipic acid manufacture to produce solvents and polymers.
(3) Development of resins for water-based and high-solids coatings.

(4) Development of acrylic microgels for the control of rheology and rubber-toughening of acrylic finishes.

Dr. Hochberg is a graduate of City College of New York with a B.S. Degree. He received A.M. and Ph.D. degrees from Columbia University. Prior to his joining DuPont in 1945 he was a teacher in New York City High Schools and a Research Associate at Columbia University under contract with the National Defense Research Committee. While at Columbia he studied the scattering of light from small spherical particles and participated in the first quantitative verification of the Mie Theory. He also clarified the influence of particle size on the toxicity of insecticides and invented a machine for large-scale control of insects from ground-level generators.

Among his significant patents are:

(1) Sand grinding of pigments in paint compositions.
(2) Coating compositions from latices of polytetrafluoroethylene.
(3) Spraying process for organic coatings using superheated steam.
(4) Rubber reinforcement of acrylic lacquers by microgels.

Dr. Hochberg has lectured widely at scientific conferences here and abroad. For the American Chemical Society he authored and teaches a short course in Organic Coatings. He is a member of the Industry Advisory Committee of the Polymers and Coatings Department of North Dakota State University.

At the Federation's 1981 Annual Meeting, Dr. Hochberg was awarded the Morehouse Industries' Golden Impeller Award for his "outstanding service to the chemical processing industry and for innovative designs and applications in the field of dispersion technology."

FSCT Nominations

Board of Directors as Past-President Member—(two-year term):

W. Dunn

William Dunn, of Monarch Coatings, Inc., Rexdale, Ont., Canada. He served as President of the Federation in 1975-76. He is a Past-President of the Toronto Society where he was also Society Representative from 1969-71. Mr. Dunn has been a Trustee and Treasurer of the Paint Research Institute.

Society Representative to the Executive Committees—(three-year term):

John T. Vandeberg, of DeSoto, Inc., Des Plaines, IL. He has been Society Representative to the Federation Board of Directors since 1978. Dr. Vandeberg is a member of the Chicago Society and has served as Chairman of its Infrared Spectroscopy Committee (1975-80) and as a member of the Technical and Education Committees. He is a recipient of the Roon Award.

Voting will take place on November 2 at the Federation's Annual Meeting in Washington, DC.

Abstracts of Papers in This Issue

THE GLASS TRANSITION: WHAT'S THE POINT?—M.B. Roller

Journal of Coatings Technology, 54, No. 691, 33 (Aug. 1982)

The glass transition temperature of a polymer is normally reported at a single temperature. The fact that the reported glass transition temperature is dependent on heating rate and frequency has sound theoretical support. It also can be instrument and operator dependent. Over many years of use of dynamic mechanical techniques to evaluate polymers and coatings, it has been observed that there is a great deal of information derivable from the shape of the glass transition region. Examples are given of the effect of polymer preparation, cure mechanism, component compatibility, and cure history on the glass transition region. The relationship between the dynamic mechanical properties and polymer performance is also discussed.

OPTICAL PROPERTIES OF BLACK CHROME. A MODEL FOR PREDICTING THE EFFECT OF EXPOSURE TO ELEVATED TEMPERATURE—S.T. Wu and L.W. Masters

Journal of Coatings Technology, 54, No. 691, 41 (Aug. 1982)

Performance and durability are major attributes of interest in selecting absorptive coatings and materials for use in solar energy systems. Previous studies have shown that environmental conditions likely to be experienced in solar collectors can lead to reduced performance and durability. This paper summarizes the first phase of research to help meet the need for predictive models. The scope of this initial phase of research is to develop a model predicting the effects of elevated temperature on the optical properties of black chrome. Oven aging tests were performed in the laboratory at temperatures of 150°C, 200°C, and 250°C. The nature of the change in reflectance spectra was found to be a horizontal shift along the wavelength axis. The model was developed based on these findings. Reasonable numerical fits were made by applying the model to the test data.

REACTIVITY OF ALUMINUM WITH SOLVENTS AND ADDITIVES IN COATINGS—W.L. Archer and V.L. Stevens

Journal of Coatings Technology, 54, No. 691, 47 (Aug. 1982)

Aluminum can be used as a construction material for equipment used in the preparation and application of industrial coatings. However, aluminum may not be a suitable construction material when handling certain alcohols, glycols, glycol monoethers, halogenated solvents, or even water which has a pH <4 or >8.5. This paper discusses the theoretical reactivity of the solvents, their mechanism of attack on aluminum, the role of inhibitors in preventing attack, and the circumstances that might lead to attack and equipment failure. Understanding the possible aluminum/solvent reactivity will enable the industrial coatings formulators and users to select the proper process and applications equipment.

USE AND MISUSE OF COMPUTERS IN COLOR CONTROL—H.R. Davidson

Journal of Coatings Technology, 54, No. 691, 55 (Aug. 1982)

The use of computers for color formulation and control is most successful when good formulation, production methods, and sample preparation principles are followed. Troubles will arise in trying to control a color made with three yellows and white for example, regardless of what instruments, including the eye, are used. If the texture on a deep blue varies as another example, no instrumentation can control the color satisfactorily. Computations, however, can be very useful in identifying the problems and in testing possible solutions.

Good pigment calibrations are essential for good first formulations, but of equal importance is the operator's understanding of what constitutes good formulation with a particular application. In any case it is unlikely, regardless of how well the pigments are calibrated, that an initial formulation of a high quality coating will be sufficiently close to the standard. A batch correction will have to be made and it is here that most of the problems of computer color control arise. Production methods, sample preparation, sample measurement, and computer programs become critical. It is here that a "correct" batch add in a "reasonable" batch add may not be the same and that errors of texture may be mistaken for errors in pigmentation. Examples of these and other computer control problems are presented.

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Lehigh University-NASA Space Shuttle Experiment Yields New Discoveries for Chemical Reactions in Space

The joint Lehigh University-NASA experiment which incorporates the first controlled heterogenous chemical reaction conducted in the weightless environment of space aboard the third Columbia Space Shuttle Mission in March 1982, yielded new discoveries for chemical reactions in space. The project entitled, "Large Particle Size Monodisperse Latexes in Microgravity," was funded by NASA with a $500,000 research grant to the university's Emulsion Polymers Institute.

"One of our fundamental discoveries," according to Dr. John W. Vanderhoff, Principal Investigator of the Lehigh University experiment and Director of the Emulsion Polymers Institute, "based upon our initial review of the data, is that a chemical reaction takes place at the same rate in space as it does within the gravitational environment on earth. Now for the first time, as a result of the Shuttle experiment, we have the data indicating that the theory and basic principle held by most scientists is correct."

Reviewing the overall success of the first phase of the project, Dr. Vanderhoff said, "First, the functional performance of the Monodisperse Latex Reactor (MLR) was excellent. This, in itself, was a signal of success, because we were in fact attempting to do something that had never been done before."

A project goal of manufacturing a product in space, in this instance to produce tiny polystyrene latex spheres of sizes, quality, and uniformity not currently possible on earth, was successful. "This was," according to Dr. Vanderhoff, "a significant step at this point in time, in determining the feasibility of such a manufacturing process that could lead to 'factories' in space."

The microspheres themselves are considered to have extensive potential for present and future scientific, medical, and industrial research applications, and are used in the calibration of highly-sensitive scientific measuring devices. The National Bureau of Standards has indicated an interest in use of the microspheres as calibration standards in medical and scientific equipment.

This first series of experiments on the Space Shuttle, is significant in that it produced monodisperse (uniform) spheres as large as five microns in size. These particles will be used as 'seed' for further polymerizations to produce even larger sizes in future experiments.

Installation of pilot plant for potential 'factory in space' is overseen by Columbia Commander Jack R. Loumas (left) and Dale Kornfeld, NASA co-investigator

An ultimate goal of the Lehigh-NASA project is to determine if spheres as large as 20 microns in size can be produced practically and economically in space. The maximum size of the latex microspheres that can be produced under conditions on earth, given required standards of quality and uniformity, is about three microns. Larger spheres would open the door to a variety of research activities that cannot be undertaken today.

Co-investigators on the research team included Dale Kornfeld, of the Marshall Space Flight Center, Alabama, and Lehigh scientists, Dr. Mohamed S. El-Aasser, Professor of Chemical Engineering, and Dr. Fortunato J. Micale, Associate Professor of Chemistry.

Describing the spheres produced on the Space Shuttle, Mr. Kornfeld said. "They are of excellent quality. It appears that we may have proved the benefits of microgravity in eliminating the negative buoyancy and sedimentary effects which now limit the ability to produce microspheres in larger sizes."

In his discussion of the success of the manufacturing phase of the project, Dr. Vanderhoff noted that the basic limitation at present is one of quality. "We had four 100 cubic centimeter reactors on the Columbia," he said. "These could be considered as research reactors. This basic design could be scaled to a two-liter reactor, and possibly to a 20-liter reactor, which could truly be classified as a 'factory' in space."

The experimental unit consisted of four one-foot tall reactors, each containing a chemical latex-forming recipe, housed in a two-foot tall metal cylinder. The recipe was a suspension 2.5 micron size seed spheres in water.

Prior to launch, each of the reactors was loaded with 100 cc's of the chemical latex-forming recipe. A small onboard

(Continued on page 13)

NPCA Supports OSHA Hazard Communication Standard

In recent comments on the Occupational Safety and Health Administration's (OSHA) latest proposed hazard communication standard for chemical industry workers, the National Paint and Coatings Association (NPCA) strongly registers support for the standard's "performance oriented" approach, which permits the employer to attain the stated objective in a manner which is most efficient and cost-effective in his manufacturing operation. The Association also emphatically urges that the agency's proposed standard be designed to provide federal preemption to prevent the promulgation of numerous and conflicting state and local hazard communication requirements.

NPCA's comments, which were submitted to OSHA in May, describe the Association's hazard communication program, which includes its Hazardous Materials Identification System and the *Paint Industry Labeling Guide*, in great detail. (The HMIS is designed to communicate the identity, hazards and proper handling techniques for the many raw materials used in the coatings industry. The *Paint Industry Labeling Guide* provides guidance to coatings manufacturers on the proper labeling of the known hazardous properties of their products.) Pointing out that through the HMIS and the *Guide* the paint industry has already established communications programs that meet many of the hazards communication proposal's goals, NPCA recommends that OSHA's final standard maintain the flexibility inherent in the proposed rule to permit continued use of these proven systems.

Regarding the question of federal preemption, the Association states that without a strong federal rule, individual states will "enact a variety of diverse labeling rules that would hamper interstate business operations and impede worker protection." NPCA cites cost estimates for compliance with state and local hazard communication requirements and, for comparison, the much lower cost of implementation of the Association's HMIS program.

Per unit cost for a raw material supplier to alter current labels to comply with a single state's requirements would be approximately $0.38. Cost of compliance for a single paint manufacturer producing six million units per year to comply with 20 differing labeling requirements in as many states would be $1.50 per unit and $1.5 million per million units. In contrast the initial cost for a single paint company with ten plants to install NPCA's HMIS program is an estimated $60,000, with an annual maintenance cost of $200 per year per million units of paint produced. (The Association indicates that it considers these figures to be conservative.)

The Association also points out that if individual states are permitted to require too much labeling information and too many hazard warning devices, there is a danger that workers will become confused and consequently less protected from serious hazards.

NPCA comments also state that the Association and the union representing paint industry workers, the International Brotherhood of Painters and Allied Trades, agree that a sound coatings industry hazard communication program should include: a detailed description of the personal protective equipment; evaluation of potential routes of exposure; acute warning symptoms of over-exposure; chemical listing of known hazardous product constituents by chemical name or CAS number; overall hazard, using ratings based upon a five-tiered pyramid approach; and, in situations where a product is so hazardous or complicated to use that all necessary precautions cannot appear on the label, a clear label statement that only persons trained to use the product or possessing specific knowledge should be allowed to use it.

Lehigh-NASA Experiment

computer controlled the experiment after the Shuttle crew turned it on.

In orbit, the latex mixture was heated to a constant 70°C which initiated a chemical reaction to form the latger plastic beads.

A recorder stored all data produced during operation of the experiment. After 14 hours, the experiment turned itself off.

The reactor was removed from the Shuttle at the landing site and returned to the experimenters for sample and data analysis. After a cleanup and refurbishment of the experiment hardware, it was ready for another Space Shuttle flight, in late June. Lehigh University has two alumni who will be directly involved in missions in 1983 and thereafter.

Experiment safety and interfacing requirements for the Shuttle flight are directed by Marshall's Spacelab Layload Project Office. The experiment, carried out in the Shuttle Orbiter crew compartment locker area, is to be conducted on three more Shuttle flights beyond the March flight.

NPCA Comments on EPA's Hazardous Waste Manifest

The National Paint and Coatings Association (NPCA) has given its support to the Environmental Protection Agency's (EPA) proposal to amend its Hazardous Waste Management System standard to require all states to use a uniform hazardous waste manifest.

NPCA supported the basic concept of a uniform manifest while criticizing certain aspects of the proposal in response to EPA's joint rulemaking with the Department of Transportation (DOT) issued in the March 4, 1982 *Federal Register*. The two agencies made the proposal in order to eliminate the confusion and compliance difficulties its present rules have caused. As it now stands, the regulations specify certain required information to be included on a manifest but do not require that a standard form be used.

DOT joined the rulemaking to propose amending its own Hazardous Materials Regulations to require that shippers and carriers of hazardous waste comply with ERA proposed amendments and to state that any state or political subdivision specifying a different or additional manifest is inconsistent with DOT's Hazardous Regulations.

NPCA supported the six-month implementation period and the addition of a space on the form for an optional EPA or state hazardous waste number. Additionally, the Association supported a special handling instructions space and a modification of the form design to allow the weight and volume of the waste to be easily recorded.

However, NPCA opposed the use of a vehicle identification number as it would cause confusion when several shipments are consolidated or when a specific shipment of hazardous waste is transferred from one vehicle to another.

The association also opposed the elimination of a continuation sheet as many industries have hundreds of hazardous wastes which must be listed on the manifest and which would be impossible to list without extra space. NPCA noted that EPA's proposal to use lab names in place of common names is unrealistic because it would take years to finalize such an effort.

Finally, NPCA criticized the proposal to allow states to print and distribute the manifest form because it would allow them to expand the margins and include their names and state assigned document numbers, thus defeating the purpose of a uniform manifest.

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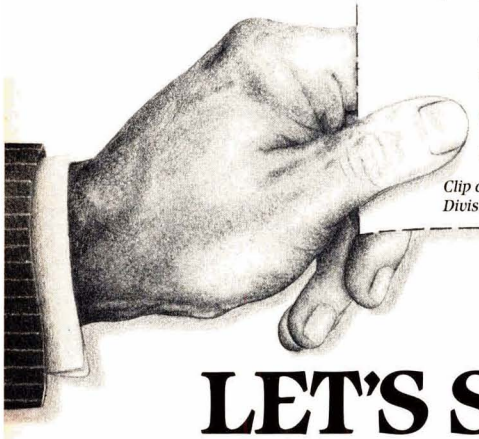
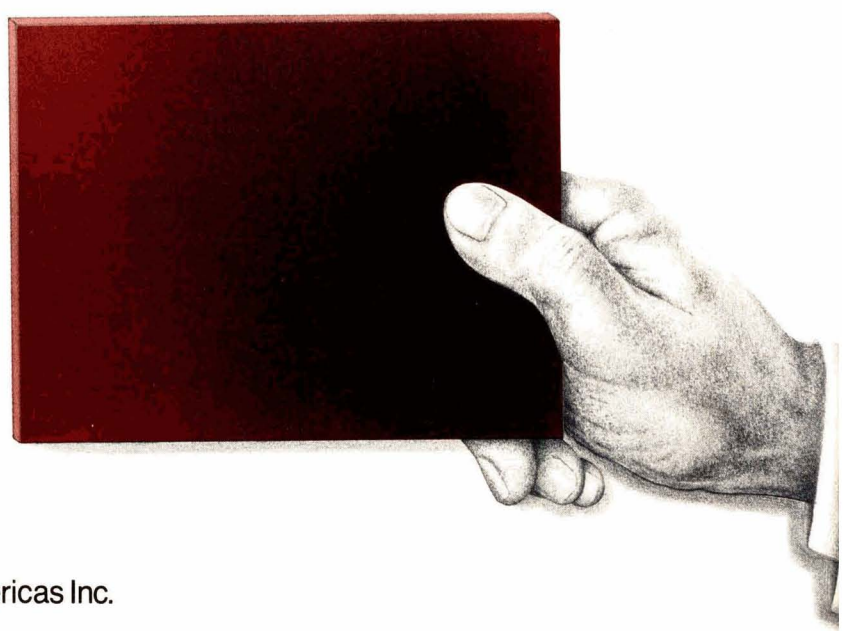


LET'S SWAP COUPONS



ICI Americas Inc.

Coil Coating Increases Despite Recession

Coil coating overcame the recession in 1981, as North American shipments increased despite downturns in major customer industries.

Estimated shipments of pre-coated steel and aluminum totalled almost 3.4 million tons in 1981, according to statistics released by the National Coil Coaters Association. This figure was 4.1 percent greater than the 1980 total of 3.2 million tons and reversed a two-year decline in industry production.

Demand for coil coated steel paced the increase. Shipments rose 6.5 percent to a 1981 total of 2.7 million tons.

Industry deliveries of coil coated aluminum slipped 4.9 percent to 668,000 tons, although shipments to major individual markets posted increases.

Coil coating executives agreed that the industry's gains in 1981 can be attributed to greater penetration in key markets. Many of these key markets, such as automotive, appliances and residential and commercial construction have been mired in recession for several years.

Total shipments of steel coated with weldable zinc-rich primers to the auto industry, for example, increased in 1981 despite much lower car production figures. NCCA members noted that more parts per car are using the specially coated steel, resulting in increased tonnage of coated coil despite car makers' lag in overall production.

The transportation industry represented the largest single market for coated coil in 1981. The bulk of tonnage consisted of steel coil coated with weldable zinc-rich primers, a proven method of fighting corrosion in passenger cars, light trucks and vans.

The recession-plagued building products industry was the number two market for coated coil. Residential and commercial construction has maintained high usage of pre-coated steel and aluminum despite a three-year slump.

Coated coil receives its organic finishes on modern high-speed lines operating at up to 900 feet per minute. The coated metal is then cured and sold to metal fabricating industries, such as the automotive industry, pre-engineered buildings and appliance manufacturing, in either coil or sheet form.

The metal arrives at a user's plant with its finish already applied. The customer can thus effect major cost savings through elimination of paint lines, energy-consuming curing ovens and expensive pollution control equipment.

Coil coating is a leading industry in terms of energy conservation as well. New designs for the natural gas-fired curing ovens on coil coating lines have been able to save as much as 60 to 70 percent in fuel through recycling of solvent-rich oven exhausts.

CARB Task Force Recommends Solvent Standard

A May 17 vote by an advisory group to the California Air Resources Board (CARB) may result in a uniform statewide solvent limit for non-flat coatings in California. CARB's Architectural Coatings Task Force, a group established to make recommendations on feasible solvent limits for paints, voted to recommend a solvent limit of 380 grams per liter for nonflat coatings. The Task Force also recommended the establishment of an exemption for quick-drying enamels once a suitable definition of quick-drying enamels is developed.

The next step in the standard-establishment process is submission of these recommendations to CARB's Technical Review Group (TRG), an association of state and local air pollution control professionals. After considering the Task Force's recommendations, TRG will make an advisory recommendation to all of California's air pollution control districts. Each district may then establish its own emission limits.

"The Task Force's decision to recommend the 380 gram limit for consideration by TRG is a significant first step in achieving a state-wide solvent emission standard for non-flat coatings," says Michael Campilongo of the NPCA General Counsel's office. "Although the TRG's recommendation to the districts is only advisory, it carries great weight because of the group's role as a consensus maker. When you consider that California has over 20 separate air pollution control districts and that each has the authority to set its own emission limits, you can see the considerable burden the industry would be spared by a uniform standard."

Coatings industry representatives on the Task Force are Federation members Robert Minucciani (Golden Gate Society), of Glidden Coatings & Resins Div., SCM Corp., and Lloyd Haanstra (Los Angeles Society), of Ameritone Paint Corp. Both attended the May 17 meeting, which was also attended by Al Aronow (Los Angeles Society), of Sinclair Paint Co., and Edward P. Kevin (Golden Gate Society), of The O'Brien Corp.

Computer and Instrumentation Applications Among Highlight Discussions Slated for Annual Meeting

The many and varied applications for computers and scientific instrumentation in the coatings industry will be two of the featured topics explored at the 1982 Federation Annual Meeting in Washington, D.C., November 3–5.

Computer applications will be discussed in two sessions. On Wednesday afternoon, November 3, a panel of speakers will discuss the role of the computer in insuring quality management and technology, focusing on such aspects as: quality control, research/technical, and applications from the perspective of the small manufacturer. Workshop sessions will afford attendees the opportunity to discuss specific aspects in more detail.

On Thursday morning, November 4, the Manufacturing Committee will sponsor a session on computer applications in the production area, including color control and process control. Included also will be a report on a recent survey of computer utilization in the coatings industry. This session, too, will afford ample opportunity for open forum participation by the audience.

Also on Thursday, morning and afternoon sessions will be devoted to the use of scientific instrumentation in designing and maintaining quality of coatings products. Featured will be a series of papers on a variety of applications, including: electrical and electrochemical measurements of corrosion protection; particle size measurement by disc centrifuge photosedimentometry; torsional braid analysis; and computers and automation in an analytical chemistry lab.

Rounding out the discussions on the use of "black box" technology will be a Thursday afternoon update by the Technical Information Systems Committee on information retrieval sources and services for the coatings industry.

Other Program Highlights

Theme of the Annual Meeting is "Quality Designed/Confidence Renewed" and Program Chairman John C. Ballard, of Kurfees Coatings, Inc., Louisville, KY, and the members of this committee have developed a schedule of additional presentations that address various aspects of the theme topic.

Among the other featured presentations are:

—Keynote Address by Jules Bergman, Science Editor of ABC Network News.

—Mattiello Lecture by Dr. Shelby Thames, of the University of Southern Mississippi.

—Paint Research Institute Session Honoring Dr. Raymond R. Myers.

—Roon Awards Competition Papers.

—Constituent Society Papers.

—Educational Committee Session Promoting and Publicizing Career Opportunities in Coatings.

—Papers From Overseas Organizations.

—Corrosion Committee Panel Discussion on Performance of Non-Lead, Non-Chrome Pigments in Aqueous and Solvent-Based Coatings.

Concurrent sessions will be held throughout the three-day meeting, but papers will be scheduled so as to avoid conflicting presentations.

Paint Industries' Show

To be held concurrently with the Annual Meeting, the 1982 Paint Show will offer attendees the exhibits of 167 supplier firms.

The Paint Show is the only national exhibit of raw materials and equipment used in the manufacture of paints and related coatings, and participating firms will have their top technical personnel on hand to discuss the latest developments in coatings manufacturing technology.

Show hours will be noon to 5:30 p.m. on Wednesday, November 3; 9:30 a.m. to 5:00 p.m. on Thursday, November 4; and 9:30 a.m. to 4:00 p.m. on Friday, November 5.

Headquarters Hotel

The Sheraton Washington will serve as headquarters hotel. Other hotels with blocks of rooms set aside for the Annual Meeting are the Shoreham, Washington Hilton, and the DuPont Plaza.

Room Reservations

All requests for rooms and suites must be sent to the Federation office on the official housing form which has been mailed to all members and is included in this issue (see page 32). Additional housing forms are available from the Federation headquarters office.

NPCA Meets Same Week

The National Paint & Coatings Association will hold its annual meeting on November 1–3 at the Washington Hilton.

The back-to-back scheduling of Association and Federation events provides coatings industry personnel with a full week of programming.

Registration Fees

Regular "on-site" registration fees will be $50 for Federation members and $65 for non-members. Advance registration will be available for $40 for members and $55 for non-members. Fee for spouses' activities will be $35 on-site and $25 in advance.

Once again there will be a special registration fee of $20 each for retired members and their spouses. This applies to advance registration only.

In Washington, the registration hours will be: Tuesday, noon to 5:00 p.m.; Wednesday, 8:00 a.m. to 5:30 p.m.; Thursday, 8:00 a.m. to 5:00 p.m.; and Friday, 8:00 a.m. to 4:00 p.m.

Registration forms are included in this issue of the JOURNAL OF COATINGS TECHNOLOGY, and were mailed to all members in April.

Spouses' Activities

Included in the spouses' registration fee will be a get acquainted wine and cheese social on Wednesday afternoon; continental breakfast on Thursday and Friday at the Sheraton Washington; and a guided tour of Annapolis (with lunch) on Thursday.

Federation Luncheon

The Annual Federation Luncheon will be held on Friday at the Sheraton Washington.

Presentations will be made to the recipients of the George Baugh Heckel Award (outstanding individual who has contributed to the advancement of the Federation) and the Flynn Awards (firms judged to have the best exhibit booths in the 1982 Paint Industries' Show).

The featured speaker will be Mark Russell, well-known political satirist, who stars in his own show on the PBS network and is regularly featured on NBC's "Real People."

Program Committee

Assisting Chairman Ballard on the Program Steering Committee are: Peter Hiscocks (Vice-Chairman), of CIL Paints, Inc., Toronto; Steven Crouse, of Kwal Paints, Denver; Loren W. Hill, of Monsanto Co., Indian Orchard, MA; Gus W. Leep, of Seymour of Sycamore, Sycamore, IL; Robert G. Modrak, of Benjamin Moore & Co., Milford, MA; Tom Ruland, of Cook Paint & Varnish Co., Houston; and Gary Van de Streek, of Wyandotte Paint Products Co., Troy, MI.

Spring 1982 Board of Directors Meeting

Thirty-five members and 14 guests attended the Spring Meeting of the Board of Directors of the Federation of Societies for Coatings Technology, on April 30, 1982, in Boston, MA.

The following were in attendance:

Officers

President ..... Howard Jerome
President-Elect ..... A. Clarke Boyce
Treasurer ..... Terryl Johnson

Society Representatives

Baltimore ..... Alex Chasan
Birmingham ..... David Lovegrove
Chicago ..... John T. Vandeberg
C-D-I-C ..... William Mirick
Cleveland ..... Fred G. Schwab
Dallas ..... Carlos Dorris
Detroit ..... Harry B. Majcher
Golden Gate ..... A. Gordon Rook
Houston ..... Willy C.P. Busch
Kansas City ..... Norman Hon
Los Angeles ..... Lloyd Haanstra
Louisville ..... Joseph A. Bauer
Mexico ..... Antonio Pina
Montreal ..... Horace Philipp
New England ..... Daniel Toombs
New York ..... Saul Spindel
Northwestern ..... Lee Sveum
Pacific Northwest ..... Deryk R. Pawsey
Philadelphia ..... John A. Stigile
Piedmont ..... Philip Wong
Pittsburgh ..... Edward Vandevort
Rocky Mountain ..... James E. Peterson
Southern ..... Al Hendry
St. Louis ..... Thomas Fitzgerald
Toronto ..... Kurt F. Weitz

Other Members

William H. Ellis ..... Los Angeles
William F. Holmes ..... Dallas
Elder C. Larson ..... Houston
Stanley LeSota ..... Philadelphia
Hugh W. Lowrey ..... C-D-I-C
John J. Oates ..... New York
Helen Skowronska ..... Cleveland

Guests

Ray Connor, Technical Director of the National Paint and Coatings Association.

Peter Robinson and Dr. Raymond R. Myers, President and Research Director, respectively, of the Paint Research Institute.

Robert Modrak, President of the New England Society.

Royal A. Brown, Federation Technical Advisor.

The following Society officers who attended the orientation meeting the previous day: Adrian Adkins, of Golden Gate; William Early, of Piedmont; Herbert Ellis, of New York; Luis Garcia, of Rocky Mountain; William Georgov, of Philadelphia; Gerald McKnight, of Pacific Northwest; George Schwartz, of Houston; Steven Vargo, of Detroit; and Joseph Wrobel, of St. Louis.

Staff

Frank J. Borrelle, Executive Vice-President; Thomas A. Kocis, Director of Field Services; and Robert F. Ziegler, Editor of the JOURNAL OF COATINGS TECHNOLOGY.

Mr. Borrelle called the roll of members and reported all present except a Representative from the Western New York Society.

The report of the Fall 1981 Board of Directors meeting was approved as published in the January 1982 JOURNAL OF COATINGS TECHNOLOGY.

Reports of Officers And Staff

PRESIDENT JEROME

Six months have passed since taking office in October 1981. During this time I have attended numerous Society meetings throughout the country. In addition, I have done considerable traveling to special meetings to help conduct the business of the Federation.

At Society meetings, in every instance, I have asked for and received the time to explain to members the happenings of the Federation. The warm reception accorded to both me and to members of staff is sincerely appreciated. I feel strongly that Society members should be made aware of the workings of the Federation and I have made every effort to discuss all aspects of Federation business with honesty and candor. The opportunity to visit with members provides a two-way level of communication that is invaluable.

The Southern Society "Consumer Guide to Trade Paint Quality" is ready for distribution. The Federation has supported this effort and we look forward to working further with the Southern Society along the same lines. The Federation has aligned itself with the National Decorating Products Association for distribution of the brochure (the initial quantity is 100,000). The support of NDPA in this venture is greatly appreciated.

The report of the PRI Ad Hoc Committee was thoroughly reviewed by the PRI Trustees and favorably received. The Trustees feel that the report is an honest reflection of the feelings and perceptions of the Federation membership. To implement this report, President Peter Robinson has begun a 5-year plan of accomplishment. Several new Trustees have been elected to the PRI as part of a careful plan to restructure the organization.

Dr. Raymond R. Myers, Research Director of PRI since January 1964, will retire from that position on December 31, 1982. I am pleased that he will be given the title, "Director Emeritus," and that the PRI Session at the Annual Meeting will be dedicated to Dr. Myers and accomplishments made by PRI during his 18 years of dedicated service.

The PRI Trustees have conducted a search for an "Executive Director" of PRI and it is expected that President Robinson will have an announcement to make at the Board meeting.

It is gratifying that a number of Societies, after listening to the "PRI story," are once again making donations. Some are increasing the amount of money. This indication of faith and confidence in the future of PRI is a credit to Federation members.

As instructed by the Executive Committee, I have appointed an Ad Hoc Committee to study "ways and means for the Federation to promote and publicize career opportunities in the coatings industry." Chairing this committee is Dr. Herman J. Lanson and he is expected to submit a final report in time for the 1982 Annual Meeting.

An Ad Hoc Committee chaired by Joe Boatwright, of the Cleveland Society, has been formed to write a comprehensive "History of Paint." A number of volunteers have come forward to serve on this committee and it is the committee's intention to have a finished volume ready for the 1985 Annual Meeting. This is probably one of the rare times in Federation history that a committee has been formed with all volunteers. Mr. Boatwright is to be commended for his personal effort in getting this activity underway.

The Correspondence Course is essentially at the same point of progress as it was at our last Board meeting. I have had a face-to-face meeting with the professors at the University of Southern Mississippi and am prepared to discuss my report of that meeting. The Board will also be asked to consider the report of the Executive Committee.

I am pleased to report that Royal A. Brown has joined the Federation as "Technical Advisor." This is a part-time position. The need for additional Federation technical activities (publications, seminars) has too long been ignored. As a starter Mr. Brown has been asked to develop a seminar for the Spring of 1983. There are many other areas where he can be of assistance to the Federation and these will be developed in the months to come. Mr. Brown will perform his duties in close cooperation with Tom Kocis, Staff Director of Field Services.

The Federation is in good financial shape due in great part to the diligent efforts of Frank Borrelle and his staff. A balanced budget was once again approved by the Executive Committee at their January meeting. The Paint Show, a major source of income, appears headed for another sellout.

Any success I may achieve as President is due in no small measure to the efforts of those who serve as Committee Chairmen. I take this opportunity to offer them my sincere thanks.

HOWARD JEROME,
President

PRESIDENT-ELECT BOYCE

My second year as an elected officer has given me the opportunity to continue meeting many old acquaintances and to make many more new friends. It is gratifying to learn first hand from members that the Federation is such an important part of their lives as coatings people. The unity of purpose in providing educational and technical support to our membership to assist them in dealing effectively with the many problems facing the coatings industry today is one of the outstanding characteristics of our association.

This year I have been directly involved in the following on behalf of the Federation:

- Investment Committee Meeting in January
- Finance Committee Meeting in January
- Executive Meeting in January
- Visits to the Pittsburgh and Western New York Societies
- Visit to the Baltimore Society's "50th" Anniversary
- Joint Paint Industry Co-ordinating Committee Meeting in Washington.

The other major activity of the President-Elect, that of selecting the various Committee Chairmen for service in 1982–1983, is well underway. The effective functioning of these committees is an important part of the total success of our operations and accomplishments.

A. CLARKE BOYCE,
President-Elect

TREASURER JOHNSON

The FSCT is once again scheduled to operate within a balanced budget. The Finance Committee presented the 1982 budget to the Executive Committee and it was approved.

The first order of business as Treasurer is a visit to the Federation office. Familiarize yourself with the operation and then realize how fortunate you and all members of the Federation are in having the quality of staff as we have in Philadelphia.

The Federation Treasurer is also Treasurer of PRI and as such I have attended two Trustee meetings. PRI, under the leadership of Peter Robinson, is in full bloom.

I also attended the Southern Society's Annual Meeting. This was an outstanding event from an excellent program to great entertainment to a record attendance. The south will not rise again, it has risen.

We were particularly proud when, after Howard Jerome's

talk to their board, they voted to donate $250 more to PRI. This on top of the $500 they had presented during the annual meeting.

TERRYL JOHNSON,
Treasurer

EXECUTIVE VICE-PRESIDENT BORRELLE

Thanks to a healthy publications activity and a most successful Annual Meeting and Paint Show, 1981 was a very good year for the Federation. In February 1982, $50,000 was transferred from operations to the Federation's permanent investment trust at Girard Bank. ($100,000 was transferred in August 1980).

1982 BUDGET

In January, the Finance and Executive Committees approved a balanced budget of $1,236,500. As budgeted, the income/expense allocations are:

Income: Publications—39%; Annual Meeting and Paint Show—45%; Dues—8%; Miscellaneous & Investment Interest—6%; Educational Activities—2%.

Expense: Headquarters Office/Administration—35%; Publications—30%; Annual Meeting and Paint Show—16%; PRI and Other Educational Activities—10%; Support of Officers, Board, Committees, etc.—9%.

PUBLICATIONS

JCT: Advertising income was up appreciably in 1981. This year, however, is off to a slow start. Technical papers continue to be in good supply.

A joint meeting of the Publications Committee and the Editorial Review Board was held on March 18 in Philadelphia. It was an exceptionally good session, as was the initial one in 1980. The members comprising these groups are dedicated to maintaining the high quality and reputation of Federation publications and this biennial meeting is one of the best investments the Federation can make in its future.

Year Book: The 1982 edition was mailed on March 23, three weeks later than in 1981. A combination of unavoidable factors caused the delay.

Series Units: Dr. Herman Lanson, of St. Louis, is nearing completion of the revision to Unit #5, Alkyd Resins.

Fred Daniel, of Daniel Products Co., has offered to write one on "Dispersion Problems." We have, of course, accepted with thanks. Others on "Statistics for the Coatings Industry" and "Inorganic Zinc Rich Primers" are still in process.

In order to stimulate the authorship of new units and updates of old ones, the Federation will give an honorarium to anyone who submits a manuscript which is accepted for publication.

Brochure on Paint Quality: Our newest publication is the Southern Society's brochure on Paint Quality—Latex Interior Flat Paint. The initial press run was 100,000. Copies are for sale from the Federation office for 10¢ each, minimum order of 100 copies. The National Decorating Products Association is cooperating with us in the promotion of this brochure.

All other publications are selling at a satisfactory pace.

OTHER SERVICES

A/V: The newest addition to the A/V library is "Batch Operated Mini-Media Mill" by the New York Society.

CAT: We are now selling the second and final production (400 sets) of the 1978 edition of the Color-matching Aptitude Test Set.

MEMBERSHIP SERVICES

Federation membership increases a little each year and the current Year Book includes about 6,800 members.

Every new member receives a letter of welcome from the Federation office. Congratulatory letters are sent to 25-year members.

ANNUAL MEETING AND PAINT SHOW

The 1981 Paint Show was the biggest ever—38,186 net square feet. The attendance was the second highest—5,774.

The 1982 Show, although a sell-out, cannot be the biggest because of space limitations in the "pillar palace" of the Sheraton Washington Hotel.

We are pleased to have been able to book Jules Bergman and Mark Russell as speakers.

PAINT RESEARCH INSTITUTE

The annual solicitation letter, to previous year contributors, was mailed in March, under the signature of President Peter Robinson.

President Robinson has recorded, on video tape, a 28-minute version of the presentation he made to the Board in May 1981. This is available for loan from the Federation office. (VHS—¾" or ½").

FSCT EXHIBIT

Thanks are extended to the New England Society for offering the Federation a complimentary booth in its Coatings Tech Expo, May 19-20. Bob Ziegler and Dick Gross will handle our exhibit and will attend.

OFFICER/STAFF VISITS

So far during the current administrative year, Officer/Staff visits have been made to the monthly meetings of: Baltimore, Detroit, Los Angeles, Louisville, New England, New York, Pittsburgh, Rocky Mountain, and Western New York.

Also attended were: a special Executive Committee meeting of Golden Gate; the Southern annual meeting; and the Baltimore 50th anniversary celebration.

TECHNICAL ADVISOR

We are pleased that Roy Brown is serving the Federation as a Technical Advisor. Staff will work closely and cooperatively with him toward the objective of improving services to both the membership and the industry.

ADDITION TO STAFF

Audrey Boozer, who was associated with the *Philadelphia Bulletin* for 15 years in subscription work, has joined the staff as Subscription Fulfillment Manager. Total staff is now 13.

FRANK J. BORRELLE,
Executive Vice-President

DIRECTOR OF FIELD SERVICES KOCIS

Major efforts have been directed to committee liaison and, as noted, there has been much recent activity in this area.

COMMITTEE LIAISON

Program—Close contact is being maintained with the Program Steering Committee, which met in Detroit on October 28, during the 1981 Annual Meeting, and again in Chicago, on December 8; as the program is developed and speakers are

scheduled for participation staff will provide liaison and coordinate arrangements.

Current indications point to an abundance of submissions and prospects for a full complement of top grade presentations keyed to the theme, "Quality Designed/ Confidence Renewed."

Manufacturing—Organizational meeting of expanded Manufacturing Steering Committee was held on October 29, in Detroit (in conjunction with the 1981 Annual Meeting), to review existing programs and consider additional areas of involvement.

Subsequently, the Committee met on March 2, in Chicago, for a full day of discussions. Primary agenda topic at the March 2 meeting was development of seminar for presentation at the 1982 Annual Meeting. Topic selected was computer applications in coatings manufacture, which will focus on such areas as process control, color control, quality control, and resource allocation.

In related agenda items, the Committee agreed to study feasibility of developing a Manufacturing Committee Speakers' Bureau, as well as sponsoring a national seminar.

Additional topics were suggested for programs in the growing library of manufacturing audio/visual presentations, and a proposed tour of a paint plant in the D.C. area (in conjunction with the 1982 Annual Meeting) is being pursued; attendance would be limited to Steering Committee members and Society Manufacturing Committee Chairmen.

Corrosion—Committee, which has been expanded to provide for more Society representation, met initially on October 28, in Detroit, in conjunction with the Annual Meeting, and again on March 16, in New York, to pursue discussions on areas of activity.

The Committee will again sponsor a symposium at the Annual Meeting; the 1982 presentation will be a panel discussion on "Performance of Non-Lead and Non-Chrome Pigments in Both Aqueous and Non-Aqueous Coatings."

In conjunction with the Technical Advisory Committee, suggested projects have been selected for undertaking by Society Technical Committees. Also, efforts will continue to promote dialogue and ongoing liaison with other organizations, to exchange information on corrosion-related topics.

Technical Advisory—Meeting of TAC with Society Technical Committee Chairmen was held on March 25 and 26, in St. Louis, which was attended by representatives of 18 Societies, to discuss activities underway and pursue suggested areas of project work.

A key topic of discussion was an update on the testing of the anchored-biocide polymer developed by PRI's Mildew Consortium. Quantities of the polymer have been distributed to two Societies (Chicago and Southern) to be formulated into paint systems and tested in outdoor exposures; 10 other Societies have expressed interest, and they will be provided with the polymer as it becomes available—hopefully, all by mid-May.

Societies have also been urged to cooperate with the request to send samples of paint chips supporting mildew growth to Dr. Paul Klens, of Lock Haven State, for study; this is a related PRI project which will investigate possible new types of mildew defacement.

Attendees also had opportunity to provide suggestions for areas of PRI research; Trustee Ruth Johnston-Feller attended the meeting, and she discussed current PRI programs and the desire of the Trustees to maintain liaison with Society Technical Committees and to receive their input on project selection.

Another feature of the meeting was a presentation by Darlene Brezinski, of the JCT Editorial Review Board, who offered advice on how to prepare and write a paper for publication in the JOURNAL OF COATINGS TECHNOLOGY.

Educational—Steering Committee will meet with Society Educational Committee Chairmen in Detroit, on April 16. Among feature agenda items will be a review of the current scholarship program and ways to promote career opportunities in coatings.

Annual update of "Guide to Coatings Courses, Symposia, and Seminars" has been published and distributed.

Progress on correspondence course, being developed in conjunction with University of Southern Mississippi, continues to lag; course was to be available in September 1981, but only 9 of the 27 chapters in volume have been submitted (in draft form) for review by Editorial Board. Completion date for Part I of the two-part course is still uncertain; current status points to late 1983 as earliest availability.

MISCELLANEOUS

Liaison and staff support also provided for activities of Mattiello, Roon, APJ, and MMA Awards Committees . . . Annual update of "Talks Available to Constituent Societies" being readied for publication . . . Participated in Officer/Staff Society visits to Golden Gate, Los Angeles, Louisville, New York, Northwestern, Rocky Mountain, and Southern; also attended April meeting of PRI Trustees.

THOMAS A. KOCIS,
Director of Field Services

Comments from Guests

Ray Connor, Technical Director of the National Paint and Coatings Association, commented on the following subjects:

The 1982 "Picture It Painted" campaign is well underway, NPCA is cooperating with the National Decorating Products Association and the Painting and Decorating Contractors of America in this regard. Several local Societies and Paint and Coating Associations are involved in joint ventures in PIP, and have campaigned in some states to have May proclaimed "Paint Month."

In reference to the Southern Society's brochure on "Paint Quality," Mr. Connor said NPCA is also interested in paint quality. However, he reported that the Association is active in changing the image of the paint industry through an ad hoc committee which is developing data to show that paint quality is improving and not declining. The committee is also working on a consumer attitude survey.

Mr. Connor reported on the current legislation affecting the industry. He stated that with the Reagan Administration's policy of "new federalism," state legislatures are becoming involved with industry regulations, especially in the areas of clean air, waste disposal, and OSHA-type requirements.

Mr. Connor concluded by saying that even with the current trend of de-regulation in Washington, Federal regulations which have already been passed will be implemented.

Paint Research Institute

PRESIDENT ROBINSON

After 19 years of continuous service, Dr. Raymond Myers has announced his retirement from the position of Research Director, Paint Research Institute, effective December 31, 1982. Dr. Myers has indicated his willingness to continue to serve PRI as Director Emeritus and the Board of Trustees is indeed fortunate to be able to continue to use Dr. Myers' vast PRI experience. The PRI session at the forthcoming Washington Annual Meeting will be dedicated to Dr. Myers and his PRI career with Dr. Percy Pierce in the chair.

Dr. Seymore Hochberg, until recently with the DuPont Co., has accepted the PRI offer of the new full-time position of Executive Director effective January 1, 1983. Dr. Hochberg's initial appointment is for three years and effective April 1, 1982. Dr. Hochberg will act as consultant to PRI until he assumes his new duties on January 1, 1983. Dr. Hochberg has been involved in coatings science and technology for most of his career with DuPont which began in 1945. Dr. Hochberg is named as the inventor of the Sand Mill, and he has wide experience in the synthesis of raw materials and polymers for use in the coatings industry. He has made contributions to theory which can be applied to the problems of paint hiding and his recent interests were concerned with problems relating to high solids coatings. Dr. Hochberg is the author of a short course in organic coatings sponsored by the American Chemical Society. The position of consultant to PRI accepted by Dr. Hochberg will allow a smooth transition of responsibilities from Dr. Myers to Dr. Hochberg.

The Board of Trustees continues to work on its five-year plan. As with all five-year plans, that of the PRI is a framework or guide within which changes can be made in succeeding years as conditions dictate. The plan will be updated on a yearly basis, and, therefore, is an annually rolling five-year plan. The Board of Trustees expects the plan to be operational effective January 1, 1983. Four committees have been established from members of the Board, and they are responsible for constructing the various components of the five-year plan. Dr. Percy Pierce is Chairman of the Scientific or Basic Research component. Ruth Johnston-Feller is Chairman of the Technological or Applied Research component. Dr. Mal Hendry, Vice-President of PRI, is Chairman of the Communications Committee, and Dr. Philip Heiberger is Chairman of the Budget Committee. The Board of Trustees is actively seeking the input of the local Societies to the planning process via the Technical Advisory Committees. The Trustees felt that two of the early committees, Education and Public Relations, should be combined into the Communications Committee. The Communications Committee is responsible for, among other things, the design of the PRI booth at the Paint Show. The President of PRI, in cooperation with the Executive Committee of the Federation and the Louisville Society, prepared a television tape which can be used for showing to any of the local Societies at their request. The ready availability of tape equipment makes this a very powerful technique. Recently, the CDIC Society received a short seminar on rheology presented under the auspices of the Communications Committee of PRI. It was well received.

The Mildew Consortium continues to make progress although the technical aspects will be found in the Research Director's report. A proposal to increase the consortium membership contribution was rejected by the membership. One of the consortium members has made available a large quantity of the active monomer of interest to the consortium, and another member of the consortium is engaged in converting this monomer into larger volumes of latex following guidelines established by PRI investigators. Constituent Societies of the Federation will be able to test the effects of paints incorporating mildewcide moities according to protocols established by the Mildew Consortium. A prospectus for a Corrosion Consortium has been designed by Herb Lowell under a PRI contract now being made ready for submission to potentially interested industrial sponsors. The goal of this consortium is to extend the corrosion-free lifetime of corrosion susceptible substrates by the use of specialized corrosion inhibiting coatings. The other two consortia planned by the Board of Trustees, the Aqueous Consortium and the High Solids Consortium, have proven difficult to define within the context of a tax-exempt organization such as PRI. Recent changes in the structure of the Board of Trustees may provide guidance in establishing proper goals.

Fund raising continues to be difficult. The current condition of the economy does not provide a climate in which increased contributions from existing supporters or new support are likely to occur. PRI continues to explore fund raising possibilities including the possible use of professional fund raisers.

During the past 12 months, there have been four retirements from the Board of Trustees of PRI plus the automatic replacement of Clarke Boyce by Terryl Johnson as Treasurer of PRI. The four retirees were Dr. Orin Keplinger, Charles Kumins, Gar Schurr, and Dr. Marco Wismer. The President of PRI and the Ad Hoc Committee of Past-Presidents of the Federation were both of the same mind in desiring a proper balance to be established for the composition of the Board of Trustees of PRI. Colin Penny was asked to join the Board in order to bring the view of the smaller paint companies to PRI while Dr. Thomas Miranda will bring understanding of the needs of the industrial paint consumer. Dr. Miranda is also Chairman of the Publications Committee of the Federation and will help us in our communications efforts. Miss Mary Brodie brings experience of research resource management while Dr. Percy Pierce continues and enhances the scientific stature of PRI. Dr. Pierce is a recent Mattiello Lecturer during which he discussed chemical and physical mechanisms in the cathodic electrodeposition process.

The Board of Trustees has embarked upon a major restructuring of the goals, image, and contributions to the paint industry of its research program and it is expected that this restructuring will be complete within the framework of a five-year plan by January 1, 1983, approximately two years after its inception. Adequate progress towards this goal is being made.

PETER V. ROBINSON,
President, PRI

[Additional comments made by Mr. Robinson dealt with other developments made by the PRI Trustees with regard to research management policies in PRI.

He also reported that two Societies (Chicago and Southern) have received a quantity of polymer (and control monomer) for developing paint systems to test the efficacy of the anchored-biocide theory being pursued by the PRI Mildew Consortium. Other Societies interested in participating in the program will receive the polymer as soon as a new supply has been made.

Mr. Chasan (Baltimore) and Mr. Pawsey (Pacific Northwest) announced that their Societies have been favorably impressed with the progressive developments in PRI and will reinstate their financial support.

A videotape of Mr. Robinson's presentation of proposed and implemented changes in the structure of PRI—"PRI: Present and Future"—was shown. The 28-minute tape, produced in cooperation with the Louisville Society, was well received by the Board. This tape is available to interested Societies.]

RESEARCH DIRECTOR MYERS

Our annual report to the Trustees will appear in the April JCT. In that report is an announcement that this will be my last one. Effective January 1, 1983 a new director will be working with PRI.

We continue to issue quarterly reports to the Trustees, of which these accountings to the Federation Board are summaries. Activity is confined largely to the Mildew Consortium, two grants that are finishing up in the ill-fated Aqueous Consortium, and one grant in the High-Solids Consortium that we still expect to flourish.

Research on a carefully selected corrosion topic is expected to begin in the third quarter. A unique method of launching this effort is being tried which places it largely out of our control

and into the hands of the steering committee that will be formed to guide the single grant under consideration.

Our participation in the move toward a more technological slant has been to issue an invitation for the writing of a critical survey on waste disposal. The individual to whom it was extended subsequently accepted a technical position with the Federation, so if this mission is carried out it will undoubtedly come under someone else's purview.

Lest one draw the conclusion that PRI is treading water with all of these changes, we point out that research is progressing in all of the present contracts except one (which terminated in March). The Mildew-Consortium anticipated this demise and took special pains at its last meeting to engage a well-qualified substitute.

Our final report to the Board will be given in October.

RAYMOND R. MYERS,
Research Director

Amendments To By-Laws

This report summarizes the actions of the Federation Board of Directors with regard to the Proposed Amendments to the By-Laws and Standing Rules.

Given First Reading

The following proposed amendment to the By-Laws (Article IV) was given first reading. It will be presented for adoption at the Board of Directors meeting of November 2, 1982.

ARTICLE IV—NOMINATIONS AND ELECTIONS

WHEREAS the monthly publication date of the *Journal of Coatings Technology* has been advanced and this earlier publication date makes it impossible to meet this By-Law's requirement of reporting nominations for elective offices in the July issue, be it

RESOLVED that By-Laws Article IV, Section A, Paragraph (2) be amended as follows:

(2) The report of the Nominating Committee shall be announced at the Spring Board of Directors meeting, after which it shall be published in the August issue of the *Journal of Coatings Technology*. Nominations for any elective office may also be made from the floor, by any Society Representative at the Fall Board Meeting, prior to the election of Officers, or by a petition signed by 25 Active Members and forwarded to the Federation Executive Vice-President in time for publication in the August issue of the *Journal of Coatings Technology*.

The Federation Executive Vice-President shall place such nominees-by-petition in nomination at the annual election meeting of the Federation Board.

Withdrawn

The following proposed amendment to the By-Laws and Standing Rules was offered for first reading:

EQUAL VOTING AND OFFICE-HOLDING PRIVILEGES

WHEREAS the Pittsburgh Society has proposed that the existing Federation By-Laws and Standing Rules be amended to extend equal voting and office-holding privileges to all Federation Active and Associate members while still maintaining the existing classes of membership, be it

RESOLVED that the Federation By-Laws and Standing Rules be amended wherever applicable in order to extend voting and office-holding privileges to all Active and Associate members.

[In commenting on the proposed amendment, By-Laws Committee Chairman Fred Schwab indicated that the committee does not oppose the proposal in principle. The amendment does, however, present problems.

For instance, taking the Pittsburgh proposal literally, the new By-Laws could force all Societies to extend voting and office-holding privileges to Associate members. Many Societies do not do this now and have been very vocal in their opposition to this proposal.

Mr. Schwab said that the Pittsburgh proposal could be modified by inserting the word, "Federation" . . . to extend voting and office-holding privileges to all *Federation* Active and Associate members.

That would leave the various options on Associate members in the hands of the Societies. However, this would create inequities because the class of Federation membership of an individual is determined by his or her class of membership in a Society. An individual who is an Associate of a Society which prohibits him or her from holding local office would be eligible to become a Federation officer.

Mr. Schwab also wondered if the proposal should include a stipulation as to the number of Associate members who could be in the Chairs at one time. And, he continued, should not Educator and Retired members be accorded voting and office-holding privileges, too?]

After further discussion, the proposed amendment was withdrawn from consideration by Mr. Vandevort, of the Pittsburgh Society.

The Board instructed President Jerome to appoint an ad hoc committee to study this matter further, to clarify the complications that could develop from its adoption, to develop an equitable plan, and to present its initial report at the November 2, 1982 Board meeting.

Nominations

The Nominating Committee places the following persons in nomination for office with terms to become effective November 6, 1982:

President-Elect—Terryl Johnson, of the Kansas City Society (Cook Paint & Varnish Co.). One-year term. He is currently Treasurer.

Treasurer—Joseph A. Bauer, of the Louisville Society (Porter Paint Co.). One-year term.

Executive Committee—John T. Vandeberg, of Chicago Society (DeSoto, Inc.). Three-year term.

Board of Directors (Members-at-Large)—Morris Coffino, of New York Society (D.H. Litter Co., Inc.); and Rudolph C. Albrecht, of Chicago Society (The Enterprise Companies). Two-year term for each.

Board of Directors (Past-President Member)—William Dunn, of Toronto Society (Monarch Coatings, Inc.). Two-year term.

Elections will take place during the Board of Directors meeting on November 2, 1982, in Washington, D.C.

Members of the Nominating Committee are: Carlos E. Dorris, Milton A. Glaser, William Mirick, John T. Vandeberg, and the Chairman.

WILLIAM H. ELLIS,
Chairman

Review of Actions Of Executive Committee

[*One of the duties of the Board of Directors is to approve or disapprove all actions of the Executive Committee.*

The actions of the Executive Committee (at meetings of October 31, 1981 and January 30, 1982) were included with the minutes mailed previously to Board Members. The actions at the April 28, 1982 meeting of the Executive Committee were presented to the Board during the present meeting.]

The actions are as follows:

OCTOBER 31, 1981

That $31,760 be appropriated to Federation Committees, (Account #677), 1981-82.

That $9,200 be appropriated to the Educational Committee, (Account #750), 1981-82.

That the recommendations of the Finance/Investment Committees—to allocate $150,000 of the Federation's Investment Trust at Girard Bank toward the purchase of U.S. Treasury notes—be approved, and that Girard Bank be instructed to implement this purchase.

That Federation Staff salaries be increased, effective November 5, 1981, and that the salary budget for 1982 be set at $265,000.

JANUARY 30, 1982

That the PRI Statement of Income ($138,502) and Disbursements ($98,191) for 1981 be accepted.

That the Federation Estimated Statement of Income ($1,227,000) and Expense ($1,139,600) for 1981 be accepted.

That no further action is required to the report of the Federation Ad Hoc Committee on PRI.

With regard to the Southern Society Brochure on Trade Paint Quality, that the Federation:

(1) Accept it as a Federation-sponsored publication.
(2) Consult with attorneys re possible legal liabilities.
(3) Advise NPCA of the action the Federation is taking.
(4) Provide $8,000 in the 1982 budget for printing 100,000 copies; income of $10,000.
(5) Seek cooperation of NDPA in promoting brochure.

With regard to the Correspondence Course being prepared by the University of Southern Mississippi, that the Federation:

(1) Write a letter to USM and express concern over delays in completion.
(2) Ask the Federation attorney to draft a letter to USM stipulating a completion date and a return of all monies paid if the deadline cannot be met.

That the policy of not revealing the news in advance to the annual Heckel Award winner be referred to the 1982 Heckel Award Committee for consideration and recommendation.

That interest in the annual Roon Foundation Awards be stimulated by implementing the four changes cited in the minutes.

With regard to retaining the part-time services of Roy Brown, that:

(1) Mr. Borrelle check with Larry Thomas, of NPCA, to be certain there is no conflict of interest.
(2) The Federation Officers meet with Mr. Brown and ascertain his role with the Federation, and applicable terms.

That the President-Elect's Breakfast Meeting not be held this year at the Annual Meeting.

That plaques be presented annually to retiring members of the Federation Board of Directors and Committee Chairmen.

That the following recommendations of the Finance Committee be approved:

(1) The four recommendations of the Investment Committee be implemented.
(2) JCT and Program Book advertising rates be increased by 25%. (*A few members expressed dissatisfaction that the percentage is too high*).
(3) Annual Meeting *on-site* registration fees be increased by $5.
(4) The Federation appropriate $55,000 to PRI in 1982.
(5) The PRI budget for 1982 be: Income—$178,000; Disbursements—$198,000.
(6) The FSCT Staff Administration charge to PRI be shown as income in the Federation financial report.
(7) The scholarships to five universities, for 1982-83, stand at the previous figure of $15,000; pending a review and evaluation by the Educational Committee.
(8) The Southern Society brochure be added to the 1982 budget: Income—$10,000; Expense—$8,000.
(9) The appropriations for Corrosion Projects in 1982 be increased from $4,000 to $5,000; and the grant to SSPC from $1,000 to $1,500.
(10) The 1982 Operating budget of the Federation be approved at: Income—$1,236,500; Expense—$1,217,960.

APRIL 28, 1982

That $8,000 be added to the Federation appropriation to the Paint Research Institute (from $55,000 to $63,000) to cover the fee of Dr. Seymore Hochberg as a consultant to PRI, April through December 1982. (Dr. Hochberg's travel expenses will be borne by PRI).

That $12,000 be appropriated in a new account (#770) to cover the fee and travel expenses of Royal A. Brown as Technical Advisor to the Federation, March through December 1982.

That the draft of basic duties of the Technical Advisor, as drawn up by the Executive Vice-President, be approved.

That a Federation-sponsored seminar be held at a Midwest location in late April 1983, the city and date to be determined by the Technical Advisor, in cooperation with the Federation staff.

That the 1983 President and spouse (Mr. and Mrs. A. Clarke Boyce) represent the Federation at the Birmingham Club meeting and OCCA Conference in June 1983.

That the Executive Vice-President be authorized to sign all expense checks for Officers and Staff, with the exception of his own.

[*All of the above actions of the Executive Committee at the three meetings listed were approved by the Board of Directors.*]

Old Business

SCHOLARSHIPS

As requested by the Executive Committee, the Educational Committee (on April 16, 1982) reviewed the Federation's Scholarship Program and presented a series of guidelines to the Executive Committee for approval.

These were considered by the Executive Committee on April 28, 1982, and recommended for approval to the Board of Directors as follows:

"(1) Letters of application for funding (not to exceed two pages in length) be received at Federation Headquarters no later than November 1 of the year preceding the academic year to be funded (i.e., November 1, 1982, for the 1983–84 academic year).
"(2) Letters of application for funding be accompanied by a report on FSCT scholarship funds expended the previous year.
"(3) Subcommittee of Educational Committee be established to review annual requests for scholarship funding and submit recommendations on same to the Finance Committee by January 1.
"(4) Scholarship funds be used as grants-in-aid for the coatings technology programs at each school, with preference given to qualified scholarship applicants who are children of Federation members. Priority to be given undergraduate students; schools may, however, provide available funds for graduate students.
"(5) Scholarship Program be administered/coordinated by a member of the Federation Headquarters Staff.
"(6) The Executive Committee shall have final authority for allocation of all scholarship funds."

[*The above guidelines were approved by the Board of Directors.*]

ADDITIONAL SCHOLARSHIP FUNDS

Another recommendation based on discussions at the April 16 meeting of the Education Committee was an increase of the 1982–83 scholarship funding from $15,000 to $18,000, by granting an additional $2,000 to North Dakota State University and $1,000 to Eastern Michigan University. These increases are in recognition of NDSU's current coatings curriculum enrollment, the largest ever, and EMU's excellent new program which has the endorsement of the Education Committee.

The scholarship funds for 1982–83 would therefore be as follows:

North Dakota State University	$6,000
University of Southern Mississippi	6,000
University of Detroit	2,000
Kent State University	2,000
University of Missouri, Rolla	1,000
Eastern Michigan University	1,000

The Executive Committee approved the additional funding of $3,000 and recommended the action to the Board of Directors for approval.

[*The Board of Directors approved the additional funding.*]

CORRESPONDENCE COURSE

Another action of the Executive Committee at its April 28, 1982 meeting was: "That the letter drafted by the Federation attorneys re the Correspondence Course be sent to the University of Southern Mississippi."

The letter, which was distributed at the meeting, set a date of September 1, 1983 for the availability of Volume 1. If the university cannot accept and meet this deadline, then it must refund the Federation monies previously advanced for the course.

[*The Board of Directors approved this action of the Executive Committee.*]

New Business

BONUS FOR MEMBERS OF STAFF

One of the actions of the Executive Committee at its meeting of January 30, 1982 was: "That the question of a bonus for members of staff be reviewed annually at the Executive Committee meeting immediately following the Annual Meeting."

Inasmuch as the method of implementation and applicable guidelines for a bonus plan were not included in the Executive Committee's recommendation, the Board referred the matter back to the Executive Committee for a more complete presentation at the November 2, 1982 meeting.

Committee Reports

CORROSION

The membership of the Corrosion Committee has been expanded to include representation from a broader spectrum of Constituent Societies. Persons have been added from Baltimore, Kansas City, Louisville and Los Angeles, thereby not only attempting to reflect a wider base of interest but also involving more persons in Federation activities. Presently, there are 14 members representing eight Societies.

There have been two meetings of the Corrosion Committee since our last report. A meeting was held at the Federation Annual Meeting in Detroit, on October 28, 1981 and a second meeting was held on March 16, 1982.

Due to time constraints at the Annual Meeting, the October 1981 meeting of the committee consisted of limited discussions regarding Corrosion Committee activities, including sponsorship of a series of papers at the 1982 meeting, possible involvement in the ASTM-SSPC Joint Symposium on Corrosion, scheduled for January 1983, and how to assist in the evaluation of a series of painted panels, originally exposed by the National Association of Corrosion Engineers (NACE). These panels require an organization possessing SEM to examine the coating-substrate interface in order to determine the cause(s) of corrosion and to relate this data with surface preparation as well as environmental conditions. The project had been suggested to PRI but was rejected. Various commercial and university possibilities were suggested and Dean Berger was to follow these up.

At the meeting on March 16, 1982, plans were formulated to sponsor a workshop on the performance of nonlead and nonchrome pigments in both aqueous and non-aqueous coatings. Panel members will include representatives from each of five manufacturers of nonlead, nonchrome pigments, each of whom will be requested to make a 15 minute presentation. The panel moderator will then make a summation and open the discussion to the audience. It is anticipated that this discussion will evoke a significant amount of interest from the convention attendees both because of its timeliness and of this opportunity to hear simultaneous presentations from competitive suppliers.

Additionally, topics were discussed to be recommended for consideration by Society Technical Committees in order to stimulate interest in the field of corrosion. These topics included the following:

(1) Effect of degree of dispersion on the performance of corrosion resistant pigments.
(2) Moisture vapor permeability as a tool to predict corrosion inhibition of water based coatings.
(3) Performance of proprietary, conversion coatings as corrosion inhibiting products when used over rusty steel.
(4) Employment of multi-environment testing (e.g., accelerated weathering *plus* salt spray) to facilitate prediction of corrosion inhibition.

(5) Comparison of ASTM G-23 Weathering Device, with ASTM G-53 Device to predict durability of coatings.
(6) Effect of maximum and minimum power wire brushing on corrosion inhibition. Note: This project will be undertaken by SSPC in the Philadelphia area. Members of the Philadelphia Society Technical Committee are invited to participate.

The program to establish liaison with other organizations has gotten off to a slow start. Letters were written to 14 organizations but, to date, only one, namely the National Bureau of Standards has appointed a liaison person. This program will be followed up.

A meeting of the committee will be held at the Annual meeting in Washington to discuss a corrosion related topic for presentation at the 1983 meeting, as well as to set a date for a one day meeting of the committee, probably in December 1982.

SAUL SPINDEL,
Chairman

DEFINITIONS

At the request of ASTM's Committee on Terminology, I have written a case study of our 13 year volunteer effort with the tautological title: "Writing a Definitive Work for the Coatings Industry: the *Paint/Coatings Dictionary*." This will be presented at an international ASTM sponsored seminar: "Terminology: The Cornerstone of Global Communications Through Standards," to be held in Toronto on July 13, 1982. This may also help our dictionary sales.

STANLEY LESOTA,
Chairman

EDUCATION

The annual Education Committee Luncheon was held during the 1981 Annual Meeting in Detroit.

The meeting was presided over by retiring Education Committee Chairman John Gordon, and attendees included six members of the FSCT Education Steering Committee and representatives from University of Southern Mississippi, Kent State, North Dakota State, University of Missouri-Rolla, and Eastern Michigan.

The Education Steering Committee for the current year is as follows: James A. Hoeck, (Chairman); Ted Favata (Vice Chairman); Donald E. Brody; Carl J. Knauss; and John A. Gordon, Jr.

The Federation Executive Committee has approved a total of $15,000 for the Scholarship Fund for the 1982-83 academic year. The funds are to be used as grants-in-aid for the coatings technology programs at each school, with the stipulation that preference be given to qualified scholarship applicants who are children of Federation members.

The Executive Committee has also approved an appropriation to provide for transportation expenses for a meeting of the Steering Committee with Constituent Society Education Committee Chairmen. The meeting is to be held in Detroit on April 16.

J. A. HOECK,
Chairman

ENVIRONMENTAL CONTROL

Our first committee meeting was held at the Paint Show in October. Six committee members were in attendance. A number of important issues were discussed. One of the major areas was hazardous wastes. We collectively agreed to put together a hazardous wastes questionnaire which we could send to the 26 Constituent Societies to be filled out and mailed back. The information obtained would then be transformed into a newsletter which could be published.

A rough draft of this questionnaire has been written and will be circulated to the committee members for approval and comments. The final draft will be sent to the Societies in midsummer.

Most of the year was spent gathering information and establishing industry contacts. We hope to publish at least one, perhaps two, newsletters before the fall meeting. We will be concentrating our efforts in the next six months on air quality regulations and hazardous wastes. The committee would appreciate receiving any information pertaining to environmental control.

JOHN FITZWATER,
Chairman

LIAISON

The Federation Liaison Committee is charged with promoting communications between the Federation members and paint technologists practicing in other parts of the world.

Our Federation is a member of the International Coordinating Committee, together with OCCA, FATIPEC, SLF, OCCA Australia, and JSCM. In 1979, members of this group agreed in principle to encourage the reprinting of selected papers in each others' technical journals.

Such an exchange of papers will benefit the FSCT, in that it will create an additional source of high quality papers for the JCT, and provide the FSCT members with information on coatings developments in other parts of the world.

Your Liaison Committee is assuming the lead in this international effort, and at a December 11, 1981 meeting addressed the procedural problems involved in nominating papers, having them reviewed for quality, attaining approval for reprinting, etc.

Following that meeting, members of the Liaison Committee nominated a number of papers from foreign journals, to be considered for publication in the JCT.

At the March 18, 1982 meeting of the Federation Publications Committee, this project was discussed. The Publications Committee heartily endorses the project and will cooperate with the Liaison Committee to see that this worthwhile idea becomes a reality.

JOHN J. OATES,
Chairman

MANUFACTURING

The Federation Manufacturing Steering Committee met March 2, 1982 in Chicago. The committee has been expanded, including new members from many Constituent Societies who have not been represented in recent years. The attendance at the meeting, despite an overnight snowfall, was excellent. A full agenda was covered during the meeting.

The prime topic of discussion was planning for the Manufacturing Committee Seminar at the Annual Meeting in Washington in November. By unanimous agreement, the committee agreed on a presentation concerning the current state of computer applications in paint and coatings manufacturing. The committee refined their program into four subject areas: (1) Process Control; (2) Color Control; (3) Quality Control; and (4) Resource Allocation.

Speakers are now being actively pursued to address those topics. According to Tom Kocis, the Program Committee will also offer a workshop session on computers at the Annual Meeting and the two committees will coordinate their efforts to produce a cohesive program. In addition, Chairman Max will attend the upcoming June 14th Golden Gate Society Manufacturing Committee Seminar on computers as a Federation representative.

The Manufacturing Committee audio-visual program was also reviewed. The New York Society slide/tape program on mini-media mills is now a part of the Federation catalog and was shown in their booth in Detroit. A list was prepared of

suggested topics for future A/V programs and will be circulated to local Society Manufacturing Committee chairmen.

Other topics discussed were the maintaining and improving of Federation/Society liaison regarding manufacturing activities. A list of current Society projects will be compiled and distributed to all local Society chairmen. Another item discussed was the publishing, from time to time, of a Manufacturing Committee Newsletter. This will update members on activities and provide information on current, relevant items of interest on manufacturing topics in the industry. Also discussed were the establishment of a Manufacturing Committee Speakers Bureau and the possibility of holding a mid-year one-day national seminar on a manufacturing topic, possibly in Spring 1983.

A plant tour and critique for Manufacturing Steering Committee members and local Society Manufacturing Committee chairmen is being planned for Tuesday, November 2nd in conjunction with the Annual Meeting.

It is with regret that the Manufacturing Committee accepted the resignations of two of its members and former chairmen. Carroll Scholle, of Chicago, and Gene LeVea, of Western New York, have served with distinction for many years and their contributions will be missed.

RICHARD E. MAX,
Chairman

MEMBERSHIP

Once again, with the convening of this Board of Directors meeting we reach the mid point in our fiscal year and it presents an opportunity to take stock of our membership status and how it compares to previous years. These figures are based on the 1980, 1981, and 1982 yearbooks and therefore represent the status as of February 1 of each year. An analysis this year is particularly difficult due to the unavailability of figures from one Society, the Southern Society, at the time the figures were compiled. The Southern Society has shown a consistent growth in membership in the last few years and was complimented for its increase of 66 members last year. For comparison purposes using last year's Southern Society membership data should keep our comparisons on the conservative side. On that basis, we note the following:

(a) The overall membership has increased approximately 1.8% to a total of approximately 6733 in 1982.
(b) The number of Active Members remains approximately the same as for 1981.
(c) There has been an increase of approximately 1% in Associate Members and 1.1% in "Other Members."

This year, four Society Membership Chairmen should be singled out for "Atta Boy" awards for having a total membership increase in their Societies of 20 or more persons. They are:

Helen Skowronska, Cleveland Society; increased membership from 348 in 1981 to 381 in 1982.

Donald Montgomery, Houston Society, increased membership from 164 in 1981 to 188 in 1982.

Lloyd Haanstra, Los Angeles Society, increased membership from 527 in 1981 to 570 in 1982.

Gilles Bernicky, Montreal Society, increased membership from 249 in 1981 to 302 in 1982.

Accolades also go to other Societies showing an increase in membership in 1982. They are: Baltimore; Birmingham; CDIC; Detroit; Louisville; Mexico; New York; Northwest; Piedmont; Toronto; and Western New York.

Last year, the Federation Membership Committee distributed lists totalling approximately three hundred prospective members, sorted by geographical location, to individual Society representatives at the Spring Board of Directors meeting. These were hand sorted by the Federation and Membership Committee from the names of approximately one thousand non-members attending the Atlanta Convention. This year we hope to have a computer read out for each Society Representative. It is hoped that each Society Membership Chairman will arrange to have prospective members in the area contacted for possible membership.

Since September, the Federation Staff has been sending a letter of welcome to each new member whose application they receive, explaining the benefits of Federation membership.

A. GORDON ROOK,
Chairman

PROGRAM

Serving on the 1982 Annual Meeting Program Steering Committee are: Peter Hiscocks—Vice Chairman (Toronto); Steve Crouse (Rocky Mountain); Loren Hill (New England); Bob Modrak (New England); Tom Ruland (Houston); Gary Van de Streek (Detroit); Gus Leep (Chicago); and John Ballard-Chairman (Louisville).

Committee members met initially in Detroit on October 28, in conjunction with the 1981 Annual Meeting; discussions included suggestions for a theme and proposals for symposium topics.

The Committee met again in Chicago on December 8 for a full day of discussions. The theme selected for the 1982 AM is "Quality Designed/Confidence Renewed," focusing on the need for upgrading product quality, which is perceived as being vital to renewing customer confidence in coatings of all types.

Two symposia are planned which address various aspects of the theme, "Insuring Quality Management and Technology Through Computer Utilization," and "Designing Quality Through Use of Scientific Instrumentation."

The Manufacturing Committee has proposed a seminar on computer use in manufacturing applications, which would be a follow-up to the symposia presentation, and the Corrosion Committee is planning a session on performance of non-chromate pigments in aqueous and nonaqueous systems.

The Paint Research Institute has advised that it will present its traditional Annual Meeting seminar.

In addition, an abundance of entries in the 1982 competition is reported by the Roon Awards Committee, five Societies have advised that they will present papers, and the Technical Information Systems Committee has proposed a session on information retrieval.

Meanwhile, a number of prospective speakers have responded to our call of papers, and their submissions are being reviewed by the Committee.

All of the above are in addition to the Keynote Address and the Mattiello Lecture, and provide the Committee with the pleasant problem of dealing with a plentitude of programming material.

Concurrent sessions will be scheduled to accommodate the presentations, and we look forward to an interesting and informative program for the Annual Meeting.

JOHN C. BALLARD,
Chairman

PUBLICATIONS

A joint meeting of the Publications Committee and Editorial Review Board was held in Philadelphia on March 18, 1982. A number of key issues were addressed:

- Review Procedures. Guidelines for reviewers with examples of good and unsatisfactory reviews were presented. Suggestions for improving the Review Procedure were made and will be acted upon.
- Several new additions were made to the Editorial Review Board to provide for attrition and to balance our technical needs.

- An incidence of plagiarism has arisen, was discussed and corrective steps outlined to prevent future incidents.
- Efforts will be made to upgrade manuscript titles to conform to subject matter and be consistent with indexing procedures.
- Roon Award papers have been given renewed attention this year and should provide a good supply of manuscripts.
- Foreign journal articles will be sought out for reprinting in JCT.
- Federation booklets require rewriting. Two booklets are in preparation now. A subcommittee was set up to develop guidelines for revising existing booklets. Report is due June 15, 1982.
- A color comments column will be initiated.
- "Humbug from Hillman" will continue.
- A Federation sponsored symposium will be a definite future event.

THOMAS J. MIRANDA,
Chairman

ROON AWARDS

Through discussions and the efforts of the committee members, several changes have been and will be made regarding the Roon Awards Competition. A number of announcements and editorials which appeared in JCT and in the American Paint Journal significantly increased the publicity regarding the Roon Awards. Consequently, 23 notices of intent and abstracts have been received thus far—a tremendous response! In addition, we are looking forward to seeing many of these papers presented at the Annual Meeting. The names of the winners and the titles of the papers will also be published in the Program Book for the Annual Meeting.

DARLENE BREZINSKI,
Chairman

TECHNICAL ADVISORY

Meeting activities accelerated during the year, with a mini-meeting held at Detroit during the Annual Meeting. The regular spring meeting of all Society Technical Directors and the Technical Advisory Committee was held in St. Louis, March 25–26. Focus of this meeting was on the PRI-Constituent Society relationship, particularly as pertains to technical projects for the locals. Excellent communication on PRI reorganization and structure took place, with the involvement of Ruth Johnston-Feller, who tabulated results of Society interests expressed in a PRI questionnaire; from Colin Penny, recapping Mildew Consortium work and society involvement in the "biomer" evaluation, as well as mildew samples for Paul Klens; and from Darlene Brezinski, who represented the Publications Committee, on the writing of technical papers, as well as PRI business. Roy Brown, formerly of NPCA, also gave valuable input at the meeting.

Eighteen Societies were represented at the St. Louis meeting, which included a session on suggested society projects as determined by the participants. Other suggestions were received from the Corrosion Committee by Saul Spindel, and the Manufacturing Committee by Richard Max, both members of the TAC. Further coordination of "biomer" distribution, a computer newsletter, possible centralization of a data bank for raw material properties, and a directory of society projects were discussed as items for further action.

WILLIAM F. HOLMES,
Chairman

TECHNICAL INFORMATION SYSTEMS

Technical Information Systems Committee members are engaged in: preparing the JOURNAL OF COATINGS TECHNOLOGY column, "Technical Articles in Other Publications," a compilation of contents of current coatings periodicals; compiling a list of available foreign language coatings dictionaries, both from English into the foreign language and from the foreign language into English; and planning and participating in a two-hour session, with a theme of "Technical Information Sources and Services for the Coatings Industry—An Update," for the Federation's 1982 Annual Meeting.

Committee members have completed Annual Subject/Keyword Index to 1981 issues of the JCT, published in the December issue.

HELEN SKOWRONSKA,
Chairman

DELEGATE TO IUPAC

David Lovegrove, of the Birmingham (England) Club, represented the Federation at the October 1–2 meeting in Sassenheim.

The meeting was held under the auspices of the Supported Polymer Film (SPF) Group, Macromolecular Division (MMD) of the International Union of Pure and Applied Chemistry (IUPAC). Professor L. Dulog is the current chairman of SPF/MMD/IUPAC. Mr. Lovegrove considered the meeting to be an excellent one. The minutes will be published in the May issue of JCT. [*Published in May 1982 JCT, p. 20—Ed.*]

It was hoped that a regional meeting of the SPF Group could be held in July in conjunction with the 28th Macromolecular Symposium of IUPAC at the University of Massachusetts in Amherst. However, conflict with the annual Athens Symposium, plus the high registration charges for the Amherst meeting ($140 minimum!) caused the committee to drop plans for such a regional meeting.

MILTON A. GLASER,
Delegate

DELEGATE TO SSPC

The annual meeting of the Steel Structures Painting Council was held at the Pittsburgh Airport Holiday Inn on March 9–11, 1982. A total of 141 attended, of which 39 (28%) are members of the Federation.

A total of 23 meetings were held. Among the 23 chairmen, 13 (57%) are Federation members as are 11 (48%) among the 23 secretaries at these meetings (some held both positions at their meetings).

GENERAL MEETING—Chairman—J.C. Murphy, President; Secretary—John Keane, Executive Director (Pittsburgh).

SSPC now has 15 supporting members representing interested industry associations, including the Federation, and 71 patron members representing material suppliers and users of coatings, both private and government.

The completely rewritten Volumes 1 and 2 have been completed and are in print. Advance orders are being accepted at $78 per set.

A new Mellon Institute Coatings Center is proposed to undertake basic and applied research, both proprietary and non-proprietary. It will be headed by a proposed Director of both the Center and of Development for SSPC.

The "Losolve" report on "Evaluation of Low Solvent Maintenance Coatings for Structural Steel," conducted for the Federal Highway Administration, has been completed. It is being printed by FHwA and should be available soon.

Highway Bridge Painting—Dr. Bernard R. Appleman (Baltimore) is leaving FHwA. His successor is Dr. Lloyd Smith who will supervise the many projects in progress. (See Federal Bridge Painting Research below.)

U.S. Navy—The U.S. Naval Civil Engineering Labs in Port Hueneme, CA is cooperating with SSPC in relating profile to coatings adhesion, panel exposures on Kwadjalein Island and in the PACE program.

ILZRO—The International Lead Zinc Research Organization is supporting SSPC studies of the effect of zinc level in zinc-rich paints and the topcoating of zinc-rich primers.

AISC—The American Institute of Steel Construction is revising their Guide to Shop Painting in cooperation with SSPC.

NACE—Kenneth B. Tator (Pittsburgh) announced the next meeting of the National Association of Corrosion Engineers at Houston on March 21-26, 1982.

ISO—The International Standards Organization is carrying out studies on Surface Preparation with emphasis on profile and surface contamination.

ASTM—Committee D-1 of the American Society for Testing and Materials and SSPC are holding a joint meeting at the Dutch Inn in Orlando, FL on January 23-37, 1983. A seminar on "New Concepts for Coating Protection of Steel Structures" will be held on January 25 following the Committee D-1 meeting and preceding the SSPC meeting. Prospective speakers are requested to submit an abstract of 300-500 words or contact SSPC for details.

NEW SPECIFYING METHODS—Chairman—Robert J. Martell (New England); Secretary—F. Rideout.

The Florida and Michigan Departments of Transportation procedures for evaluating and qualifying paint systems from prospective suppliers were described in detail. A permanent committee will be formed to investigate these approaches for possible use in developing SSPC specifications.

SURFACE PREPARATION—Chairman—K. Trimber; Secretary—A. Mallory.

B. Appleman reviewed the SSPC/MARAD study on "New Surface Preparation Methods" and the chapter in the new Volume I on "New Alternative Methods." These include wet blast, water blast, air-water-sand blast, water curtain, carbon dioxide, ice pellet and zinc shot blast, and controlled cavitation.

J. Keane reviewed the SNAME problem of removing preconstruction primers prior to application of the final coating system.

D. Berger described Surface Profile Comparators being evaluated by NACE-ISO working groups. A 4 segment comparator is preferred to the 3 segment comparator suggested by ISO. R. Allen stated that ISO has tentatively established 40, 80, and 120mm as definitions of Fine, Medium, and Coarse profiles. A specification for Manual and Mechanical Methods of Surface Preparation is being prepared by the U.S. group.

A draft specification on "Bright Metal Power Tool Cleaning" is under review. This can be considered for use in the PACF program. The following methods may be considered in 3 grades of cleaning: Grinding wheels, Needle guns, Non-woven abrasives, Power wire brushes, Rotary captive shot-peening, and Coated abrasive discs.

A task group was formed to develop a specification on nonmetallic abrasives. Another was formed to develop a specification on various types of wet blast cleaning.

WATER-BORNE EPOXY PAINTS—Chairman—Dr. Edward G. Bozzi (New York); Secretary—B. Carlozzo.

J. Bruno reviewed the PACE results on water-borne epoxy coatings. Salt fog panels have completed 10,000 hours of exposure. Field exposure panels are ready for exposure in three locations.

Rough draft specifications for a primer, topcoat and paint system will be prepared based on the salt fog results.

NEW SSPC PUBLICATIONS—Chairman—Sidney Lauren (Cleveland); Secretary—H. Hower.

The following publications were recommended as possibilities: Proceedings of seminars such as the one in Orlando; Monographs on special subjects such as power tool cleaning; An inspector's handbook; and A comprehensive index to SSPC publications.

SPECIFIERS CHECKLIST—Chairman—A. Levy; Secretary—F. Couch.

A Levy described the concept of the checklist format using Specification SSPC PS1.01 as an example.

A task group was formed to prepare such a checklist for all SSPC specifications.

WATER-MISCIBLE COATINGS—Co-Chairmen—David B. Norby (Western New York) and C. Dukes; Secretary—Walter J. Kurnik (Louisville).

Performance parameters for testing water-miscible coatings were reviewed and agreed upon for initial screening of samples to be submitted for test. Suppliers will be asked to submit complete paint systems, i.e., primer plus topcoat.

PAINT APPLICATION & THICKNESS—Chairman—F. Couch; Secretary—D. Graham.

The following specifications have been issued and will appear in the new Volume 2: SSPC-PA1—"Shop, Field and Maintenance Painting"; SSPC-PA2—"Measurement of Dry Paint Thickness with Magnetic Gages."

The following draft standards will be prepared: Destructive type thickness gages, e.g., Tooke and Battery operated digital thickness gages.

A task group was formed to investigate maximum film thickness.

PACE II—EVALUATING ECOLOGICAL ALTERNATIVES—Chairman and Secretary—Dr. Bernard Appleman (Baltimore).

J. Bruno described the major branches of PACE II:

(1) *Alternate Coatings*— This branch contains 1,500 panels of 74 coatings varying from 25 alkyd to 2 vinyl. It includes 39 coatings from raw material suppliers, 15 from paint manufacturers, 13 controls and 7 miscellaneous.
(2) *Water-Borne Epoxy*—This branch includes 45 coatings from paint manufacturers and 15 from raw material suppliers.
(3) *Coatings Over Existing Coatings*—5-10 new coatings and 1 control will be applied on weathered Alkyd-BLSC coated angle iron specimens.
(4) *New Surface Preparation*—This branch includes new power tools, citric acid and wet abrasive blasting.

Additional efforts are needed to solicit or even purchase suitable proprietary coatings for the Alternate Coatings evaluation.

The State Highway Advisory Committee on PACE II will meet in September during the SSPC meeting week. They will review results to date and recommend additional coatings and exposure sites.

The following state DOTs are carrying out programs which supplement the PACE program: Michigan; Georgia; Florida; and California.

CHLORINATED RUBBER PAINTS—Chairman—Henry R. Stoner (New York); Secretary—R. Wint.

Painting System Guide SSPC-15.00 and four new painting systems were reviewed.

A Field trip in May 1982 is planned to investigate the use of Chlorinated rubber paints by the Baltimore Gas and Electric Co.

A new project on developing a high build (4-6 mils per coat) paint system was initiated.

Pace II includes paint systems pigmented with zinc chromate, Oncor, Nalzin, iron oxide, ferrous phosphate, and molywhite. If all weather well, it will be possible to use some of these paint systems in potable water tanks.

OTHER LATEX PAINTS—Chairman and Secretary—Arnold J. Eickhoff (New York).

The following specifications have been approved: Latex Metal Primer; Latex Metal Topcoat; and Latex Metal Paint System.

Three raw material suppliers and three paint manufacturers will supply specification latex paints for inclusion in the PACE program.

URETHANE COATINGS—Chairman—D. Hergenrother; Secretary—Donald Eritano (Pittsburgh).

Exterior exposure tests will be run in accordance with recommendations by J. Keane and J. Bruno. Chemical spot and mechanical abrasion tests will be run to coincide with SSPC procedures. Recoatability tests will be run after 30 days and one year of exposure after: (1) Light sanding; (2) Solvent wipe; and (3) Water detergent wash and rinse.

Two samples will be accepted from each cooperator. Raw material suppliers should also supply complete formulations. Paint manufacturers should supply only commercial products.

PACE III—EVALUATE PROPRIETARY PAINTS—Chairman—Sidney Lauren (Cleveland); Secretary—Sidney B. Levinson (New York).

The following conclusions were reached as a result of the discussion at the meeting:

(1) PACE III is worthwhile and should be initiated.
(2) PACE III should be an extension of PACE I and II using some of their controls.
(3) Proprietary paint suppliers should subsidize the evaluation.
(4) Their submitted coatings will be coded but they will be asked to supply product numbers unless they object to doing so.
(5) It may be necessary to use upgraded controls.

A task group was formed to organize the project.

COAL TAR PAINTS—Chairman and Secretary—Henry R. Stoner (New York).

The coal tar epoxy paint and guide specifications have been finalized and will be included in Volume 2.

A new study to be considered is the effect of excessive film build (40 + mils dft) on coating performance, especially on concave surfaces.

Two specifications, MIL-C-15203D and MIL-C-18480B (coal tar emulsion and coal tar solvent) sent in by the Navy will be reviewed for possible development as an SSPC specification.

FUTURE MEETINGS & SEMINARS—Chairman and Secretary—Dean M. Berger (Philadelphia).

The following meetings were suggested: On one specific topic, e.g., Surface Preparation; and By authors of the chapters in Volume 1.

SSPC should also prepare talks which can be presented by members at meetings of NACE, AIA, CSI and ASME.

GOVERNMENT RELATIONS—Chairman—Sidney B. Levinson (New York); Secretary—Sidney Lauren (Cleveland).

Some government agencies wish to be able to purchase directly from paint manufacturers without the use of their specifications. However, since some quality control is necessary, SSPC has been approached to prepare equivalent SSPC specifications which can be used instead.

The following conclusions were reached after discussion on the topic:

(1) SSPC should consider acceptance of responsibility for development and custody of specifications on a specification-by-specification basis.
(2) A fee should be imposed for doing so.
(3) Mellon Institute/SSPC should NOT undertake to do routine testing of paints purchased for government use to replace the government laboratories which have been closed down.

MAINTENANCE PAINTING—Chairman—M. O'Connor; Secretary—James R. Courtright (Philadelphia).

The contents of SSPC-PA Guide 4 were reviewed. A task group was formed to collect available information for the development of a maintenance repainting guide.

ZINC RICH PAINTS—Chairman—Kenneth B. Tator (Pittsburgh); Secretary—J. Ignatow.

Specifications SSPC-Paint 20 "Zinc Rich Primers" and SSPC-PS12.01 "One Coat Zinc-Rich Painting System" have been issued.

Zinc-Rich Performance Specifications: 60 to 70 coatings forming 35 paint systems will be exposed by SSPC.

Topcoating Zinc-Rich Primers: A draft guide has been prepared and is in circulation for review.

FEDERAL BRIDGE PAINTING RESEARCH—Chairman and Secretary—Dr. Bernard R. Appleman (Baltimore).

B. Appleman reviewed the progress of the various FHwA contracts on bridge painting.

(1) Improved Field Reliability of High-Performance Coating Systems—Georgia Institute of Technology is nearing completion of Phase I investigating quality control tests for zinc-rich and water-borne coatings, application and contracting practices, and zinc-rich failures.
(2) Coatings for Non-Blast Cleaned Highway Metals—Management and Technology Associates will investigate three major surface conditions: chloride-contaminated rust, sulfate contaminated rust and oil/grease.
(3) Improved Short-Term Evaluation Procedures for Coatings—The National Bureau of Standards is applying reliability analysis for short-term evaluation of coating performance. Thermography is being investigated as a tool for early detection of coating failure.
(4) Weathering of Coatings in the Field—This is proposed for 1983. A major task is to develop a procedure to determine the condition and soundness of existing paint in order to establish criteria for repainting and for selecting coatings.
(5) New Techniques and Applications in Surface Preparation—The following will be investigated: Cavitating water jets; Wet abrasive blasting; and Removal and recovery of lead based paint.

REGULATIONS—Chairman—W. Johnson; Secretary—W. Stanford.

The following regulations are in effect:

(1) Lead: Personal protection, i.e., air masks may be used. No limit yet on "lead free."
(2) Chromates: Particulate matter regulation in effect; Chromates still questioned re toxicity.
(3) VOC: EPA regulation in effect; Safety data sheets required.
(4) Free Silica: Regulations on sand blasting in effect; Some allow face masks.
(5) Safety in Painting: A painting guide would be beneficial; EPA and OSHA regulations in effect but being relaxed; ASTM Comm. D-33 is preparing a safety kit.

New York State has new regulations on coating potable water tanks which are difficult to follow because of required extraction tests and pigment analysis.

SILICONE-CONTAINING COATINGS—Chairman and Secretary—W. Finzel.

The heat-resisting guide will be circulated to members of the committee. Work will begin on Water-Reducible Silicone Alkyds and updating SSPC-Paint 21 "White or Colored Silicone Alkyd Paint."

LEVEL OF ZINC IN ZINC-RICH PAINTS—Chairman and Secretary—G. Evarts.

Committee will investigate:

(1) Various levels of zinc from 92% down.
(2) Extenders will be investigated at various levels between 6 and 50%: Aluminum, Busan, Zinc phosphate, Zinc molybdate, Zinc oxide, Calcium silicate, Miox, Mica, Barytes, and Ferrophos.
(3) Binders will include two organic and two inorganic.
(4) Tests will include: Bullet hole; Salt fog; Exposure.

(John D. Keane, Joseph Bruno, and Kitti Condiff are to be highly commended for their excellent organization of every phase of this meeting.)

SIDNEY B. LEVINSON,
Delegate

DELEGATE TO NACE

The annual meeting of the National Association of Corrosion Engineers took place during the week of March 22–26, 1982, at the Albert Thomas Convention Center, Houston, Texas. As usual, an extremely varied program of conferences, symposia, technical committee meetings, and exhibits, was offered on numerous topics related to corrosion, out of which coatings is only one.

This year there were two symposia of direct interest to coatings, the first one was entitled "Economics of Corrosion Protection with Coatings," sponsored jointly by Committee T-3C, which is concerned with the study of economics of corrosion, and T-6, on "Protective Coatings and Linings." The symposium had several interesting papers, such as "Evaluation of Bridge Corrosion Cost Computer Model," "Louisiana: A Testing Ground for High-Performance Coatings for 19 Years," "Probability Functions in Corrosion Economics," "Avoid Unnecessary Costs Through Proper Specifications," "Coatings Work Costs and Estimating," "Managing a Maintenance Painting Program to Reduce Costs," and "The Many Factors Affecting Coatings Economics."

The second symposium was sponsored solely by the T-6 Committee, and included papers on "The Promising Future of Zinc-Coated Abrasives," "Coating Failures," "Centrifugal Wheel Blast Cleaning," "Selecting and Purchasing Paint Based on Pigment Volume Concentration," "Urethane Coatings," "The Performance of Coatings Applied Under Adverse Conditions," and "High-Performance Coating Systems Over Non-blasted Surfaces."

Numerous other papers in other symposia, although not so directly related to coatings, were of considerable interest, especially in specific problems such as atmospheric, underground, underwater, or pipeline corrosion.

Just as the FSCT has working Committees, NACE has Technical Groups, which study specific corrosion-related topics. There were numerous meetings of committees and subcommittees of Group T-6, involved primarily with protective coatings and linings. Among those meeting in Houston were:

T-6A on coatings and lining materials for immersion service,

T-6G which is studying topics related on surface preparation for protective coatings,

T-6G-12 which is evaluating visual standards for centrifugally blasted clean surfaces,

T-6G-19 which is developing techniques and procedures for field measurement of surface profiles on metal,

T-6G-22, studying the surface preparation of contaminated metal surfaces,

T-6H, concerned with coating materials for atmospheric service,

T-6H-15 which studies the effect of surface preparation on service life of protective coatings, and

T-60 which is developing information on the quality assurance of protective coating materials and their application.

While all of these groups and committees do a praiseworthy job, it is my feeling that the work being undertaken by T-6H-15 is unique and especially remarkable because of the thorough experimental design, meticulous execution, long-term follow-up, and statistical treatment of the data obtained. Every facet of the work of T-6H-15 reveals superior technical quality, and thus it is likely that its reports and conclusions will become the definitive study on the subject for many years.

It should be pointed out that although these technical committee meetings cover a variety of subjects under their respective general topics, the context of these meetings is generally limited to the reporting and approval of conclusions reached by the same committee during what is called the "Fall Committee Week." During these fall committee meetings, most of the actual discussion and consensus is developed in a smaller setting, more conducive to reaching conclusions than large committee meetings. Therefore, the Fall Committee Week is a more appropriate environment for those interested in the discussion and drafting of documents. The attendance to these meetings is open, and anybody interested in participating will be cordially received. The 1982 Fall Committee Week will be held on September 13–17 in Dallas.

Also during CORROSION '82 there was a meeting of the U.S. Technical Advisory Group (TAG) to the International Organization for Standardization (ISO) TC 35/SC 12, which has the charter to develop a document achieving international consensus regarding the "Preparation of Steel Substrates Before Application of Paint and Related Products." There are three working groups, which study specific topics: (1) surface profile; (2) surface cleanliness; and (3) methods of evaluation. These groups had met the preceding week for discussion, and the corresponding chairmen reported to the TAG on progress achieved.

As usual, CORROSION '82 was enriched by an exhibit which provided an opportunity to learn the latest offerings of industry in the field of corrosion evaluation, monitoring, and protection. Taking place in NACE's own hometown, as well as home of many energy- and chemical-related companies, the meeting was a strong reaffirmation of the vigor and health of NACE and the corrosion community.

THOMAS GINSBERG,
Delegate

The next meeting of the Board of Directors will be held on Tuesday, November 2, 1982, at the Sheraton Washington Hotel, Washington, D.C.

Proposed Amendments to Federation By-Laws and Standing Rules

Following is the report which the By-Laws Committee will present to the Federation Board of Directors at their meeting of November 2, 1982, in Washington, D.C.

TO BE PRESENTED FOR ADOPTION

The following amendment to the By-Laws was given first reading at the April 30, 1982 Board of Directors meeting and will be presented for adoption on November 2.

Article IV—Nominations and Elections

A. (2) NOMINATIONS

WHEREAS the monthly publication date of the JOURNAL OF COATINGS TECHNOLOGY has been advanced and this earlier publication date makes it impossible to meet this By-Laws' requirement of reporting nominations for elective offices in the *July* issue, be it

RESOLVED that By-Laws Article IV, Section A, Paragraph (2) be amended as follows:

"(2) The report of the Nominating Committee shall be announced at the Spring Board of Directors meeting, after which it shall be published in the August issue of the JOURNAL OF COATINGS TECHNOLOGY. Nominations for any elective office may also be made from the floor, by any Society Representative at the Fall Board meeting, prior to the election of Officers, or by a petition signed by 25 Active Members and forwarded to the Federation Executive Vice-President in time for publication in the August issue of the JOURNAL OF COATINGS TECHNOLOGY.

"The Federation Executive Vice-President shall place such nominees-by-petition in nomination at the annual election meeting of the Federation Board."

Comment: The By-Laws Committee recommends adoption.

★ ★ ★ ★ ★ ★

TO BE PRESENTED FOR FIRST READING

The following amendment to the By-Laws will be presented for first reading on November 2.

Article IV—Nominations and Elections

A. (2) NOMINATIONS

WHEREAS the Baltimore Society has requested that nominations for Federation elective offices be permitted from the floor at the Spring Board of Directors meeting, be it

RESOLVED that By-Laws Article IV, Section A, Paragraph (2) be amended as follows:

"(2) The report of the Nominating Committee shall be announced at the Spring Board of Directors meeting. Nominations for any elective office may also be made from the floor by an Society Representative at the Spring meeting, or by a petition signed by 25 Active members and forwarded to the Federation Executive Vice-President in time for publication in the August JOURNAL OF COATINGS TECHNOLOGY, in which the slate of nominees shall be published. The Federation Executive Vice-President shall place such nominees-by-petition in nomination at the Fall meeting of the Federation Board.

"(3) Nominations for any elective office may also be made from the floor by any Society Representative at the Fall Board Meeting, prior to the election of Officers."

Comment: The By-Laws Committee recommends adoption.

★ ★ ★ ★ ★ ★

TO BE PRESENTED FOR ADOPTION

The following amendment to the Standing Rules will be presented for adoption on November 2.

Article SR I—Constituent Societies

B. CONSTITUENT SOCIETY BOUNDARIES

WHEREAS the Montreal Society has requested the addition of New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland, and Labrador to its boundaries, be it

RESOLVED, that the Standing Rules be revised as follows:

"*Montreal Society*—All of the Canadian Provinces of Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland, and Labrador, and that part of Ontario within a 125-mile (200 km) radius of Montreal."

FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY
1982 ANNUAL MEETING AND PAINT INDUSTRIES' SHOW
SHERATON-WASHINGTON HOTEL, WASHINGTON, DC
NOVEMBER 3, 4, 5
(Wednesday, Thursday, Friday)

APPLICATION FOR HOTEL ACCOMMODATIONS

MAIL TO: **Fed. Socs. Coatings Tech.**
1315 Walnut St.—Dept. H
Philadelphia, PA 19107

Please indicate below the type of accommodations requested and choice of hotels. All reservations will be processed by the Housing Bureau of the Washington Convention & Visitors Assn. Hotel assignments will be made in accordance with prevailing availability. The Housing Bureau will send you an acknowledgment, noting the hotel to which you have been assigned. The confirmation of your reservation will come to you directly from the hotel, to whom you must direct all inquiries. No reservations at cooperating hotels can be guaranteed after October 4.

TYPE OF ACCOMMODATION	NUMBER	RATE REQUESTED
Single (1 person)		
Double (2 persons)		
Twin (2 persons)		
Suite (parlor and 1 bedroom)		
Suite (parlor and 2 bedrooms)		

CHOICE OF HOTELS:
1st
2nd
3rd
4th

NAMES AND ADDRESSES OF ROOM OCCUPANTS AND DATES OF ARRIVAL/DEPARTURE

Type of Room	Name	Address	Dates Arrive	Depart

Please Type Additional Reservations on a Separate Sheet and Attach to This Form

SEND CONFIRMATION FOR ALL RESERVATIONS TO:

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE _____

Note: Requests for accommodations at the Sheraton Washington will be limited to seven rooms per company. A parlor counts as one room.

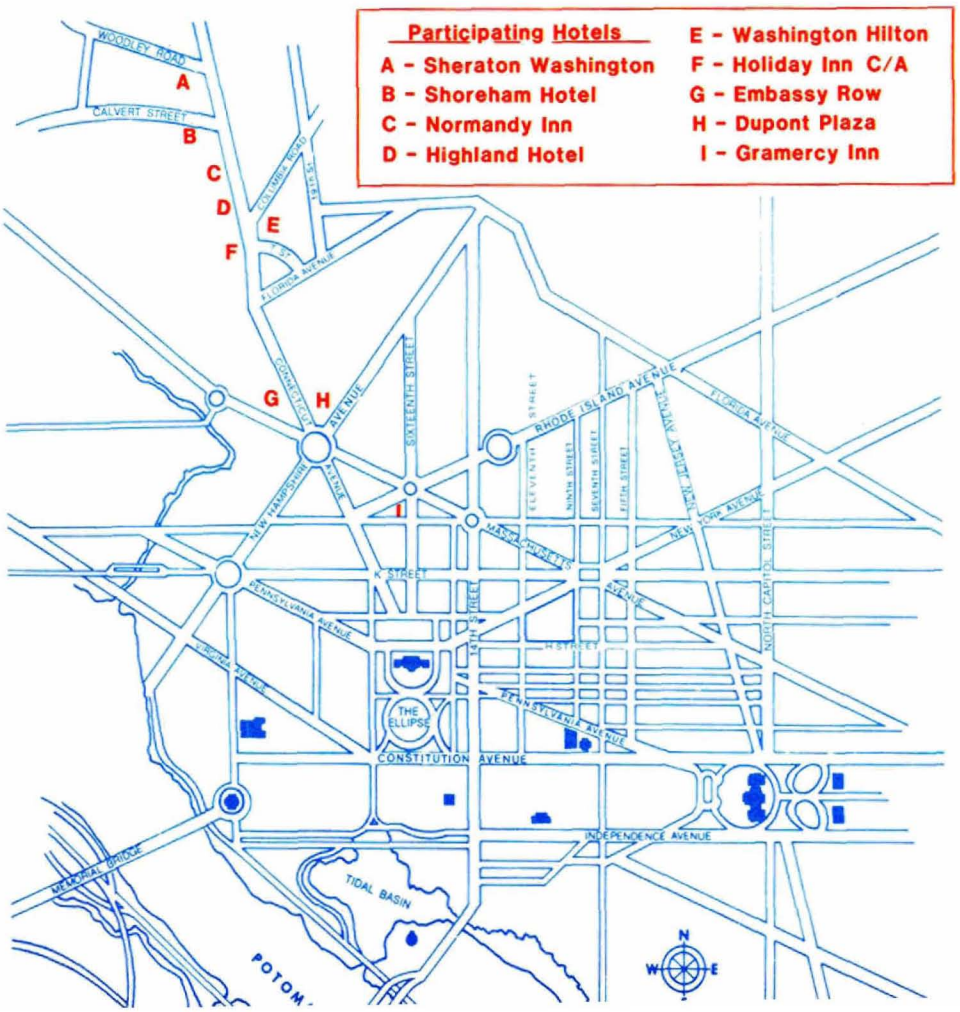
HOTEL INFORMATION AND RATES

All room rates in Washington, DC are subject to an additional Sales Tax of 10%, and .80¢ per night, per room occupancy tax.

Hotel	Singles	Doubles Twin	Parlor & 1 Bedroom	Parlor & 2 Bedrooms
SHERATON WASHINGTON* (see below)	$81/90/95	$95/105/109	$180/240 260/275	$265/325 345/360
SHOREHAM	$75/80	$87/92	$125/200	$225/400
WASHINGTON HILTON† (see below)	$60/80/90 100/110	$78/98/108 $118/128	$198/378 478	$326/506 606
DU PONT PLAZA	$65/76	$85/95	$170/200	$240/270
GRAMERCY INN	$64	$74	$130	—
EMBASSY ROW	$95	$115	$175	$250
HIGHLAND	$60/70	$80	$100	—
HOLIDAY INN	$57	$65	—	—
NORMANDY INN	$56	$66	$120	—

*Requests for accommodations at the Sheraton Washington will be limited to seven rooms per company. A parlor counts as one room. Additional reservations will be assigned to other cooperating hotels.

†Reservations for the Washington Hilton will be accepted for arrival beginning Wednesday, November 3, only.



PLEASE PRINT EXACTLY as you wish registration badge prepared

NICKNAME

FIRST NAME LAST NAME

BUSINESS AFFILIATION

STREET

CITY STATE *(U.S. only)*

ZIP (U.S. or CANADA) COUNTRY (OTHER THAN U.S.)

Name of the Federation Society Of which you are a paid member _____

PLEASE CHECK ONE BLOCK IN EACH CATEGORY

YOUR COMPANY *(Check One)*:

- A ☐ Manufacturers of Paints, Varnishes, Lacquers, Printing Inks, Sealants, etc.
- B ☐ Manufacturers of Raw Materials
- C ☐ Manufacturers of Equipment and Containers
- D ☐ Sales Agent for Raw Materials and Equipment
- E ☐ Government Agency
- F ☐ Research/Testing/Consulting
- G ☐ Educational Institution/Library
- H ☐ Paint Consumer
- J ☐ Other

YOUR POSITION *(Check One)*:

- A ☐ Management/Administration
- B ☐ Manufacturing and Engineering
- C ☐ Quality Control
- D ☐ Research and Development
- E ☐ Technical Sales Service
- F ☐ Sales and Marketing
- G ☐ Consultant
- H ☐ Educator/Student/Librarian
- J ☐ Other

***Special registration for Retired Federation Members and their spouses $20.00 each in advance only.**

IMPORTANT: **REGISTRATION AND FULL PAYMENT MUST BE IN THE FEDERATION OFFICE NO LATER THAN FRI., OCTOBER 1, 1982 TO QUALIFY FOR THIS OFFER.**

FSCT Annual Meeting and Paint Show Registration Fees

Federation Member	ADVANCE REGISTRATION WASHINGTON, DC NOVEMBER 3-5, 1982	Non-Member
$40.00		$55.00

(0) **MAIL TO: FSCT, 1315 WALNUT ST., PHILADELPHIA, PA 19107** (1)

ANNUAL MEETING AND PAINT INDUSTRIES SHOW

REGISTRATION FEES

	Member	Non-Member	Spouses Activities
ADVANCE	$40.00	$55.00	$25.00
ON SITE (FULL TIME)	$50.00	$65.00	$35.00
ON SITE (ONE-DAY)	$30.00	$40.00	—

SPOUSES' ACTIVITIES

The schedule of activities planned for the spouses will begin with a wine and cheese social at 2:00 p.m. on Wednesday in the Maryland Suite of the Sheraton Washington.

After a continental breakfast on Thursday (7:30 a.m.) in the Maryland Suite, buses will leave the Sheraton Washington at 9:00 a.m. for a guided tour of Annapolis, MD. The tour will include the U.S. Naval Academy, the campus at St. Johns College, the Maryland State Capitol Building, the exterior of many 18th century mansions, and the bustling waterfront. Luncheon will be served at two locations—The Hilton Hotel and the Maryland Inn. Buses will return to Washington at 3:00 p.m.

On Friday, continental breakfast will again be available. The Federation Annual Luncheon will be held beginning at 11:45 a.m. in the Sheraton Ballroom. Well-known political satirist Mark Russell will be the featured speaker.

The spouses registration fee ($25.00 in advance, $35.00 in Washington) includes the wine party, the continental breakfasts, and the Thursday tour and luncheon.

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NOVEMBER 3, 4, 5, 1982

The Glass Transition: What's the Point?

Mark B. Roller
Mobil Chemical Company*

The glass transition temperature of a polymer is normally reported at a single temperature. The fact that the reported glass transition temperature is dependent on heating rate and frequency has sound theoretical support. It also can be instrument and operator dependent. Over many years of use of dynamic mechanical techniques to evaluate polymers and coatings, it has been observed that there is a great deal of information derivable from the shape of the glass transition region. Examples are given of the effect of polymer preparation, cure mechanism, component compatibility, and cure history on the glass transition region. The relationship between the dynamic mechanical properties and polymer performance is also discussed.

INTRODUCTION

The glass transition is widely accepted as a predominant factor in determining the physical and mechanical properties of amorphous polymers.[1] As a consequence, during the day-by-day operation of coatings and thermosetting resin laboratories, one often hears the question of what is the glass transition of a resin or cured formula. The reply is usually that Tg is some number of degrees centigrade. But, it is acknowledged that the glass transition occurs over a temperature range rather than at a single point or temperature. It is further observed that factors such as intrachain stiffness, intermolecular polar forces, and comonomer compatibility can affect the size of the transition region and, therefore, the behavior of polymers.

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Nielsen[1] compares thermoplastic polymers of similar size and shape repeat units, such as polypropylene, polyvinylchloride, and polyacrylonitrile, and shows that they have vastly different reported glass transition points (−10, 87, and 104°C, respectively). The differences arise from the different magnitude of the intermolecular polar forces in each. On the other hand, polyacrylonitrile, polymethylmethacrylate, and polystyrene have similar reported glass transition points[1] (104, 105, and 100°C, respectively) but different room temperature properties. Nielsen points out that the temperature range over which the glass transition occurs for thermoplastic copolymers and plasticized systems can be affected by the molecular interactions between components. He also shows that the level of crosslinking in thermosets affects the magnitude of accompanying physical changes and the temperature range of the glass transition.

When commercial coatings and thermoset formulations are considered, one is often faced with complex mixtures of relatively low molecular weight polymers or oligomers of very different chemical make-up. Coreaction of these low molecular weight components leads to crosslinked products. The crosslinking restricts the mobility of the polymers formed by homo- and co-polymerization of the components. Localized regions consisting of varying levels of component separation or dissolution can be locked in place during the formation of the infinite network. The small size of these regions can result in clear products. This clarity and apparent homogeneity does not reflect the influence of the local regions on the performance of the polymer network.

It is the intent of this report to illustrate that the same factors that influence the compatibility and glass transition behavior of thermoplastics can have a profound effect on the transition region and performance of coatings and thermosets. It is also intended to demonstrate that Dynamic Mechanical Testing (DMT) can provide

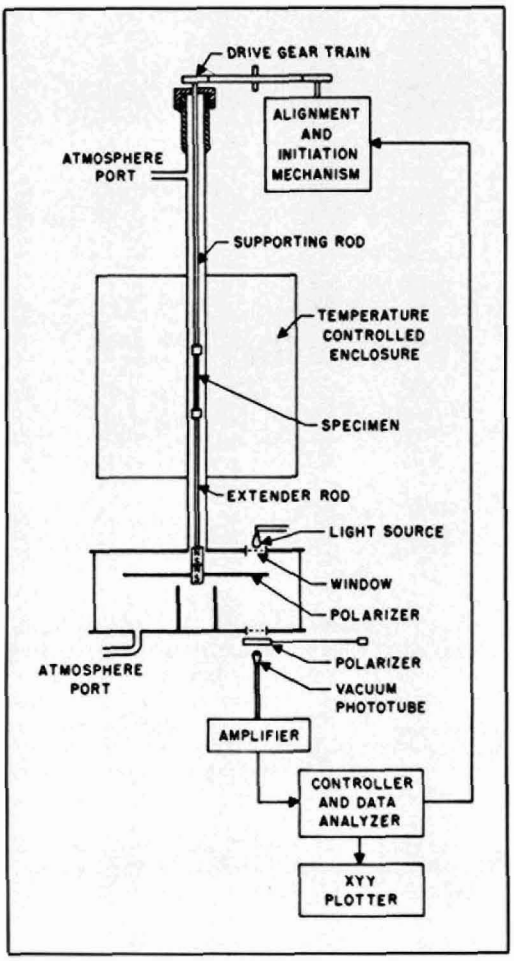

Figure 1—Schematic diagram of Torsional Braid Analyzer

a sensitive monitor of the entire glass transition region, rather than just providing a glass transition point or temperature. This picture can provide insight into the performance of the final product.

In the last 25 years viscoelastic theory has been applied to the study of polymeric materials in order to obtain structure-property relationships. The dynamic mechanical measurement of viscoelastic properties has become one of the most important characterization tools of polymer engineering and science. Recent advances in the automation of experimental control, data analysis, and display have made DMT a viable industrial tool available to polymer scientists and technologists.[2] These advances have been particularly stimulative in the coating, adhesives, and general thermosetting polymer industries where formula variations abound. Ease of operation and short turnaround times allow these techniques to provide insights into the cured polymer's structure and the effect of formulation on that structure and in-service performance.

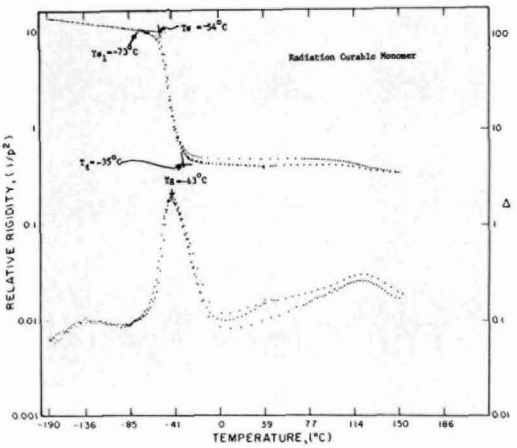

Figure 2—Dynamic mechanical spectra of self-cured radiation curable monomer

The thermomechanical data presented herein were all obtained on a Torsional Braid Analyzer (TBA).

EXPERIMENTAL

The TBA (shown schematically in *Figure* 1) is an automated, free-hanging, freely decaying torsion pendulum which uses supported specimens and, thereby, permits monitoring of the changes which occur during cure of thermosets and through load limiting transitions.[3]

The specimen is made by impregnating a glass fiber braid or a suitable fabric with the solution, dispersion, or other liquid form of the polymer or reactive system. The specimen can be dried or cured externally, or in the apparatus. The pendulum is intermittently set into oscillation to generate a series of freely damped waves. The frequency of operation is about 1 Hz. The character of these waves changes during cure to provide a monitor of reaction. Similarly, the dynamic mechanical spectra of a cured thermoset or of a thermoplastic polymer are provided by the changing character of the waves as a function of temperature. To obtain dynamic mechanical spectra, the instrument is generally programmed to heat or cool 2°C/min while the data are being generated. In this sense, TBA is a mechanical analogue of Differential Scanning Calorimetry (DSC). Changes observed in the thermomechanical spectra upon further heating of a "cured" polymer can be related to cure level and/or degradation.

The experiment provides plots of relative rigidity ($1/P^2$, where P is the period in seconds) and logarithmic decrement [$\Delta = \ln(A_i/A_{i+1})$ where A_i is the amplitude of the ith oscillation of freely damped waves]. The relative rigidity is directly proportional to the in-phase or elastic portion of the shear modulus (G′); the logarithmic decrement is directly proportional to the ratio of the out-of-phase or viscous portion of the shear mod-

Torsional Braid Analyzer is available from Plastics Analysis Instruments, Inc.

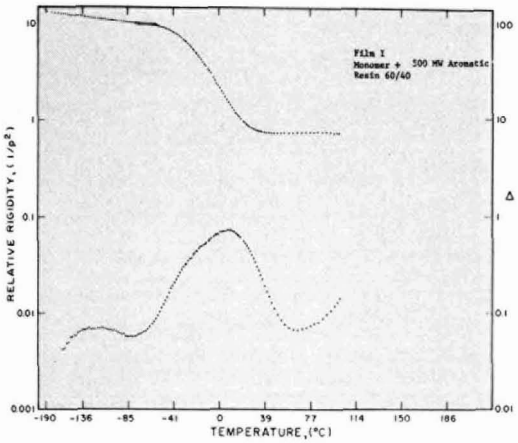

Figure 3—Dynamic mechanical spectra of radiation curable monomer and α, ω-unsaturated aromatic resin, 60/40

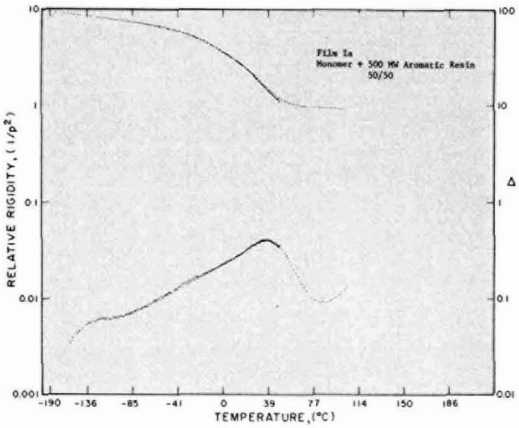

Figure 3a—Dynamic mechanical spectra of radiation curable monomer and α, ω-unsaturated aromatic resin, 50/50

ulus (G″) to G′ [$\Delta \simeq \pi G''/G' = \pi \tan \delta$]. G′ and G″ are material parameters of the specimen which characterize the storage and loss of mechanical energy on cyclic deformation; quantitative values may be obtained by using dimensions of the specimen. More detailed descriptions of the technique and the interpretation of viscoelastic parameters determined have been described elsewhere.[3,4]

DISTRIBUTIVE NATURE OF THE GLASS TRANSITION REGION

In the last ten years, the dynamic mechanical properties of about 2000 different samples have been obtained using torsional braid analysis. During that time, it has become apparent that a single temperature is often not sufficient to define the glass transition. Not only is the reported glass transition temperature a function of the instrument or technique used to measure it, sometimes it is operator dependent. For example, when DSC is used to determine the glass transition temperature, extrapolation of the straight line portions of the endothermic shift has been reported at either the upper or lower end of the region. Alternatively, the midpoint of the shift can be measured or estimated. Each method provides a different point as the glass transition. Often a glass transition is reported as being obtained by DSC without specifying which methodology was used.

DMT can provide a sensitive measure of the physical changes that occur to polymers over a wide temperature range. To illustrate this point, the behavior of two radiation curable monomers crosslinked with several different types of liquid and solid resins is described. For the purposes of this report, a "monomer" is defined as

Table 1—Comparison of the Glass Transition Region Descriptive Parameters Obtained by Torsional Braid Analysis for Radiation Cured Films

Film Monomer	Composition 100%	Tg −43°C	Ts −54°C	Tsi −73°C	Tℓ −35°C	Tℓ-Ts −19°C	Tg of Resin
I	Monomer + 500MW Aromatic resin, 60/40	8	−32.5	−54	25.5	58	83°C
Ia	Monomer + 500MW Aromatic resin, 50/50	39	−32	−47	54	86	83
II	Monomer + High MW Aromatic Resin, 50/50	9	−11	−23	23	34	—
III	Monomer + α, ω-condensable Aromatic resin, 50/50	7	−8	−24	18	26	—
IV	Monomer + Aliphatic polyester resin, $\overline{Mn}$ = 258, 50/50	−32, 62	−56	−67	87	143	>150
V	Monomer + Aliphatic polyester resin, $\overline{Mn}$ = 314, 50/50	−35, 20	−55	−65	37	92	91
VI	Monomer + Aliphatic polyester resin, $\overline{Mn}$ = 342, 50/50	−35, 2	−46	−56	17	63	67
	Polyester monomer + Aliphatic polyester resin, $\overline{Mn}$ = 258, 50/50	63	44	24	74	30	>150
	Polyester monomer + Aliphatic polyester resin, $\overline{Mn}$ = 314, 50/50	42	30	15	52	22	91

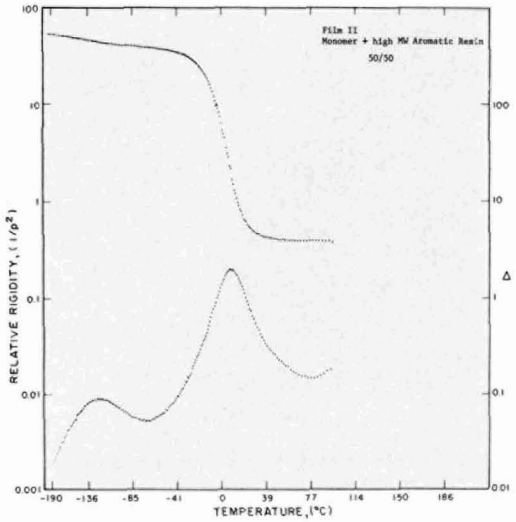

Figure 4—Dynamic mechanical spectra of radiation curable monomer and high $\bar{M}n$ α, ω-unsaturated aromatic resin, 50/50

having one double bond; and a crosslinking "resin" has two identical functional groups (double bonds or condensable groups), one at each end of the molecule.

The monomer that will be used in most of the examples is a mixture of oligomers with a number average molecular weight ($\bar{M}n$) of about 400 with 90% of the molecules between 175 and 650. In all cases discussed, the monomer forms clear solutions with the crosslinking resins and clear cured films. The nature of the glass transition region provides information about the structure of the cured mixture.

Specimens were prepared by impregnating a nonwoven cloth with the liquid coating and exposing the specimen to electron beam (E-beam) cure. The unimpregnated cloth had a flat mechanical response from −180° C to 120°C.

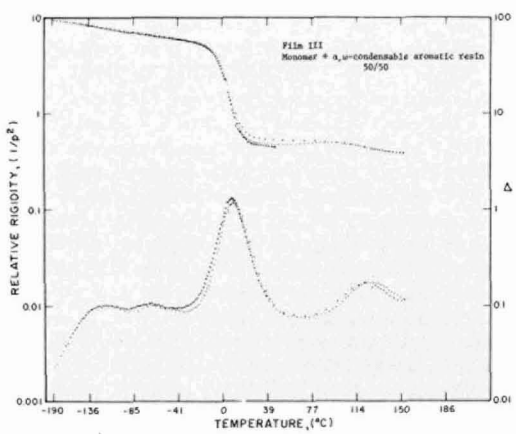

Figure 5—Dynamic mechanical spectra of radiation curable monomer and α, ω-condensable aromatic resin, 50/50

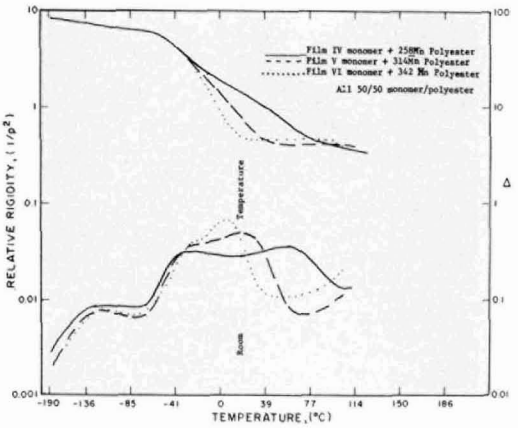

Figure 6—Dynamic mechanical spectra of cured monomer with three α, ω-unsaturated aliphatic polyester resins, 50/50

The monomer polymerized under the E-beam has a narrow glass transition region centering around −43°C. Free films, prepared this way, have been found to be predominantly insoluble gel when extracted with a good solvent. This indicates that a degree of self-crosslinking is induced by the E-beam.

In order to better describe the glass transition region, four parameters were used for the self-cured monomer, as indicated in *Figure* 2. Tg = −43°C, as indicated by the maximum in Δ; T_s = −54°C is the onset of the glass transition region as indicated by the intersection of the two lower temperature straight line portions of the log (relative rigidity) vs temperature plot; Ts_1 = −73°C is the first deviation of the log (relative rigidity) vs temperature plot from the straight line; Tℓ = −35°C is the end of the glass transition region as indicated by the intersection of the two higher temperature straight line portions of the log (relative rigidity) vs temperature curve; and Tℓ − T_s = 19°C defines the width of the glass transition region.

An equimolar (based on equivalents of double bonds) mixture of the monomer (60 parts) and an α, ω-diethylenically unsaturated aromatic resin (40 parts) of $\bar{M}n$ approximately 500 was cured and resulted in the mechanical response shown in *Figure* 3. The description parameters are shown in *Table* 1. This film (I) has a very broad glass transition region. One way to interpret this result follows.

The film has, on the average, one monomer double bond per crosslinker double bond. Consider this vinyl-type polymer with a distribution of side chain lengths with an average molecular weight of about 375 (90% of the side chains between 150 and 625) and, on the average, one crosslink on either side of the repeat unit. Steric constraints may force some of the longer, more flexible side chains to occupy regions of low local crosslink density. The local regions may vary in size and the level of crosslinking resin content. The temperature at which a given chain segment attains sufficient energy to move translationally and "soften" depends upon both its inherent stiffness and its interactions with its nearest neighbors. Therefore, individual network segments and

Table 2—Comparison of Room Temperature Mechanical Properties Of Radiation Cured Free Films

Film	Tg °C	E'_{RT}[a] x10^{-10} dynes/cm^2	Ts °C	Tℓ-Ts °C	% Elongation to break	Break Strength Psi
I	8	0.136	−32.5	58	14	500
IV	−32, 62	0.290	−56	143	29	2700
V	−35, 20	0.149	−55	92	20	740
VI	−35, 2	0.104	−46	63	10	320

(a) E'_{RT} is an estimate of the film/support composite's modulus at room temperature. This assumes a modulus at −180°C of 2×10^{10} dynes/cm^2 and uses the TBA relative modulus to calculate E′ at room temperature.

monomer side chain segments would each have a temperature at which thermal motion commences that depends on their particular molecular environment. This would create a continuous spectrum of softening points and the bulk film would then soften over a range of temperatures from the softening point of the self-cured monomer upwards. As seen in *Figure* 3, this is the case.

Decreasing the monomer to resin ratio to 50/50 reduces the average monomer double bond to crosslinker double bond ratio to 0.6 to 1. The film that results (Ia) has the thermomechanical properties shown in *Figure* 3a. When compared with Film I, the Tg has increased and the transition region has further broadened. The softening still begins at about −50°C but rigidity is maintained to higher temperatures. This may result from increased resin/resin associations.

To further test this model, Film II was prepared from a 50/50 mixture of a higher molecular weight (about 1500) α, ω-diethylenically unsaturated aromatic resin of similar chemistry to the first. The ratio of average monomer to crosslinker double bonds is increased to 2 to 1. The thermomechanical properties are shown in *Figure* 4 and the parameters describing the behavior are detailed in *Table* 1. Film II has a significantly narrower glass transition region reflecting the effect of a less tightly crosslinked structure. This structure allows better mixing of the monomer side chains and crosslinking resin chain segments. The narrow glass transition region is indicative of monomer/crosslinker compatibility in the absence of sterically induced segregation.

Film III is a case where the monomer is mixed with a third aromatic resin that is chemically similar to those above ($\overline{M}n < 400$) but has α, ω-condensable functionality. Radiation triggers the condensation reaction between the ends of the resin and a functional group at the end of the monomer's side chain. Therefore, under irradiation the double bond in the monomer polymerizes by free radical mechanism and the monomer's second functional group reacts with the resin's condensable functionality. This incorporates the monomer's large, flexible side chain into an integral part of the polymer network and backbone. The free radical cure of the double bonds provides crosslinking sites. Incorporating the monomer's side chain into the backbone of the system can provide a better mixing of the monomer and the resin chain segments and reduces crosslink density. Again, a narrow glass transition region is obtained (see *Figure* 5 and *Table* 1). Note that the Tgs (Δ max) of the films, I, II, and III are relatively constant although the width of the region is not. Both the temperature of the damping maximum and the width of the transition is indicative of how the compositional parts of the film are distributed within their local environment.

The next series of films was prepared by E-beam curing

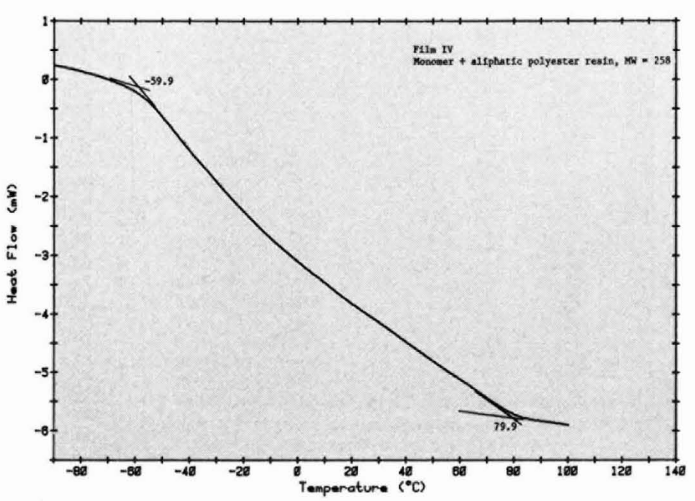

Figure 7—DSC curve for film IV; monomer + 258 $\overline{M}n$ aliphatic polyester resin, 50/50

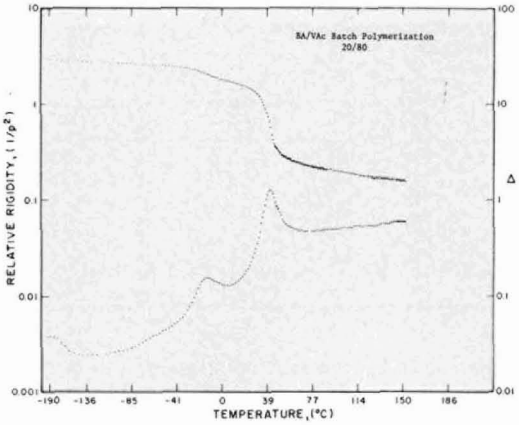

Figure 8—Dynamic mechanical spectra of BA/VAc copolymer 20/80 batch polymerization

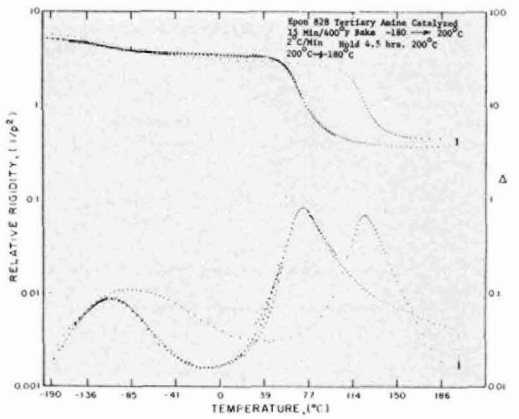

Figure 10—Dynamic mechanical spectra of Epon 828, tertiary amine catalyzed and cured 15 min/400°F. Data obtained −180°C ⟶ 200°C; hold 4.5 hr ⟶ 180°C at 2°C/min

mixtures of the monomer with α, ω-diethylenically unsaturated aliphatic polyester resins of $\overline{M}n$ from about 250 to 350. The mechanical response of these films is shown in *Figure* 6. The descriptive parameters are in *Table* I. These crosslinkers provide films with considerably different characteristics than the aromatic resin-based crosslinkers. The glass transition regions are distinctly bimodal. The high damping (Δ) and continually decreasing modulus between the Δ maxima is indicative of the dynamic mechanical response of semicompatible interpenetrating networks.[5] Since the films were optically clear and no unsaturated groups were available for heavy metal staining, neither optical nor electron microscopy could confirm these results.

It is not clear to what extent this behavior occurs from the low molecular weights of these crosslinkers, from differences in cured monomer/cured resin compatibility, or from a difference in reactivity that provides for a degree of self-cure of the monomer and/or the resin. With all these resins we observed plasticization of the resin phase. At the same time, it appears that the onset of low temperature softening can be attributed to a substantially pure monomer phase. Other, lower molecular weight monodisperse and more polar monomers produce narrower and, therefore, more homogeneous glass transition regions when reacted with these polyester crosslinking resins. One such monomer, chemically similar to the polyesters and with a molecular weight of about 220, was cured with both the 258 and 314 molecular weight polyester resins. The monomer to crosslink double bond ratios were 0.60 and 0.73, respectively. The cured films had single Tgs of 42 and 63°C with glass transition regions that were 22 and 30°C wide, indicating homogeneous networks (see *Table* 1). These results suggest that the predominant factor in the broad glass transition region of films I, Ia, IV, V, and VI is the high average crosslink density coupled with the high molecular weight of the species present in the monomer mixture.

Films IV, V, and VI provide a perfect example of the second aspect of "the point" of understanding the nature of the glass transition. As noted in *Table* I, all of the films discussed above have glass transition regions which

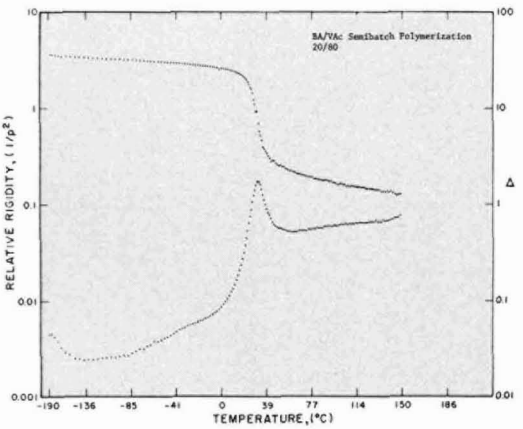

Figure 9—Dynamic mechanical spectra of BA/VAc copolymer 20/80 semibatch polymerization

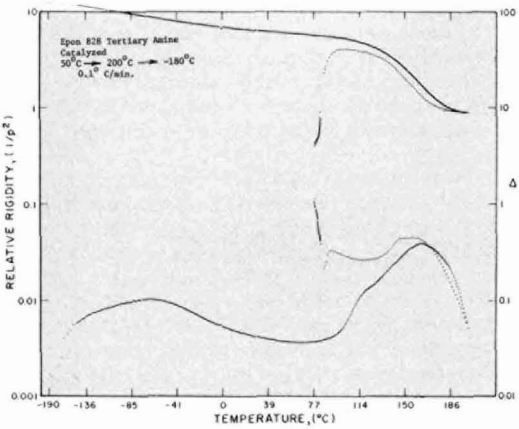

Figure 11—Dynamic mechanical spectra of Epon 828, tertiary amine catalyzed and heated 50° ⟶ 200°C ⟶ −180°C at 0.1°C/min

Table 3—Comparison of the Glass Transition Region Descriptive Parameters for Epon 828, Tertiary Amine Catalyzed as a Function of Cure History

Cure	Tg °C	Ts °C	Tsi °C	Tℓ °C	Tℓ-Ts °C	E'_{RT} x10⁻¹⁰ dynes/cm²	$E'_{200°C}/E'_{-180°C}$
15 min/204°C (400°F)	73.5	57	39	91	34	1.29	0.065
15 min/204°C + 4.5 hr 200°C	127	110	91	139	29	1.13	0.075
0.1°C/min 50°C ⟶ 200°C ⟶ −180°C	163	132	104	182	50	1.13	0.074

include room temperature. Elongation to break and break strength of free films of some of these formulae have been determined at room temperatures. The results are shown in *Table* 2. If the onset of softening (Ts) is used to represent glass transition, one obtains an erroneous picture of the room temperature behavior of these films. For example, it has been found that the estimated room temperature modulus (E'_{RT}) correlates well with room temperatures break strength of a large number of radiation curable materials. Therefore, a more accurate picture of the performance of the films is obtained by comparing the E'_{RT} of the composite specimens. In the case at hand, the toughest film (IV) has Ts that is lower than Ts of the other films. While, as a result of the interpenetrating network effect of enhancing the toughness of the IPN product relative to the individual network components,[5] IV has the highest E'_{RT}, elongation to break, and break strength.

Figure 7 shows a DSC curve for film IV. It is clear that there is information in the DSC experiment that is similar to that obtained from the mechanical experiment. It is also clear that if the DSC experiment is not taken to about 100°C, the entire glass transition region may not be observed. One might be tempted to conclude that the glass transition region ended by −10°C and attribute further endothermic shift to baseline drift.

These radiation curable systems provide an example of the influence of the nature of the glass transition region and polymer structure on film performance. The evidence is particularly convincing because of the uncommonly large magnitude of the effect as observed by TBA and DSC. The proximity of the glass transition region to room temperature and its readily observable effects on behavior make this example even more convincing. Still, it must be remembered that the implications of this broad view of the glass transition region extend to other systems.

GLASS TRANSITION REGION, POLYMERIZATION AND CURE

Careful examination of a polymer's glass transition region's shape can provide information about the polymerization process. For example, *Figures* 8 and 9 show the dynamic mechanical spectra of two butylacrylate/vinylacetate emulsion copolymers impregnated onto glass braids. The composition of both is BA/VAc = 20/80. The first was batch charged into the reactor and polymerized. The second was charged into the reactor in a semibatch fashion, keeping the system monomer-starved.[6] The batch reaction shows two distinct Tgs at −13 and +41.5°C. The semibatch reaction has a single Tg at 32°C.

The copolymerization reactivity ratios of vinyl acetate and butyl acrylate[7] indicate that butyl acrylate is incorporated into polymer much faster than vinyl acetate. In the batch process the butyl acrylate monomer reacts first to form a BA rich phase (Tg = −13°C). When the BA is depleted, VAc homopolymerization proceeds to form a PVAc rich phase (Tg = 41.5°C). In the monomer starved semibatch case, the monomer is consumed and incorporated into polymer molecules at the composition being charged.[9] Hence, a single Tg at 32°C is observed.

The glass transition region can also provide significant information about the effect of cure history on the structure of thermosets. *Figures* 10 and 11 show the effect of cure history on the mechanical behavior of nonvolatile ($\overline{M}n > 500$) tertiary amine catalyzed self-cured epoxy resin.

Two specimens of catalyzed Epon® 828 were prepared and subjected to the following cures: (a) 15 min at 400°F and (b) 0.1°C/min from 50°C to 200°C (392°F). After the 15 min/400°F bake, a Tg of 73.5°C was observed which increased to 127°C after heating to and holding at 200°C for 4.5 hr. Programmed cure at 0.1°C/min resulted in a film with a Δ maximum of 163°C and a Δ shoulder near 120°C.

Epon is a registered trademark of Shell Chemical Co.

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The results can be interpreted in the following way. When the system was heated instantaneously to 400° F, gelation occurred at a volume corresponding to the volume of a liquid or rubber well above Tg. The crosslinking progressed further and the configuration of the molecules became more and more locked into this expanded state. After the initial bake and post bake, cooling to about 125° C was required to reduce the volume to that of the glassy state. In the case of the slow programmed cure, gelation and much of the crosslinking reaction occurred at modulus levels and densities corresponding to the lower temperature end of the glass transition region. This time the structure was locked into a more dense configuration. This denser configuration required more thermal energy to soften. Therefore, the slow cure system had a higher Tg even after the high temperature gelled sample was postcured for 4.5 hr at 200° C. Both samples had similar glassy state and rubbery moduli indicating similar levels of reaction and effective crosslink density in spite of the different glass transition characteristics (*Table* 3). The state that the system was in at the time of cure controls the structure, glass transition, and mechanical behavior.

CONCLUSIONS

The few examples discussed make it clear that both the temperature and the shape of the glass transition region can provide information about the progress of polymerization, cure reactions, and the interaction of various components of a fully formulated polymer product. Knowledge of the structural and behavioral features of the polymeric product can then be correlated with end-use performance. In the final analysis, that is the point of all applied and much fundamental polymer research and development.

ACKNOWLEDGMENT

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Optical Properties of Black Chrome

A Model for Predicting the Effect Of Exposure to Elevated Temperature

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Performance and durability are major attributes of interest in selecting absorptive coatings and materials for use in solar energy systems. Previous studies have shown that environmental conditions likely to be experienced in solar collectors can lead to reduced performance and durability. This paper summarizes the first phase of research to help meet the need for predictive models. The scope of this initial phase of research is to develop a model predicting the effects of elevated temperature on the optical properties of black chrome. Oven aging tests were performed in the laboratory at temperatures of 150°C, 200°C, and 250°C. The nature of the change in reflectance spectra was found to be a horizontal shift along the wavelength axis. The model was developed based on these findings. Reasonable numerical fits were made by applying the model to the test data.

INTRODUCTION

The purpose of utilizing absorptive coatings in solar energy collectors is to absorb the solar energy and convert it into thermal energy. Of prime importance are the initial optical properties of the absorptive coatings and the maintenance of these properties during the lifetime of the collector system. The National Bureau of Standards (NBS)[1,2] has conducted studies on the performance and durability of various solar absorptive materials to aid the development of the technical basis for consensus evaluation standards. In these previous studies, the optical properties of most absorber materials were found to be affected by the exposure conditions likely to be experienced in solar collectors, such as elevated temperature, temperature cycles, and moisture. The studies have shown that, even though the total integrated values of reflectance and emittance of the coating systems may exhibit little change following exposure, changes in optical properties can frequently be identified by comparing the reflectance spectra for aged and unaged specimens. But studies to date have not led to accurate models for predicting the long-term effects of environmental exposure on optical properties. Such models are needed for generating the durability data which are essential to effective selection of absorptive coatings for specific environmental conditions.

The purpose of the present study is to develop analytical models to meet the need mentioned above. In the first phase of research, which is reported in this paper, the effect of exposure to elevated temperature on optical properties of black chrome was chosen for investigation because of the extensive use of this material as an absorber. Specimens of black chrome were exposed, in the laboratory, at temperatures up to 250°C to determine the effects of thermal aging on reflectance. Exposure temperatures were selected to provide a range over which black chrome is frequently used in solar applications.[3]

PREVIOUS STUDIES

The thermal stability of different types of black chrome solar coatings has been investigated at temperatures from 300°C up to 600°C by Lampert and Washburn.[4] The study indicates that black chrome shows degradation of optical properties after heating for a period as short as one hour. At NBS, long-term oven aging at 150°C, 200°C, and 250°C showed that degradation can occur

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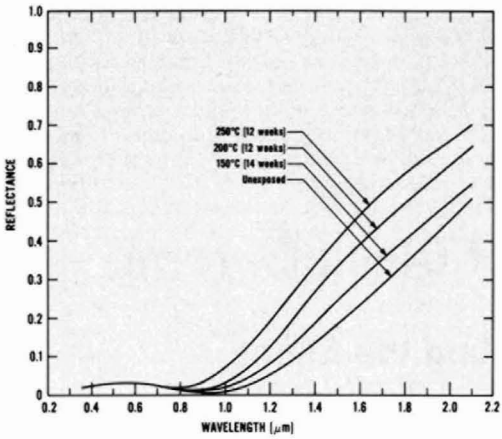

Figure 1—Reflectance of black chrome on copper before and after oven aging (Reference 1)

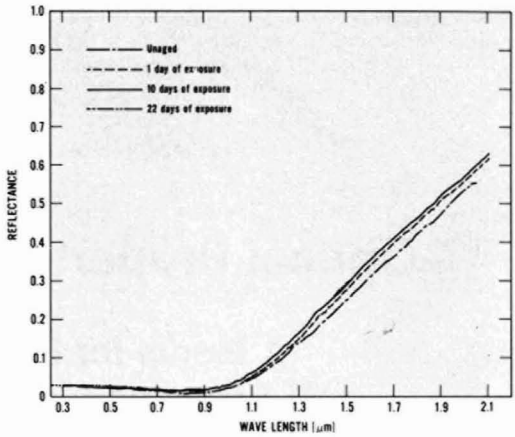

Figure 2—Reflectance of black chrome on steel after 150° C oven aging (Specimen #1)

at temperatures as low as 150° C. The reflectance spectra of black chrome on a copper substrate after exposure to elevated temperatures is shown in *Figure* 1. Thermal stability of black chrome may be affected by various factors including the composition of the standard plating bath.[5] Hence, the buildup to the relationship between the microstructure and the optical properties is not a straightforward task.[6]

EXPERIMENTAL STUDIES

Procedure

Heat aging exposures in an oven were performed for the black chrome specimens at temperatures of 150° C, 200° C, and 250° C. Three specimens were tested for each of these temperature conditions. The black chrome was on 0.8 cm thick steel with a nickel flash of 25–50 μm. The major purpose of the experimental work was to find how the reflectance of the specimens varies with time of exposure. Reflectance was measured with an integrating sphere reflectometer as described in ASTM E424, Method A, before and after exposure to the various temperature conditions. Prior to the measurements, the specimens were removed from the oven and allowed to cool for approximately one-half hour.

The test scheme is outlined in *Table* 1. The duration of the test was 22 days. The reflectance of all specimens was measured at the end of 1, 10, and 22 days. A description of the results follows. A limited number of tests were also performed of black chrome on copper substrate. While the preliminary results of specimens on copper were similar to those of the specimens with black chrome on steel, no details are presented in this paper because of the preliminary nature of the data.

Table 1—Summary of the Test Conditions For the Black Chrome Specimens

Test Conditions	Duration of Experiment			
	Unaged	1 Day	10 Days	22 Days
150° Oven	X	X	X	X
200° C Oven	X	X	X	X
250° C Oven	X	X	X	X

Remarks: X = measurements of the reflectance spectra taken on these days.

There are three specimens for each test condition (i.e., 9 specimens in total).

Results of Laboratory Tests

For each test specimen, the reflectance spectra before exposure (unaged) and after 1, 10, and 22 days of exposure to thermal environments were compared. The change in reflectance due to oven aging increased with time up to 10 days. The difference in reflectance spectra

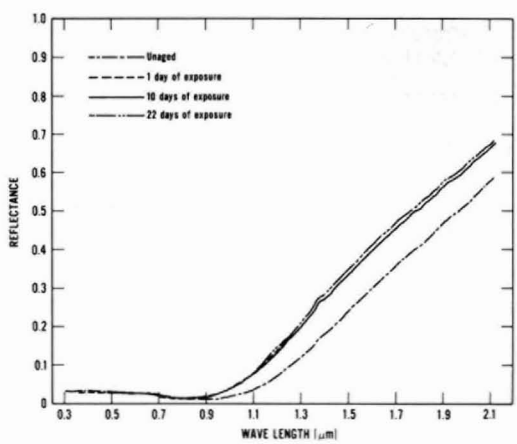

Figure 3—Reflectance of black chrome on steel after 200° C oven aging (Specimen #4)

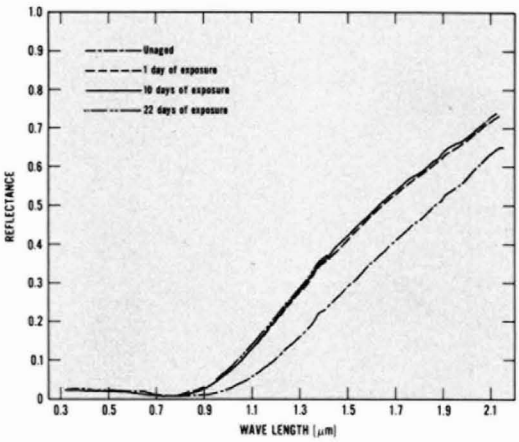

Figure 4—Reflectance of black chrome on steel after 250° C oven aging (Specimen #7)

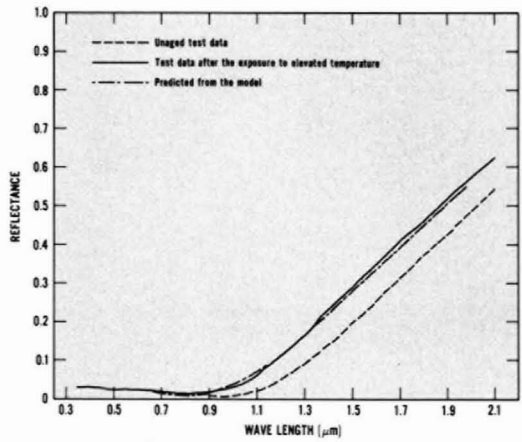

Figure 5—Comparison of reflectance spectra predicted from the model with the measured data for black chrome on steel after oven aging at 150° C (Specimen #1)

after exposure for 10 days and 22 days was negligible for each specimen. To illustrate these results, the reflectance spectra for one specimen at each temperature are shown in *Figures* 2–4. The remainder of the specimens showed similar results. By examining these figures, it was found that the reflectance curve shifts horizontally with increasing time of exposure to the temperatures. The development of the analytical model as described in the following section is based on this horizontal shift. The reflectance after 10 days of exposure is considered to show the maximum permanent change from the unaged one.

ANALYTICAL MODEL

The reflectance spectra of the absorber system affected by the elevated temperatures may be expressed as:

$$\rho_\lambda (T, t) = f[\lambda, T(t)] \qquad (1)$$

where:

λ = wavelength,
T = temperature,
t = time,
ρ_λ (T, t) = reflectance at wavelength (λ) at room temperature after being exposed to elevated temperature (T) for time (t), and
f = a mathematical function for the specific coating system.

From the results of the tests, the reflectance spectrum shifts horizontally as a result of exposure to the elevated temperatures. Since the change increases with time only up to 10 days, the permanent reflectance spectra for the specimens of interest may be expressed as:

$$\rho_\lambda (T) = F[\lambda + g(T)] \qquad (2)$$

where:

F = mathematical function representing the reflectance spectra. (F(λ) represents the measurement at room temperature, before exposure to higher temperatures.)
g(T) = a mathematical function to be derived from the model to adjust the wavelength.
ρ_λ (T) = reflectance at wavelength λ after exposure to oven temperature T.

The basic function F(λ) is assumed to be a known function. The scope of the present study is limited to the

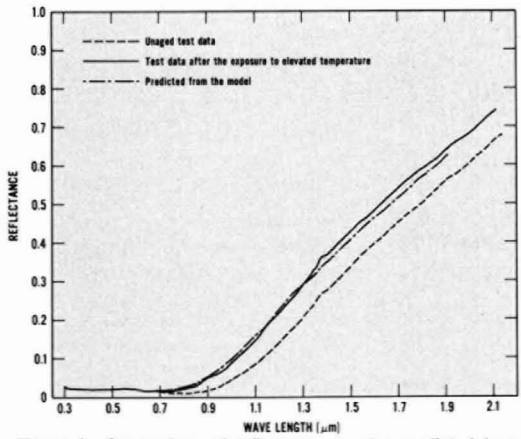

Figure 6—Comparison of reflectance spectra predicted from the model with the measured data for black chrome on steel after oven aging at 150° C (Specimen #2)

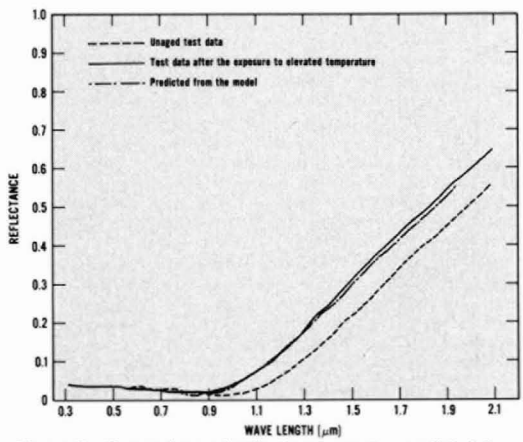

Figure 7—Comparison of reflectance spectra predicted from the model with the measured data for black chrome on steel after oven aging at 150° C (Specimen #3)

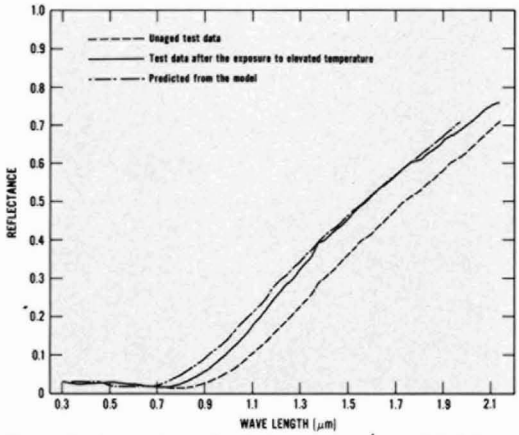

Figure 8—Comparison of reflectance spectra predicted from the model with the measured data for black chrome on steel after oven aging at 200°C (Specimen #4)

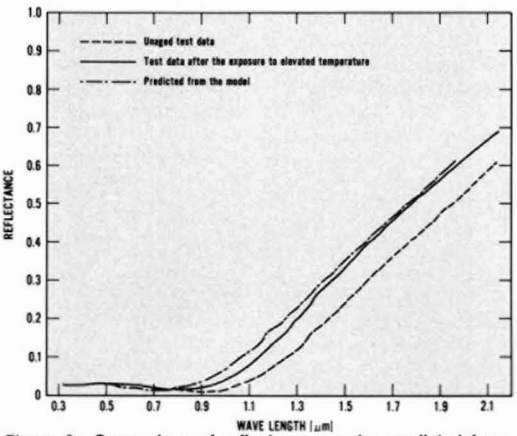

Figure 9—Comparison of reflectance spectra predicted from the model with the measured data for black chrome on steel after oven aging at 200°C (Specimen #5)

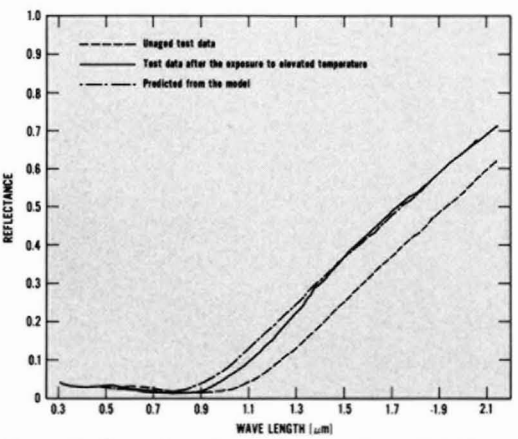

Figure 10—Comparison of reflectance spectra predicted from the model with the measured data for black chrome on steel after oven aging at 200°C (Specimen #6)

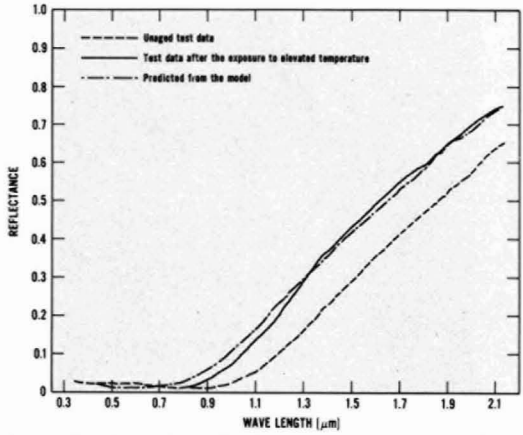

Figure 11—Comparison of reflectance spectra predicted from the model with the measured data for the black chrome on steel after oven aging at 250°C (Specimen #7)

investigation of the function g(T). Based on the experimental data shown in *Figures* 2–4, g(T) is assumed to have the form:

$$g(T) = A \exp [-B/(T - T_o)] \tag{3}$$

where A, B, and T_o are constants. T_o may be considered as the threshold temperature required to produce a non-negligible permanent change in reflectance spectra. The mathematical expression of g(T) can illustrate the feature, i.e., by taking the limiting state of T approaching T_o.

$$\lim_{T \to T_o} g(T) \simeq 0 \tag{4}$$

The constants A, B, and T_o may be evaluated by numerical techniques such as the least-squares method. Since the equation for g is of exponential form, the function may be evaluated conveniently from the following alternative form:

$$G = A_1 - B/(T - T_o) \tag{5}$$

where:

$G = \ln(g)$
$A_1 = \ln(A)$.

With the constants, A, B, and T_o known, the reflectance spectra after exposure to the elevated temperatures may be estimated from the unaged spectra. As an example, the experimental data obtained in this study were used to illustrate the validity of the model. The constants A, B, and T_o were evaluated by use of equations (2) and (3) and the test data from the three temperatures. For the example shown here, $\ln A = 4.0$, $B = 310$, and $T_o = 30°C$. The reflectance after 10 days exposure was considered to reach the maximum permanent change from the unaged one. Therefore, the reflectance after 10 days exposure was selected for prediction. The comparisons between the predicted and the tested curves are shown in *Figures* 5–13 for each specimen. If the absorptance spectra, $\alpha\lambda$, is of interest, it can be converted from reflectance spectra with the expression:

$$\alpha_\lambda = 1 - F(\lambda + A \exp [-B/(T - T_o)]) \tag{6}$$

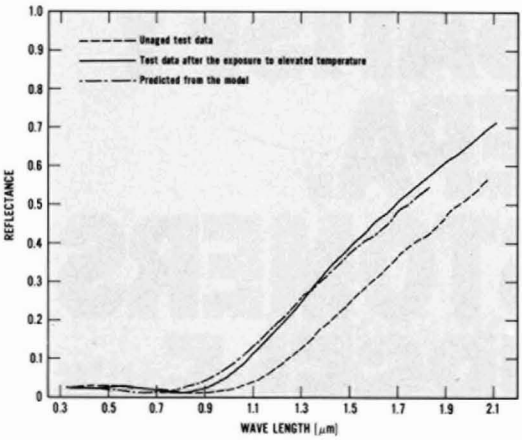

Figure 12—Comparison of reflectance spectra predicted from the model with the measured data for the black chrome on steel after oven aging at 250°C (Specimen #8)

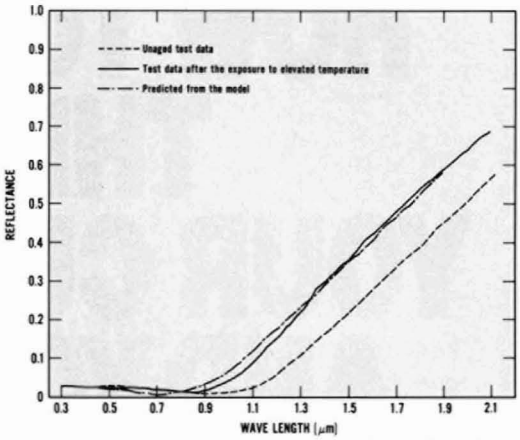

Figure 13—Comparison of reflectance spectra predicted from the model with the measured data for the black chrome on steel after oven aging at 250°C (Specimen #9)

DISCUSSION

The current model is different from the "Fermi model" presented in Reference 7 not only in the number of the parameters involved but also in their physical significance. The introduction of the variable, T_o, is an assumption in the model as stated in the previous section. T_o is the threshold temperature above which permanent changes in reflectance are induced. In reality, it may not be possible to verify that this threshold temperature does exist. Nevertheless, there is no doubt that the permanent change may be considered negligible below a certain temperature. It should be noted that equation (3) has the form of an exponential function which is close to the Arrhenius equation, but the introduction of T_o results in the constant B having a different physical meaning than the activation energy.

The model is limited in scope, at present, to black chrome on metal which is exposed to temperatures below 250°C. For conditions other than these, more complex effects may occur and the model may need to include the chemical and physical composition changes related to the microstructure changes.

CONCLUSIONS

In most spectrally selective layers, the spectral profiles shift with elevated temperature conditions.[1,7] For the black chrome specimens tested here, the permanent change shown in the reflectance spectra was found to be a horizontal shift. The three-parameter model, equation (3), developed to characterize the reflectance changes resulting from the horizontal shift, has been shown to be useful in predicting experimental data. A threshold temperature, T_o, below which no permanent changes were observed, was introduced in the study.

Further research is needed to extend the model to other absorber materials. Additional work is also needed to correlate the composition and microstructure changes with the changes in reflectance due to exposures above room temperature.

ACKNOWLEDGMENTS

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Reactivity of Aluminum With Solvents and Additives in Coatings

Wesley L. Archer and Violete L. Stevens
Dow Chemical U.S.A.*

Aluminum can be used as a construction material for equipment used in the preparation and application of industrial coatings. However, aluminum may not be a suitable construction material when handling certain alcohols, glycols, glycol monoethers, halogenated solvents, or even water which has a pH <4 or >8.5. This paper discusses the theoretical reactivity of the solvents, their mechanism of attack on aluminum, the role of inhibitors in preventing attack, and the circumstances that lead to attack and equipment failure. Understanding the possible aluminum/solvent reactivity will enable the industrial coatings formulators and users to select the proper process and applications equipment.

INTRODUCTION

During the past 15 to 20 years, the introduction of new coatings technology such as new application methods, new resins, and environmentally acceptable coatings systems has required that the finishing industry learn to adapt rapidly. A major consideration for industrial finishers has been equipment changes needed for this new technology. This adaptation continues as industrial finishers work to meet air quality standards. Understanding the reactivity of aluminum with the components of the coating systems can enable users of these products to have effective, safe systems.

The move to water-borne coatings since the 1960's is a good illustration of the equipment changes required for new coatings technology. The fear that water-borne systems would corrode black iron caused equipment manufacturers to move to aluminum and stainless steel as construction metals.

The increased use of additives in conventional solvent formulations and high solids was another force for change. A bulletin published by Binks noted, "Some of these additives may cause excessive metal erosion on some of the standard components in the system made of nonferrous metals such as, zinc, aluminum, and brass. When eroding additives are used, recommendation should include: Black iron mix tanks, carbon steel or stainless steel ball valves, and nickel coated or stainless steel backpressure valves and fluid regulators."[1] GM and Ford[2,3] developed similar guidelines on their coatings lines in the 1970's.

Intense efforts by industrial finishers to meet approaching air quality guidelines requires further equipment evaluation to find equipment materials which are compatible with new coating systems. One of the most controversial areas of this evaluation has been the use of aluminum or aluminum alloys as a material of construction for tanks, piping, pumps, stirrers, valves, nozzles, and other equipment that handle organic compounds or products formulated with organic materials.

Aluminum alloys used in coating equipment include 2000 and 6000 series aluminum. The 2000 series alloys contain high copper (4-4.5%) and smaller amounts of magnesium and manganese. The 6000 series have a low copper content and contain larger amounts of magnesium and silicon. Coating equipment that may contain aluminum alloy parts include pump pressure chambers, filters, valves and nozzles, pressure tanks, spray guns, and heaters.

Aluminum is a reactive metal which may not be a suitable construction material in the presence of certain

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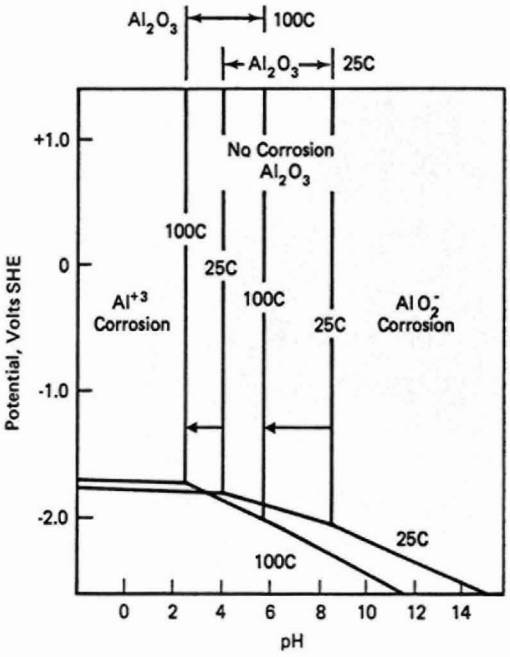


Figure 1—Pourbaix Diagram. Stability of aluminum oxide in water at 25°C and 100°C

organic solvents such as alcohols, glycols, glycol monoethers, halogenated solvents, or even water which has a pH of <4 or >8.5. This paper discusses the solvents and environmental parameters used that may lead to corrosive attack on aluminum and to equipment failure. Attack mechanisms on the normally very protective aluminum oxide film on the aluminum are discussed along with the accepted or suggested mechanisms of aluminum attack by the various solvents. The role of inhibitors for preventing or lessening aluminum attack are detailed along with circumstances where inhibitors cannot be expected to prevent possible aluminum attack. Finally, a unified theory of aluminum reactivity with these solvents is presented.

THERMODYNAMIC NATURE OF ALUMINUM

The literature on corrosion of aluminum deals mostly with the electrochemical corrosion of aluminum in water solutions containing various electrolytes. The high negative oxidation potential (−1.66 volts) of aluminum indicates that the metal has a high corrosion potential under the right environmental conditions. However, a highly protective oxide film protects the reactive aluminum in many potentially corrosive environments. On a freshly prepared aluminum surface, this film is only 2.5–5.0 nm thick and consists of amorphous aluminum oxide (Al_2O_3). Exposure to air or water solutions at pH's of >4 <8.5 results in slow growth of a second, thicker and less protective oxide film. This film consists of hydrated aluminum oxide ($Al_2O_3 \cdot nH_2O$) where temperature determines the degree of hydration. Bayerite ($Al_2O_3 \cdot 3H_2O$) is formed below 75°C and Boehmite ($Al_2O_3 \cdot H_2O$) above 75°C. Below 200°C this film may have a final thickness of 100 nm.[4]

Any chemical or physical action that destroys this thin, protective oxide film will result in aluminum corrosion. Proper environmental conditions or addition of certain inhibitors can, in turn, serve to protect the integrity of the film and, thus, protect the aluminum.

Normally, hydroxyl ions or water will be absorbed on the aluminum oxide surface to satisfy unoccupied cation (aluminum) valence sites. However, certain anions, e.g., chloride ions, adsorbed onto the aluminum oxide film, which is the result of an induced electric field at the solution interface, will compete with the hydroxyl or water species for available surface sites.[5] Formation of a hydroxychloride aluminum salt with aluminum oxide cations will create a more soluble species, separation from the oxide lattice, and slow dissolution of the oxide film. Formation of alkoxy substituted aluminum salts in the presence of an alcohol, glycol, or glycol monoether would likewise provide a pathway to dissolve the protective oxide film. A chlorinated hydrocarbon under the proper conditions can provide a chloride ion which will degrade the protective alumina film on aluminum. Thus, the induction period or "unreactive" phase of the aluminum corrosion reaction actually involves a variety of competitive reactions at the aluminum oxide surface in an effort to satisfy unoccupied valence sites.

ALUMINUM-WATER REACTION

The lack of aluminum stability in water at pH <4 or >8.5 due to dissolution of the protective aluminum oxide film is shown on a potential − pH plot (*Figure* 1), known as a Pourbaix diagram.[6] The diagram, developed from the standard free energies of the constituents and general electrochemical behavior of the aluminum, shows the pH areas where acid or alkaline induced corrosion will occur along with the area of passivation—no corrosion. Byrne[7] has shown that increasing the temperature to 100°C will shift the stable area to a pH of 2.5–5.5 (see *Figure* 1). At a temperature of 260°C, no stable oxide film will exist and aluminum will react spontaneously with water.

In strongly acidic media, the aluminum corrosion will involve proton reduction at cathodic sites on the metal surface and liberation of hydrogen gas. At adjacent anodic sites, aluminum atoms will enter solution as trivalent aluminum ions. Initial acid attack on aluminum will of course first involve an anion induced destruction of the protective oxide film. Concentrated nitric acid (above 70%) and glacial acetic acid are exceptions and not corrosive to aluminum.

Under alkaline conditions, the cathodic reaction site will liberate hydrogen, and the aluminum ion produced at anodic sites is complexed by hydroxyl ions to give the water soluble aluminate species, $AlO_2^{\ominus}$. One exception to this alkaline attack on aluminum is seen with ammonium hydroxide at a pH of 13, where essentially no corrosion occurs.

Pitting corrosion of aluminum, a type of localized

attack, can occur within the stable pH range in water containing chloride electrolytes. Nguyen and Foley[8] have suggested that initiation of aluminum pitting in halide solution proceeds in four steps. First, the anion is adsorbed onto the oxide film to satisfy unoccupied oxide valence sites. Second, there is a reaction of the adsorbed anion, e.g., $Cl^{\ominus}$, with Al^{+3} in the oxide lattice, as shown in equation (1).

$$Al^{***}\ (\text{in } Al_2O_3 \cdot nH_2O) + Cl^- \longrightarrow Al(OH)_2Cl \qquad (1)$$

Third, the formation of the more water-soluble hydroxychloroaluminum salt leads to thinning and eventual destruction of the protective oxide film. Fourth, a direct attack of the bare aluminum metal by the anion gives a transient complex which is finally hydrolyzed, as shown in equations (2) and (3).

$$Al^{***}\ (\text{in lattice}) + 4Cl^{\ominus} \longrightarrow AlCl_4^{\ominus}\ (\text{soluble}) \qquad (2)$$

$$AlCl_4^{\ominus} + 2H_2O \longrightarrow Al(OH)_2Cl + 2H^{\oplus} + 3Cl^{\ominus} \qquad (3)$$

Trace amounts of heavy metal ions like copper, mercury, nickel, and tin in neutral water can drastically increase pitting and localized corrosion of aluminum.[7] Deposition of these metal ions onto the aluminum surface can also cause galvanic or dissimilar metal corrosion. Direct contact of copper or steel parts to aluminum components in equipment handling water should be avoided because of possible dissimilar metal corrosion.

In summary, neutral water ($pH > 4 < 8.5$) that does not contain an aggressive anion can be safely used in aluminum equipment at ambient temperatures. At 100° C the stable pH range narrows to 2.5–5.5. The presence of an anion like chloride can cause localized or pitting corrosion of aluminum. The addition of certain inorganic or organic inhibitors to water solutions to lessen aluminum corrosion will be discussed later.

ALUMINUM-ALCOHOL REACTIONS

Anhydrous C_1-C_4 alcohols react directly with aluminum to give the corresponding aluminum alkoxide and hydrogen gas. Adsorption of the alcohol onto unoccupied cation valence sites on the aluminum oxide film gives formation of the soluble alkoxy substituted aluminum salts. Removal of the oxide film by dissolution, in turn, allows direct reaction of alcohol with aluminum, as shown in equations (4) and (5).[9]

$$Al(OH)_3 + ROH \longrightarrow Al(OR)(OH)_2,\ Al(OR)_2OH,\ Al(OR)_3 \qquad (4)$$

$$Al + 3ROH \longrightarrow Al(OR)_3 + \frac{3}{2}H_2 \qquad (5)$$

Water inhibits the alcohol-aluminum reaction because of the formation of the more insoluble hydroxy aluminum compounds at the oxide-metal interface. Solubility of the aluminum salts increases in the series $Al(OH)_3 < Al(OH)_2OR < Al(OH)(OR)_2 < Al(OR)_3$.

Broockmann[10] has reported extensive aluminum corrosion in anhydrous methanol, ethanol, n-propanol, n-butanol, and secondary butanol as well as in several glycols at reflux temperatures. The propanol and butanols gave complete dissolution of aluminum coupons within 4–14 hr. Ethylene, propylene, and butylene glycols dissolved aluminum coupons within 1–2 hr. Anhydrous isopropanol will dissolve an aluminum coupon to give aluminum isopropoxide and hydrogen gas.[11] Avery[12] has reported on the reactivity of pure aluminum with C_2-C_4 alcohols at their boiling points. An aluminum coupon was completely reacted in n-butanol within 40 min, in isopropyl alcohol within 8 hr. At elevated temperatures, 2-methoxyethanol reacts readily with aluminum to give the alkoxide and hydrogen. Other glycol monoethers that react with aluminum include methyl and ethyl diethylene glycol ethers and ethylene glycol ethyl ether.[12]

The use of ethanol with certain fluorocarbon aerosol propellants can cause extensive corrosion of aluminum aerosol containers.[13,14] The corrosion is attributed to the formation of the aluminum ethoxide and hydrogen. There is also some interaction between alcohol and fluorocarbon to give the corrosive hydrohalide acid. The presence of 1.5–2.0% water inhibits the alcohol-aluminum reaction.

The use of aluminum as a construction material for chemical handling equipment should be avoided if lower molecular weight aliphatic alcohols, glycols, or glycol monoethers are being used. Exceptions to this requirement may exist, since water tends to lessen the aluminum attack. However, the potential reaction between aluminum and hydroxyl functional groups could be dangerous since hydrogen gas is produced in the reaction.

There are no cases of equipment failure due to hydroxyl/aluminum reactions recorded in the literature. However, the product literature and Material Safety Data Sheets for many alcohols and glycols warn against prolonged contact with aluminum.

ALUMINUM-CHLOROHYDROCARBON REACTIONS

There have been several incidents of improper contact of a chlorohydrocarbon with aluminum and a resultant aluminum reaction. Although properly inhibited chlorohydrocarbons can be contacted with aluminum for short periods of time without aluminum corrosion, aluminum tanks, pumps, gauges, and associated equipment are not recommended for storage and handling of inhibited or uninhibited chlorohydrocarbons.

The improper contact of aluminum or aluminum powder with propylene dichloride, carbon tetrachloride, ethylene dichloride, and ortho-dichloro benzene have resulted in a number of violent reactions and, in some cases, the loss of life.[15–18]

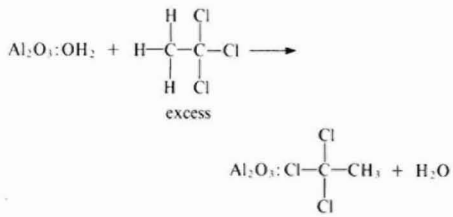
Stern and Uhlig[19] have systematically investigated the reaction of aluminum with carbon tetrachloride. They found that a definite induction period exists before carbon tetrachloride corrodes an aluminum coupon. However, the corrosion rate after this induction period is very high (approximately 40,000 mg/decimeter/day) and remains constant until the aluminum is consumed. Demo[20] has shown that high concentrations of water in areas of hot condensed chlorinated solvent can give catastrophic metal attack. Work by Archer, Simpson, and Harter[21,22] has shown that excess water promotes

corrosion at the solvent-water interface because the metal chloride reaction products can be easily dissolved from the metal surface into the water phase.

Several other uninhibited chlorinated solvents will completely react with aluminum, these include 1,2-dichloroethane, 1,2-dichloropropane, 1,1-dichloroethane, 1,1,1-trichloroethane, and 1,1,2-trichloroethane.[21] However, as with hydroxyl compounds, the addition of a variety of selected organic inhibitors will render each of these solvents noncorrosive toward aluminum and allow the use of the solvent in many applications.

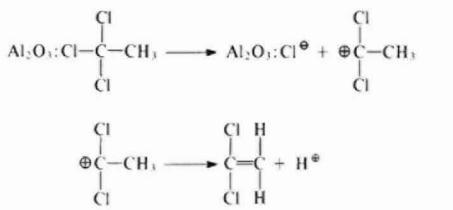
Work by Archer and Simpson[21,23,24] has revealed many interesting facts concerning the reaction of uninhibited solvents like 1,1,1-trichloroethane and methylene chloride with aluminum. Uninhibited 1,1,1-trichloroethane reacts immediately at room temperature with aluminum when the metal surface is scratched beneath the solvent. The resultant "bleeding" red color emitting from the scratch area is the solvent-aluminum chloride product complex. The products of reaction are metal salt, dimer, and unsaturated dimer. Subsequent dehydrochlorination (loss of HCl) of the solvent by the aluminum chloride product gives an unsaturated chlorinated product and hydrogen chloride.

The following reaction sequences have been proposed to explain the 1,1,1-trichloroethane-aluminum reaction.[23] Normally hydroxyl ions or water will be adsorbed on the aluminum oxide surface, to satisfy unoccupied valence sites. However, the oxygen containing species can be displaced by the chlorinated solvent, e.g., 1,1,1-trichloroethane (CH_3CCl_3), as in equation (6).



(6)

Ionization of a chlorine-carbon bond would give the species shown in equation (7).



(7)

Loss of a proton from the dichloro ethane carbonium ion gives vinylidene chloride ($CH_2{=}CCl_2$) a product that has been identified in the 1,1,1-trichloroethane-aluminum reaction.

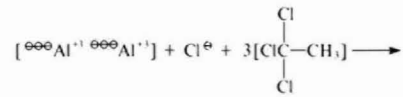
The adsorbed chloride ion, in turn, can degrade the protective oxide structure by formation of a basic aluminum hydroxychloride salt with the lattice cation $Al(OH)_2\oplus$ species as shown in equations (8) and (9).

$$Al(OH)_3 \rightleftharpoons Al(OH)_2^{\oplus} + OH^{\ominus} \quad (8)$$

$$Al(OH)_2^{\oplus} + Cl^{\ominus} \longrightarrow Al(OH)_2Cl \quad (9)$$

This reaction sequence suggested by Foroulis[5] can be used to explain the chloride ion induced breakdown of aluminum oxide films. The resultant soluble aluminum hydroxychloride salt, $Al(OH)_2Cl$, is removed from the oxide structure by complexing with the solvent.

The second reaction sequence between aluminum and 1,1,1-trichloroethane is shown in equations (10) and (11).

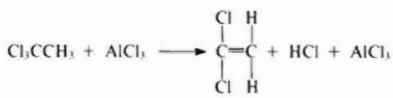


$$[\ominus\ominus\ominus Al^{+3}] + Al^{+3} + 4Cl^{\ominus} + 3(\cdot CCl_2CH_3) \quad (10)$$

$$3(\cdot CCl_2CH_3) \longrightarrow \frac{3}{2}(CH_3CCl_2CCl_2CH_3) \quad (11)$$

(I)

Homolytic cleavage of the carbon-chlorine bond and electron donation from the aluminum to chlorine atom gives identified products of aluminum chloride and product I, 2,2,3,3-tetrachlorobutane.[23] The aluminum chloride, a Lewis acid, can then degrade the solvent as shown in equation (12).



(12)

The aluminum chloride product is not consumed in the reaction and, thus, affords autocatalytic degradation of the solvent.

Dry, uninhibited methylene chloride solvent produces less than 1 mil per year penetration of aluminum at reflux temperatures.[21] The direct reaction between methylene chloride and aluminum involves a mechanism identical to the 1,1,1-trichloroethane reaction, see equation (13).

$$6CH_2Cl_2 + 2Al \longrightarrow 3ClCH_2CH_2Cl + 2AlCl_3 \quad (13)$$

The aluminum chloride does not react with the solvent, as it does with 1,1,1-trichloroethane, but the chloride salt does help enlarge the initial corrosion site by degrading the normally protective aluminum oxide film.

In summary, it has been well documented that many uninhibited chlorinated hydrocarbons can be corrosive toward aluminum. The reaction produces the metal chloride salt along with saturated and unsaturated dimers of the organic reactant. The aluminum chloride product enlarges the initial corrosion sites and can, in certain incidents, react with the solvent to give corrosive hydrogen chloride.

The addition of selected organic inhibitors to the solvent will prevent this natural solvent-aluminum reactivity. Use of the properly inhibited solvent allows the contact of a chlorinated solvent with aluminum in a variety of industrial applications. However, long-term

contact or storage of any chlorinated solvent with aluminum should be discouraged. Therefore, aluminum tanks, pumps, gauges, and associated equipment are not recommended for storage and handling of chlorinated solvents.

Studies are presently underway to determine the reactive potential of metallic pigments in coatings containing chlorohydrocarbons and cosolvents. Until this potential is understood, metallic pigment applications are generally not recommended and should be carefully tested.

REACTION OF CHLOROHYDROCARBONS AND CO-SOLVENTS WITH ALUMINUM

The addition of an alcohol cosolvent to a chlorinated solvent like 1,1,1-trichloroethane often enhances the aluminum reaction.[9] The presence of some copper, e.g., as an alloy metal, is apparently necessary for fast dissolution of aluminum in the cosolvent system. An aluminum coupon containing 4% copper starts to react within 10 min when placed into a 66 volume % inhibited 1,1,1-trichloroethane and 34 volume % methanol mixture at room temperature. Within 85 min, the coupon sustains a 63% weight loss. Reaction products include: vigorous hydrogen evolution, the reduced CH_3CHCl_2 product, and the $CH_3CCl_2CCl_2CH_3$ dimer. The use of ethanol and isopropyl alcohol as cosolvents in this reaction give longer induction times, probably due to trace amounts of water in the alcohols.

The 1,1,1-trichloroethane-methanol mixture does not react with a pure aluminum coupon at room temperature. In turn, a copper coupon does not degrade a mixture of 1,1,1-trichloroethane and methanol. Intermetallic particles, e.g., $CuAl_2$, may be acting as cathodic sites for the hydrogen evolution from the alcohol-aluminum interaction.[25] Refluxing mixtures of an inhibited grade of 1,1,1-trichloroethane and anhydrous isopropyl alcohol can also be very corrosive toward pure aluminum.[9]

The addition of an aromatic diluent such as toluene to uninhibited methylene chloride can dramatically increase the usually slow attack by methylene chloride on aluminum. Trace amounts of aluminum chloride from the normal metal reaction initiates a Friedel-Crafts reaction between the aromatic component and methylene chloride. The hydrogen chloride by-product of this reaction attacks the aluminum, giving more aluminum chloride catalyst and further increased rates in the Friedel-Crafts reaction.[24]

ALUMINUM-CHLOROFLUOROHYDROCARBON REACTIONS

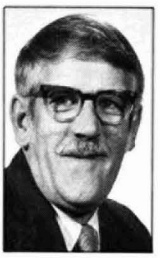
Chlorofluorohydrocarbons have outstanding chemical stability toward aluminum and other metals. This stability is linked to the small amounts of completely insoluble aluminum fluoride produced at the initial micro reaction sites. There is no solvent-salt complexing or dissolution; therefore, the initial reaction (defect in protective oxide film) site is sealed over by this insoluble aluminum fluoride product. For this reason, these solvents normally do not contain organic metal stabilizers. Eiseman[26] has, however, reported several incidents where catastrophic reactions have occurred between a chlorofluorohydrocarbon and aluminum impellers in large centrifugal compressors. Friction or abrasion between the aluminum impeller and compressor housing is believed to have initiated the runaway centrifugal compressor incidents. Production of a continuous oxide free aluminum surface with accompanied friction heat input was enough to trigger this thermodynamically favored reaction. The thermodynamic potential for this solvent-aluminum reaction is actually greater than for the chlorinated solvent-aluminum, but the insoluble aluminum fluoride salt product prevents reaction continuation.

The use of a cosolvent like ethyl alcohol with a chlorofluorohydrocarbon may cause unexpected aluminum corrosion problems in some applications. In aerosols, mixtures of anhydrous ethanol with fluorocarbon 114 or fluorocarbon 11 can cause severe corrosion of aluminum aerosol containers.[13,14] Water tends to decrease the corrosion potential of the alcohol-fluorocarbon mixtures.

SOLVENT-ALUMINUM INHIBITORS

Inhibitors for Water Solutions

Inhibitors for water solutions can be inorganic or organic compounds. Inorganic inhibitors can be classified as cationic, anionic, or oxidizing inhibitors.[27] The cationic and anionic inhibitors can function in three ways: first, reduce the open-circuit potential difference between adjacent anode and cathode sites; second, increase the electrical resistance of solution; or third, increase the polarization of anode or cathode sites.



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Chromates and molybdates are anionic inhibitors and probably function by precipitating corrosion products at the anode.[27] These inhibitors must be used in sufficient concentration to ensure complete anode coverage, otherwise pitting corrosion may occur. Other anionic inhibitors include nitrite, silicate, tungstate, and permanganate ions. Cationic inhibitors include magnesium, calcium, and nickel ions while oxidizing inhibitors that promote oxide film growth include chromate, nitrite, and permanganate ions. Three authors[27-29] have reported lists of various inorganic and organic inhibitors suitable for aqueous-aluminum systems.

Matasa and Setzer[30] have presented an excellent review of inhibitor use for aluminum in aqueous solutions under acid and neutral pH conditions. The authors comment on the use of inorganic and organic inhibitors which complex (chelate) with aluminum ions in the aluminum oxide lattice and reduce the tendency of aggressive anions to afford dissolution of the protective aluminum oxide film. Samuels and coworkers[31] have studied the use of complexing of chelate compounds to protect aluminum in sodium chloride solutions. They found that hydroxy carboxylic acid salts, like sodium citrate or tartrate, form soluble chelates that accelerate rather than inhibit corrosion. Sodium acetate, benzoate, and oxalate inhibit aqueous chloride corrosion of aluminum, with sodium benzoate being the most effective. Organic chelating agents, like cupferron, azelaic acid, and benzotriazole, offer fair inhibition of aluminum corrosion.

While many suggested inhibitors are cited in the literature for protection of aluminum in various aqueous solutions, no very satisfactory inhibitors are known for aluminum in strong alkali solutions. Strong acid solutions are almost as difficult to inhibit. Dangerous evolution of hydrogen occurs in both instances.

Inhibitors for Hydroxyl Containing Solvent

Inhibitors used in alcohols, glycols, and glycol monoethers are mostly organic compounds containing functional groups that are electron donors. Electron donor compounds such as ketones and aldehydes[10] compete with and displace the aggressive hydroxyl group from unoccupied oxide lattice sites. As previously mentioned, water may also act as an inhibitor by forming very insoluble aluminum hydroxide at unoccupied lattice sites. Avery[12] has found that a variety of ketones, aldehydes, nitro compounds, and certain inorganic salts inhibit the reaction between 2-methoxyethanol (a glycol monoether) and aluminum.

Chlorinated Solvent Inhibitors

In the reaction between aluminum and a chlorinated solvent, the aluminum chloride product is removed from the reaction site by solvent interaction. The inhibitor, a Lewis base, competes with the solvent for this aluminum chloride. The purpose of the inhibitor is to form an insoluble complex with the metal chloride produced at the initial microscopic reaction site.[24] This insoluble complex repairs the protective oxide film. Structures commonly cited in the patent literature as chlorinated solvent-metal inhibitors include ethers, sulfides, amines, carbonyls, nitriles, and alcohols.

Proprietary chlorinated solvent formulations can contain three different types of inhibitors: antioxidants, acid acceptors, and metal stabilizers. Solvents like trichloroethylene and perchloroethylene contain an amine or phenolic-type antioxidant to minimize air induced oxidation of the solvents. A few parts per million of hydrogen chloride that may be formed in many solvent applications are neutralized by the epoxy-type acid acceptors. The third type, metal stabilizers, may be one or more organic compounds needed to prevent the aluminum or other metal reactions. Perchloroethylene is the only commercially used chlorinated solvent that does not normally require a metal inhibitor. The other three, large scale, commercially available solvents—methylene chloride, 1,1,1-trichloroethane, and trichloroethylene—all contain varying amounts of one or more metal inhibitors plus an acid acceptor.

Abrasion or other mechanical action that will disturb or destroy the protective aluminum oxide film will, of course, make a normally stabilized chlorinated solvent more susceptible to aluminum attack. The surface area of the aluminum is also important, as witnessed by the tragic ballmill accident with aluminum powder and carbon tetrachloride.[16]

SUMMARY

Aluminum is a very reactive metal that may be corroded by a variety of water solutions or organic solvents. The water reactions, which are electrochemical in nature, or direct chemical attack by organic solvents can result in aluminum equipment failures.

The highly protective aluminum oxide film on the metal is an effective barrier that separates the reactive aluminum from various corrosive environments. Normally, hydroxyl ions or water will be adsorbed on the oxide surface to satisfy unoccupied aluminum cation valence sites. It is at this point that any aggressive anion like alkoxy or chloride can displace the normal hydroxyl and water species from the oxide lattice. This displacement results in formation of more solvent-soluble alkoxy, chloro or other anion salts of aluminum and gives dissolution of the protective oxide film. Exposure of a virgin aluminum surface will then result in a steady and rapid corrosion reaction which is temperature dependent. In water solutions or alcoholic type solvents, the product of consequence will be hydrogen gas. Chlorinated solvents will not directly yield hydrogen, but can produce gaseous hydrogen chloride. Further reaction of hydrogen chloride with aluminum can then give hydrogen gas.

The reaction of water solutions and organic solvents with aluminum can be inhibited in many cases with selected inorganic or organic compounds. The inhibitor acts by covering up or neutralizing the reactive sites on the aluminum oxide film. Organic inhibitors contain electron-rich functional groups which complex with the electron-deficient (Lewis acid) sites on the oxide and aluminum surface. Inhibitor structures include ether sulfide linkages, amines, ketones, aldehydes, nitriles,

and alcohols. An effective inhibitor will extend the induction period of the solvent-aluminum reaction for an infinite period. An extension of the induction period is equivalent to corrosion inhibition.

Many properly inhibited organic solvents or water solutions are successfully used in industrial applications where short-term aluminum contact occurs. However, the potential for corrosive attack by these solvents should discourage the use of aluminum equipment for the storage or long-term handling of these compounds. Users of the materials can obtain information on specific applications from equipment and chemical manufacturers.

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OPEN FORUM

An experiment in communications designed to give readers the opportunity to share creative concepts in all aspects of coatings. Suggested topics include color, formulation and manufacture, testing, and selection of raw materials. These "tricks of the trade" need not be prepared formally such as research papers, but should, however, be thorough in their preparation and presentation. Submissions should be sent to "Open Forum" Editor, Journal of Coatings Technology, 1315 Walnut St., Philadelphia, PA 19107.

Use and Misuse of Computers In Color Control

Hugh R. Davidson
Davidson Colleagues*

Introduction

For many years now, people have been using computers for color formulation and control with a high degree of success. In most cases, these people are successful not because their products are easily controlled, not because their color tolerances are wide, and not because their problems are less complex than those of other operators. They are successful simply because they use computers as mere tools, and not as replacements for a basic understanding of the factors involved in successfully coloring industrial materials. These operators have learned to say, "If we are getting poor results, it is probably because we are doing something wrong." They consider all aspects of specific problem colors and usually find a solution to the difficulty.

At the other extreme there are, unfortunately, people who make a few perfunctory stabs at using instrumental color control, and fail to get good results, and then try no more. These are the people who say, "It doesn't work; I told you so." It is not necessarily true that instrumental color control is desirable for all manufacturing operations. But, when one company claims failure and another company, making the same materials under the same conditions and using the same instruments, claims a high degree of success, the difference must lie in the attitudes of management or operating personnel.

My purpose here is to point out a few problems which lead to misuse of computers and thereby help to move some operators from the unsuccessful to the successful category.

Computation of initial colorant formulations is not, in itself, very difficult. The operator specifies a small group of pigments and asks the computer program to show him the least metameric and the least expensive formulations using any combination of these pigments. This seems simple and straightforward, and yet probably 80% of the problems encountered in color control can be traced directly to poor initial formulation. These problems show up not in the formulation programs but in the batch corrections. If problems are to be avoided, good formulation practice must be followed whether the job is being done visually or with instruments.

The Four Pigment Rule

The first requirement for good color formulation is to have full control of the color. This means that four pigments should be used, one of which is usually, but not always, white. Two of the pigments are needed for adjusting the hue and the other two are needed for controlling the lightness and the chroma, or the saturation, or the purity of the color. If fewer than four are used, situations will arise in which the color cannot be adjusted without introduction of additional pigments. The same situation can arise if one of the four pigments is used in such small quantities relative to the other nonwhite pigments, that its presence is almost insignificant. On the other hand, selection of pigments should be such that significant changes in the pigment ratios lead to significant changes in the color. Matching a yellow with three yellows and white, for example, is poor practice. Use of more than four pigments can also lead to unnecessary problems. There are, of course, many cases in which a fifth and possibly a sixth pigment is needed; for example, reduction of metamerism, or cost, or improvement of lightfastness. If a color can be matched

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Table 1—Standard vs Batch ΔE = 1.52

	Wt. Batch	% Batch	% Match	Wt. Add	Wt. Batch	% Batch	% Match	Wt. Add
Yellow oxide	1.70	0.20	0.14	0.00	1.70	0.20	0.20	0.00
LCR Yellow	34.00	4.00	4.35	18.82	34.00	4.00	4.34	3.00
Black	14.00	1.65	1.71	6.61	14.00	1.65	1.70	0.50
White	800.00	94.15	93.80	338.74	800.00	94.15	93.76	0.00
		ΔE = 0.00				ΔE = 0.11		

with the pigments available to the formulator, it can be matched in one light with only four pigments. The rule, therefore, should be to always use a four-pigment formulation unless there is a very good reason for using more or less.

"Correct" or "Reasonable"

Computer formulation programs do not force an operator to select the best overall formula. They merely point out which will be least metameric and which will be least expensive in terms of pigment cost. In fact, the formulator can be led astray by some programs if he does not consider his problems carefully. For example, if his computer program prints out the three least metameric and the three least expensive matches, all of these might use an insignificant amount of one pigment, leading to expensive control problems in production. There may well be other possible formulas just slightly more expensive or slightly more metameric which will be much easier to control.

Table I illustrates the sort of production control problem that can arise because of improper formulation. Two typical computer printouts are shown. In each case the first column shows the names of the pigments involved, the second shows the weight of each pigment in the batch, and the third shows the percent of each pigment in the batch. The fourth column lists the computed percent pigment required to match the batch, and the last column shows the weight of each pigment which must be added to the batch to achieve the computed percentages. The color difference between the standard and the batch is 1.52 FMCII units. This is close, but a correction is required. As the first printout shows, the computations call for a tremendous add of white to reduce this small color difference to 0.0 units. The operators in the unsuccessful category would say, "Isn't this ridiculous! Let's forget computer control." The operators in the successful category would say, "Let's see where the trouble lies."

It is apparent from *Table* I, that the problem arises because there is 0.20% of yellow oxide in the batch, but there should be only 0.14% to match the standard. To reduce 0.20% to 0.14%, the size of the batch must be increased by more than 300 pounds, most of which is white. As shown by the second printout, however, the batch may be corrected to a color difference 0.11 units by a small add of LCR yellow and black.

This illustrates the difference sometimes seen between a *correct* and a *reasonable* add. The add shown in the first printout is *correct*; to make a perfect match, all that white must be added, but this is not a reasonable add. A sufficiently close match can be achieved with a much smaller add. *Correct* adds, like the one shown, convince the unsuccessful operators that instrumental color control doesn't work. The successful operator knows what the problem is and uses his computer properly to get a *reasonable* add.

The major cause of the problem in this case, however, can be traced to improper formulation. The pigment selection does not permit adequate control of the color; the yellow oxide dulls the color in much the same way as does the black and amounts to only a very small percentage of the colored components. A greener yellow, an orange, and black and white would have given better control.

Even with proper formulation, however, similar situations can arise. In such cases the operator must recognize the difference between correct and reasonable adds. He must know how to use the computer to make a smaller add which will enable him to meet his color tolerance. In no case should an add, such as the one shown in *Table* I, be considered a failure of instrumental color matching.

A further question might be asked about this formulation. If it is so poor, why did the computer select it? The answer here is straightforward: the computer did not select it, the operator did. He looked at several possibilities and perhaps saw that this was the least expensive. It is the operator's responsibility to recognize that the least expensive or the least metameric match is not always the easiest to control.

Use Proper Formulations

Another source of batch correction problems involving misuse of computers is formulation with five pigments where four are sufficient. To illustrate this, suppose a tan color is being made with a formulation consisting of red, black, white, and two yellows which are essentially the same in color. One yellow might be made by company A, the other by company B, but otherwise there is very little difference. It will be apparent that the ratio of one of these yellows to the

Table 2—Sets of Reflectance Values for a Standard and a Batch

λ	Standard	Batch	Standard	Batch
400	5.61	5.58	5.6	5.6
420	5.54	5.52	5.5	5.5
440	5.55	5.52	5.6	5.5
460	5.56	5.52	5.6	5.5
480	5.90	5.85	5.9	5.8
500	6.16	6.10	6.2	6.1
520	5.54	5.53	5.5	5.5
540	4.89	4.90	4.9	4.9
560	4.65	4.66	4.6	4.7
580	4.57	4.58	4.6	4.6
600	4.54	4.55	4.5	4.6
620	4.54	4.55	4.5	4.6
640	4.58	4.59	4.6	4.6
660	4.62	4.63	4.6	4.6
680	4.51	4.53	4.5	4.5
700	4.59	4.60	4.6	4.6
DRG		0.43		1.15
DYB		0.22		0.69
DL		−0.02		0.09
ΔE		0.48		1.34

other is arbitrary. The ratio can be varied over a very wide range without causing any real difference in color. Because this ratio is arbitrary and because some value must be computed, any computer program may call for very large changes in the ratio, leading to tremendous adds to make small color changes. Although this is an extreme example, less extreme ones arise when two very similar pigments are used. Proper formulation eliminates the problem. Don't use five pigments where four are enough. Where five really are required to reduce metamerism, the ratios are not arbitrary and the computer program will handle the problem with no difficulty. When two pigments nearly identical in color must be used because of cost, availability, or other noncolor reasons, programs are available to handle the problem. In this case, however, the operator must recognize the situation and use the computer properly. Failure to do so may lead to very unreasonable, although probably correct adds.

Table 3—Standard vs Batch ΔE = 0.48

	Wt. Batch	% Batch	% Match	Wt. Add
Black	22.00	22.00	20.00	0.00
PH. Blue	38.00	38.00	40.00	6.01
LCR Yellow	38.50	38.50	38.00	3.31
White	1.50	1.50	2.00	0.70
		ΔE = 0.03		

Table 4—Standard vs Batch ΔE = 1.34

	Wt. Batch	% Batch	% Match	Wt. Add	Wt. Batch	% Batch	% Match	Wt. Add
Black	22.00	22.00	15.94	17.16	22.00	22.00	20.00	0.00
PH. Blue	38.00	38.00	46.12	75.30	38.00	38.00	40.00	6.01
LCR Yellow	38.50	38.50	37.34	53.23	38.50	38.50	38.00	3.31
White	1.50	1.50	0.61	0.00	1.50	1.50	2.00	0.70
		ΔE = 0.02				ΔE = 0.77		

Example Shows How

As a final example showing the necessity for proper use of a computer system, consider the problem of correcting a dark blue paint batch. Although this is a mathematically generated problem to illlustrate the point, it is nearly identical to similar problems encountered in control of industrial coatings.

Table 2 shows two sets of reflectance values for a standard and a batch. The first set leads to a color difference of 0.48 FMCII units. The second set is the same as the first except that the reflectance values have been rounded to the nearest 0.1%. This second set leads to a color difference of 1.34 units. Before considering any additional problem, this in itself is very disconcerting. These might be considered to be two sets of measurements differing from each other at each wavelength by a maximum of ±0.05%, which is a very small error indeed, and yet the computed change in color difference is visually significant. At the very least, this means that if the color must be controlled to better than about 1.5 FMCII units, averages of several measurements must be made. But now consider the batch correction obtained from these two sets of reflectance values.

Table 3 shows the batch correction based on the first set of values. The computed add is reasonable and would lead to a correction, if one were needed, of the small color difference.

The first part of *Table* 4 shows the batch correction based on the rounded reflectance values. The computed add is very unreasonable; *correct*, but not *reasonable*. In other words, this add can be considered as that computed from reflectance measurements which have a maximum random error of ±0.05%, well within the error specified by the instrument makers. In the second part of *Table* 4 the same add made in *Table* 3 leads to a proper correction, but not to a zero color difference.

The trouble here is caused by the fact that in a dark color of this sort, large changes in the formula often make only small changes in the color. It is not a case of poor formulation, but rather of the inherent problems of handling dark colors. To make a reasonable add, the operator must be able to use the computer in the appropriate manner.

Conclusion

In summary, if computers are to be used and not misused in color formulation and control, the operator must:

- Formulate his colors in a way that makes sense colorimetrically.
- Distinguish between reasonable and merely correct adds, and operate the computer in such a way as to produce *reasonable* adds.

Societies' Reports on Project Work Reflect Wide Scope of Technical Activity

These reports are published as part of the Federation's efforts to inform members of technical activities, both underway and planned, to stimulate interest in formulating new programs at the local level.

Baltimore

Current project is on Near Infrared Reflectance of Paint Pigments. This is a study to compile reflectance data on pigments in an acrylic vehicle for the red-infrared part of the spectrum: 600nm–2500nm. Dark coatings can be formulated from this information to have either high IR reflectance (to maintain a cool surface in direct sunlight, for example), or high IR absorbence (to promote a high surface temperature in direct sunlight). This concept may prove useful for more energy-efficient coatings to reduce air conditioning costs, and for metal implements that can become extremely hot from exposure to the sun. Spectra are being compiled on a Beckman DK2A Spectrophotometer, and collection of surface temperature data of duplicate colors with high and low IR absorbence pigments using high intensity lamps is planned . . . Cooperating in formulating and testing program with Mildew Consortium.

Birmingham

Recently completed an A/V program on An Introduction to the Paint Industry, for distribution to educators and students to promote interest in coatings careers; a copy has been forwarded to the Federation office . . . Have established awards for coatings-related technical papers . . . Subcommittee investigating possibility of correlating results obtained with 1978 edition of Color-Matching Aptitude Test . . . Cooperating with FSCT Ad Hoc Committee on Paint History; will compile historical data of paint manufacture in the U. K. Industrial Midlands . . . Planning a Technical Lecture addition to regular monthly program; initial presentation will focus on European Community Regulations on Labeling . . . Continuing marketing efforts on behalf of Federation publications and training aids.

Chicago

Four projects currently active. Biocides—Literature search being conducted on enzyme inhibitors and natural biocides; meanwhile, formulation work is underway using PCP latex supplied by Mildew Consortium—paints will be produced and exposed on test fences in conformance with protocols established by Consortium. Renewable Resources—Current activity is concentrated in two areas: (1) Review is underway of literature on starch as a renewable resource; (2) Economic analysis of cultivating, harvesting, and processing of desert plants (jojoba and guayule) is planned. Shelf vs. Oven Stability—Object is to determine degree of correlation (if any) between shelf stability at ambient temperature and the results of stability measured by accelerated oven tests at 120°F (or higher); data currently being gathered, and will be analyzed when appropriate. Water-Borne Anti-Corrosion Paints—Literature search has been concluded, and preliminary conclusion is that there is no correlation between salt-fog test results and actual corrosion; this conclusion is generally accepted by a number of researchers, and written critical review of test procedure is not planned. General compendium of published test results using salt-fog test is contemplated, if need for such an effort exists.

C-D-I-C

Cooperating in formulating and testing program with Mildew Consortium.

Cleveland

Initial work on Characterization of Functional Latexes for Autodeposition, which was reported on at 1981 Annual Meeting, is continuing; further investigation is being conducted into the effects of pH on electrophoretic mobility, with additional studies planned on the relationship of acid functionality to the rate of autodeposition. Objective is to provide more insight into the mechanism of autodeposition . . . Cooperating in formulating and testing program with Mildew Consortium.

Dallas

Two projects currently active, both of which are to be reported on in papers scheduled for presentation at 1982 AM: Viscosity Losses in Latex Paints; and Computer Design of Latex Flats to Meet Required Film Porosity and Paint Cost . . . Cooperating in formulating and testing program with Mildew Consortium.

Detroit

Blocked Isocyanates—Novel isocyanurate crosslinkers containing blocked isocyanate groups were synthesized and the kinetics of thermal dissociation were studied by isothermal thermogravimetric analysis in air and N_2. Isocyanurate crosslinkers containing aromatic and aliphatic isocyanates were blocked with methyl ethyl ketoxime and 2-ethylhexanol. Activation energies and frequency factors were measured and a method of calculating dissociation temperatures proposed. Project was reported on at 1981 AM (paper published in April '82 issue of JCT); further investigation will assess the effects of catalysts on unblocking of isocyanurate crosslinkers in the presence of hydroxy-functional polymers. Study is in progress on unblocking temperatures and cure rates of isocyanurate crosslinkers as a function of molecular structure of blocking agents . . . Two projects being undertaken in conjunction with Eastern Michigan University: (1) Computer Applications for Coatings—Survey will be conducted to determine current use of computers to assist coatings formulation and manufacture, with special attention to the practical aspects of implementation; coatings-oriented software for inexpensive "home" computers will be written, field-tested and published; (2) Novel Reactions for Low Temperature Crosslinking Polymers—Objective is to exam-

ine feasibility of crosslinking polymeric systems employing known, but virtually unexplored crosslinking agents. Reaction of disketamines with polymers containing nucleophilic substituents and those of tetraalkyltitanates with isocyanate-containing polymers will be studied.

Golden Gate

Continuing project work on corrosion control. Currently studying problem with salt fog cabinets in predicting the performance properties of water-borne primers to determine if there is some way to improve the correlation between salt fog and exterior exposure. This might include, for instance, drying for a long time at lab temperature, exposure in a QUV cabinet, exposure in a Weather-O-Meter, and low temperature baking; when data have been compared with actual exterior exposures, a second series of tests on physical properties of the films after "curing" will also be included in the study . . . Cooperating in formulating and testing program with Mildew Consortium.

Houston

Cooperating in formulating and testing program with Mildew Consortium.

Kansas City

Project work continues on Evaluation of Performance of Coatings on Exterior Hardboard Surfaces. All panels being evaluated (total of 120) have been put out at Kansas City for about one year at a near vertical south exposure, and checked at three-month intervals. Three different types of panels, by five manufacturers, are included: smooth lap (preprimed), textured lap (preprimed), and textured lap (unprimed). Four resin systems were used in the topcoats, each formulated in two colors at each of three PVC's: 35%, 43%, and 50%. Object is to identify cause of discoloration, peeling, and poor coating performance, and to develop proper coating recommendations for optimum performance over this type substrate . . . Cooperating in formulating and testing program with Mildew Consortium.

Los Angeles

Work on three projects will be reported on at 1982 AM: (1) Silane Treated Talcs—follow-up to presentation at 1981 AM in Detroit; (2) Viscosity of Coatings Materials—results of round-robin viscosity determinations on six standard samples; (3) Angular Color Characteristics—description of optical physics of newly-developed instrument for matching colors from high gloss to dead flat . . . Cooperating in formulating and testing program with Mildew Consortium and collecting paint mildewed samples for Dr. Klens . . . Gathering data on compliance coatings for input to California Air Resources Board Task Force.

Louisville

Three projects currently active: (1) Waste Disposal—Continuing work reported on at 1981 AM (paper published in May 1982 JCT) on Reclaiming Energy Value of Coatings Wastes Through Pyrolysis; current area being investigated is the solid char resulting from pyrolysis as a potentially reusable resource. This work is being conducted in conjunction with University of Louisville. Follow-up paper is planned for 1982 AM; (2) Corrosion-Inhibitive Pigments—Literature search is nearing completion on this project, with paper planned for 1983 AM . . . Cooperating in formulating and testing program with Mildew Consortium and collecting mildewed paint samples for Dr. Klens.

Montreal

Two projects currently active: (1) Adhesion to Latex Paints — This is study of adhesion of semi-gloss latex paint to alkyd substrates; to date, test method has been studied, with various substrates, testing times and different labs, used as variables. More recently, a designed (Plackett-Burman) experiment has been undertaken to evaluate the following formulation variables: PVC, coalescent level, propylene glycol level, polymer, adhesion additives, and TiO_2. It is hoped that the most significant variables will be identified and further work carried out; (2) Rheological Performance—Object is to gain better understanding of pigment settling; project involves use of a Brookfield viscometer, special measuring procedure, computer processing of the Brookfield data, and fitting into the Casson equation. Method makes use of the yield point, one of the constants obtained from the Casson equation, to predict settling. All samples examined thus far show good relationship between yield value and settling. As yield value increases, there is less tendency for system to exhibit sedimentation. Classes of paint examined include alkyd semi-gloss, traffic paint, latex paint, and experimental samples which were deliberately formulated to show sedimentation at different degrees; for each class of paint, were able to arrive at an empirical value at which sedimentation is very slow.

New England

Current work is focused on continuation of studies on corrosion resistance of aqueous acrylic coatings. Effect of Surfactants on An Aqueous Acrylic Coatings study includes testing various surfactants at three levels to determine their effect on dispersion, as well as on the salt spray and water resistance of the resultant acrylic coatings; anionic, cationic, and non-ionic surfactants are included in the study; paper planned for presentation at the 1982 AM . . . Developing a coatings formulating program for use with a personal computer; related project involves use of computer for evaluating environmental impact of coatings . . . Cooperating in formulating and testing program with Mildew Consortium.

New York

Project work, which has been lagging for some time, has been revitalized. Survey is being conducted on Utilization of Computers in the Coatings industry; this includes information, hardware, software (manufacturing, laboratory, specialized process, and office procedures). Form has been distributed to coatings manufacturers throughout U.S. and results are planned for presentation at 1982 AM . . . Sub-committee has been formed to study Effects of Additives; literature search is underway and areas being considered are: Surface Tension-Related Problems in High Solids Coatings; and Loss of Drying in Water-Reducible Coatings Due to Drier Acid Variations . . . Cooperating in formulating and testing program with Mildew Consortium . . . Sub-committee being formed to study Rheology of Coatings . . . Additional sub-committees being considered for: collection and distribution of information on governmental regs and methods of compliance; investigation of flash point of water-reducible paints; investigation of effects of surfactants; wetting agents or dispersants on such films and paint properties as scrub, gloss, adhesion, viscosity, stability, contrast ratio, etc. . . . Revitalized project activity has been aided by recruiting "old timers" to again assist in these efforts.

Northwestern

Technical Committee has been reorganized . . . Project work is underway on determining Effects of Application Conditions (wind speed or air flow, temperature and humidity) on the Performance of an All Acrylic House Paint; tests completed to date show no difference in performance that can be correlated to application conditions. Additional tests are planned, with a report anticipated for presentation at the 1983 AM . . . Cooperating in formulating and testing program with Mildew Consortium.

Pacific Northwest

Project has been initiated on Evaluation of Poplar Hardwood vs. Cedar Conventional Softwood, with the objective of determining relative merits of hardwood substrates for exterior siding installations. Old-growth, large-diameter softwoods of the West are diminishing; conventional sawing method for softwoods include sawing green, drying and planing. This method works well with species having little growth stress; hardwoods, however, do not work well due to growth stresses that are released, creating warp upon cutting and are further warped when conventional drying is used. A method has been developed called SDR (Saw, Dry and Rip—drying at high temperature) which is effective in eliminating warping, creating a viable source of wood for the building industry. Coatings industry must have good understanding of the weatherability of present exterior coating capabilities on these substrates. Project plan is to acquire quantity of rough poplar and cedar beveled siding for exposure in the Seattle-Tacoma area . . . Cooperating in formulating and testing program with Mildew Consortium.

Philadelphia

Active program subcommittee schedules papers for monthly Technical Committee meeting; efforts have been successful in drawing attendance, but have developed few additions to project volunteers . . . Sponsoring May seminar on "Modern Dispersion Technology" . . . Work continuing on investigation of the HLB number system for dispersible resins for its use in the coatings industry . . . Sub-committee has been reactivated to review past work on the flash point technique; one variable to be studied is effect of high solids on flash point . . . Study of Arrhenius Plot is currently in abeyance; project is to apply the Arrhenius Plot technique to evaluation of data form lab studies and control tests . . . A/V program planned on Microbiological Audit for a Paint Plant, as well as a six-unit series on Color . . . Projects under consideration include developing a set of pictorial standards for application defects, especially the type occurring from commercial spray application, such as pinholing, sagging, and cratering.

Southern

Completed development of brochure on Consumer Guide to Trade Paint Quality, which has been published by Federation. This is designed to educate the consumer on quality criteria and an awareness of the limitations of lower-priced products; brochures will be distributed to retail dealers for use as a point-of-purchase selling aid. National Decorating Products Association is cooperating in distribution to their member dealers . . . Cooperating in formulating and testing program with Mildew Consortium.

Toronto

Three projects are in various stages of development: (1) Oxidative Dry Retention of Water-Reducible Alkyds—Effect of Glycol Ethers—This is a new project, being undertaken to investigate the degradation of glycol ethers and its effect on dry retention; (2) Relationship of CPVC to Binder Index—Continuation of project reported on at 1979 AM; current focus is on investigating effect of pigment particle polydispersity on CPVC; (3) Parameters Affecting Wear Rate in Small Media Mills—Project is nearing completion and data being evaluated; paper will probably be presented at 1983 AM.

Society Meetings

BALTIMORE — April
VIRGINIA SECTION

"Solvent-Borne Millbase Development for High Speed Dispersion of Titanium Dioxide"

Calvin C. Tatman, of the Chemical/Metalurgical Division of SCM Corp., presented "SOLVENT-BORNE MILLBASE DEVELOPMENT FOR HIGH SPEED DISPERSION OF TITANIUM DIOXIDE."

Mr. Tatman introduced various equations and relationships important to his work. Central among these was the Guggenheim Equation used to calculate proper mill base formulation based on viscosity.

With the aid of extensive charts and graphs, Mr. Tatman showed that, for the paints tested, the Daniel's wet point value, using the specific resin(s) to be employed in the dispersion process rather than the Gardner-Coleman value in the Guggenheim Equation, gave rise to a Specific Vehicle Approach Equation for help in designing an optimum millbase for high speed dispersion equipment. In addition, slight modifications to Patton's Nomograph extended its utility for predicting dispersion properties of newer, high solids vehicles.

Mr. Tatman worked with several different types of TiO_2 and a number of different resins to confirm the applicability of the studied systems. It is thought that the approach presented has broad applicability, but more detailed study is warranted in specific cases, said Mr. Tatman. Generally, the Specific Vehicle Approach gives a relatively direct way of achieving sound millbase formulation.

Q. Has a similar study been conducted for water-based systems?

A. The work is in process but results are not available at this time.

CARL B. MINCHEW, *Secretary*

BIRMINGHAM — May

"An Investigation Into the Comparison Between Artificial Weathering and Outdoor Exposure In Various Paint Systems"

Gerhard Wilker, of Hoescht AG, spoke on "AN INVESTIGATION INTO THE COMPARISON BETWEEN ARTIFICIAL WEATHERING AND OUTDOOR EXPOSURE IN VARIOUS PAINT SYSTEMS."

According to Mr. Wilker, the weathering fastness of colorants takes 1-3 years to assess in Southern Florida. To reduce test times, said Mr. Wilker, a variety of test methods are being evaluated by Hoescht in three metallic automotive paint systems. They are an alkyd/melamine nonaqueous dispersion, an acrylic/melamine nonaqueous dispersion, and a two-coat paint consisting of an oil-free polyester/CAB/melamine basecoat and an acrylic/melamine topcoat.

Change of shade (delta E) values for various pigments are obtained, Hoescht's work being to DIN 53 235, in reduction with rutile titanium dioxide.

The affect of UV absorbers is shown to have a significant bearing on the performance of the two coat-system in results to date, explained Mr. Wilker.

Mr. Wilker concluded that results varied with pigments, media, whether UV absorbers were present, with the test methods' inherent variability, and with the poor correlation between some methods.

Q. Why were all pigments tested at one-third reduction? Why not take the manufacturers' recommendations?

A. Some base line had to be established; this was ours.

Q. Have your results been shown to West European car manufacturers, and what were their reactions?

A. Certainly in West Germany, and I believe in the UK. No adverse comments have been received so far. Users' experience also bears this out.

Q. How do Florida and Xenotest results compare with exposure in Western Europe?

A. Tests in Frankfurt give the same results as in Florida, and you have seen data comparing Florida with the Xenotest.

Q. Are your Florida tests extended beyond 1 year? Does UV absorber effectiveness become exhausted, causing failure of pigments which need their protection?

A. Current work is of 1½-2 years duration. The final arbiter of pigment acceptibility must be the user.

D.H. CLEMENT, *Secretary*

CLEVELAND — May

"60th Anniversary"

Nineteen Past-Presidents attended the 60th Anniversary Meeting. In attendance were: Jack Malaga (1980-81), Paul Houck (1979-80), Charles Beck (1978-79), Helen Skowronska (1977-78), Fred Schwab (1976-77), Tom Keene (1975-76), Don Fordyee (1974-75), Paul Sleeman (1971-72), Vic Sandorf (1967-68), and Ken Waldo (1965-66). Also present were: W.J. Bair (1964-65), Bob Taub (1963-64), Bob Evans (1960-61), Fred Hollenberg (1958-60), George Selden (1957-58), Mike Malaga (1956-57), Sam Huey (1949-50), G.H. Mutersbaugh (1940-41), and Ed Schulte (1938-39).

Frank Borrelle, Executive Vice-President of the Federation, congratulated the Cleveland Society on its 60 years of active membership and commended it for having a program that has maintained the interest and participation of the distinguished group of past presidents.

Dr. Raymond R. Myers, University Professor at Kent State University and retiring Director of the Paint Research Institute, was elected to Honorary Membership in the Society.

Twenty-five year pins were presented to Fred Schwab, of Coatings Research Group, Inc., and Charles Beck, of Premier Industrial Corp.

Awards Committee Chairman Mike Malaga presented Merit Awards for outstanding contributions to the benefit of the Cleveland Society to Charles Beck, and to Paul Houck, of Morgan Adhesives Co.

Vic Sandorf, on behalf of the Cleveland Society and its Education Committee, in cooperation with the Cleveland Area schools science fair, presented $100 awards to three high school students, who then gave a brief description of their projects.

William Mirick, of Battelle Memorial Institute, gave a brief history of Battelle Laboratories. He described it as the largest nonprofit research institute in the world with projects that cover or have covered most branches of science.

DONALD C. DENISON, JR., *Secretary*

GOLDEN GATE — May

"Where Color Systems Come From And Where They Are Headed"

Jim DeGroff, of Applied Color Sciences, Inc., discussed "WHERE COLOR SYSTEMS COME FROM AND WHERE THEY ARE HEADED".

Mr. DeGroff traced the early steps of color control by machines and computers and discussed the science of color and how it is handled by computer.

KEN TRAUTWEIN, *Secretary*

Cleveland Society for Coatings Technology 1982–83 Officers. From left to right: Secretary—Raymond Podlewski; Incoming Past-President—Carl J. Knauss; Treasurer—Richard Horger; President—Girish C. Dubey; Society Representative—Fred G. Schwab; President-Elect—Harry Scott; and Assistant Treasurer—Robert D. Thomas

Past-Presidents in attendance at the 60th Anniversary of the Cleveland Society for Coatings Technology

KANSAS CITY — May

"PRI Video"

A PRI video presentation, narrated by PRI President Peter Robinson which detailed the five-year accomplishment plan for PRI, was shown. Discussed were the plan's scientific, technical, communicational, and monetary aspects. Also, a consortium approach to the areas of corrosion, aqueous coatings, and high solids coatings was recommended by Mr. Robinson. A mildew consortium is already taking place. Mr. Robinson concluded by stating that 70% of PRI support comes from large companies.

MELVAN L. BOYER, *Secretary*

LOS ANGELES — May

"Awards Night"

Al Seneker, Awards Committee Chairman, presented 25-year pins to the following Society members: William T. Cloake, of Neville Chemical Co.; Daniel H. Gelfer, of Ameron; Leslie W. Huoy, Jr., of Kerr McGee Chemical Co.; Donald I. Jordan, of Cargill, Inc.; Dr. Stephen S. Kane, of East Los Angeles Junior College (retired); Charles Y. Miyada, of Reichhold Chemicals, Inc.; J.T. Modawell, of C.P. Hall Co.; and J.C. Newcomer, Jr., of Major Paint & Varnish Co. Twenty-five year members not present at the meeting were: John V. Croul, of Behr Process Corp.; Chester I. Edmondson, of J.E. Bauer Co. (retired); C.K. Myers, of C.K. Myers Engineering, and Jerome A. Woolf, of Techform Laboratories, Inc.

Outstanding Service Awards were presented to Dermont G. Cromwell, of Sinclair Paint Co.; James R. Elliott, of J.R. Elliott Enterprises, Inc.; Robert A. McNeill, of PPG Industries, Inc.; and Trevellyn V. Whittington, of Parke-Davis & Co.

James T. DeGroff, of Applied Color Systems, Inc., presented "EXPANSION OF COLOR CONTROL AND PRACTICAL PAINT APPLICATIONS".

Mr. DeGroff stated that color technology has advanced in the last 5 years. He discussed where we are headed, what it means to the coatings manufacturers and the products and technology that are under development.

First, DeGroff defined a color system as a color measurement instrument, such as a spectrophotometer, used in conjunction with a computer and the software for operation and calculations for: (1) Colorant identification; (2) Measuring color difference; (3) Determining and adjusting color strength; (4) Color matching; and (5) Production improvement.

Mr. DeGroff next described the components of a color system. First, however, he stressed the importance of sample preparation in color control for reliability and reproducibility of data. The spectrophotometer measures the reflected light from a sample for color characterizations. The computer provides an instantaneous and reproducible analysis of the color. The color systems industry is working on the concept of a standard optical base to develop reproducible standards common to all instruments and systems. In other words, said Mr. DeGroff, the objective is to develop an absolute color system or mathematical standards that could ultimately eliminate wet samples. Limiting factors at this time are sample preparation and specification variables.

The newest color systems are completely integrated with the color instrument and the computer working together in conjunction with a videoterminal, lineprinter, memory disc, controller, and microprocessors for the collection and analysis of data, explained Mr. DeGroff. These systems are becoming more functional with computational devices to analyze production problems. The software capabilities are advancing to deal with hiding problems, base characterization, and other trade sales and industrial QC and production problems. Mr. DeGroff described "operator friendly" or realistic and understandable programs for technicians of variable capabilities.

Mr. DeGroff discussed other present and future system capabilities. LABCAL is an add-on program to advance laboratory formulations into production control environment. Production control programs are available for management information involving order entry, raw material, batch tickets, conversion of volume and pounds and time information. The Visual Color Simulator, based on the Maxwell Disc, creates color from components with a controlled light source. Color can be predicted or formulated mathematically from base standards. Adaptation of this Visual Color Simulator System to dispensing for tinting system has exciting possibilities, said Mr. DeGroff. Complete color control for production in the textile industry is now being done and is soon expected for the coatings industry. A computer formulation of any color could be dispensed into any size batch for production into inventory. Finally, the ultimate step is to proceed from a color chip to the computer to manufacturing without an intermediate laboratory step!

Mr. DeGroff concluded by stressing that color technology does not stop in the laboratory. ACS is involved with color in the textile, cosmetics, plastics, printing

ink, and coatings industries. Color problems are interrelated and ACS is dedicated to the concept of designing color control systems for any industrial production environment.

EARL B. SMITH, *Secretary*

MONTREAL May

"The Purchasing, Sales, and Technical Interface"

Society Officers elected for 1982–83 include: President—John Flack, of International Paints Canada Ltd; President-Elect—Bert Papenburg, of Canada Colors Inc.; Secretary—Mike Megelas, on International Paints Canada Ltd.; Treasurer—Dennis Yokota, of Indusmin. Horace Philipp, of Sherwin-Williams Canada Ltd., will continue as Society Representative.

Presented with a 25-year pin was D.A. Connor, of NL Chemicals Canada, Inc.

A panel discussion featuring "The Purchasing, Sales, and Technical Interface" was presented. Speakers included: K. Alcock, of C-I-L Paints, Inc.; P. Rheaume, of NL Chemicals Canada, Inc.; and G. Simpson, of the Trade Sales Div., SICO, Inc.

Mr. Alcock briefly outlined the purchasing function. He stated that this is a large responsibility when one considers that raw materials represent 50% of the cost of paint. Mr. Alcock said that too much emphasis is placed on price by many purchasing agents while he himself felt that effective purchasing is based upon a balance of price, appropriate quality level, and supply. Also, Mr. Alcock said that adequate presentation of requirements by the purchasing agent to the sales representative is essential in order that he can make a meaningful presentation of customer requirements to his management.

Mr. Rheaume described the sales function. He stated that ideally a sales representative should be an educator and communicator with technical competence in regard to the products he sells and their application, since the expertise and technical competence of purchasing agents and technical personnel precluded the high pressure sales tactics of the past. Also, in today's business environment technical advantages or price incentives are usually short-lived. Mr. Rheaume gave his impression of a successful sales representative based upon a personal survey with purchasing agents. The three outstanding qualities were: (1) Quiet, soft spoken, friendly; (2) Reliable; and (3) Knowledgeable. As far as job fulfillment was concerned, Mr. Rheaume said that of all people in industry the sales representative has the greatest opportunity to develop sales, and increase productivity and overall performance of his company.

Mr. Simpson outlined the technical function stating that it accounted for substantial contributions in many areas due to wide range of involvement. The knowledge of a product's performance and how it compares to competitive products is very important, according to Mr. Simpson, since this may provide the basis for technical back-up internally for product development and to other departments such as marketing and sales. The technical function also encompasses research with new technology and raw materials, evaluation of competitive products, training personnel, and acting as referee between company and consumer where there is always potential conflict.

ERIC J. TEMPLETON, *Secretary*

NEW ENGLAND May

"Annual Elections"

Officers for 1982–83 were elected: President—John Fitzwater, of Polyvinyl Chemical Industries, Inc.; Vice-President—N. Bradford Brakke, of Lilly Chemical Products; Treasurer—Robert Hicks, of Fish Chemical & Equipment, Inc.; and

Secretary—Charles Hoar, of Union Chemicals Div.

Society Past Presidents in attendance included: Robert Andrews (1950–51); Fremont Wood (1970–71); Richard Granito (1972–73); Daniel Toombs (1973–74) and (1980–81); Ray Illingworth (1974–75); James Craffey (1975–76); Thomas Manning (1976–77); Paul Muellar (1977–78); and Martin Davis (1978–79).

Thomas Manning, of Samuel Cabot, Inc., and Augustus Herman, retired, were recognized as 25-year members.

A plaque was presented to Robert Marderosian, Chairman of Tech Expo '82 by President Modrak on behalf of the Society in recognition for his outstanding work as chairman of the Society's "Coatings Tech Expo 82."

Guest speaker for the meeting was Dick Flavin, television personality and raconteur.

N. BRADFORD BRAKKE, *Secretary*

NORTHWESTERN April

"Federation Visit"

Honored guests in attendance were Federation President Howard Jerome and Field Services Director Thomas Kocis.

Mr. Kocis opened the program with a slide presentation covering the organization of the Federation, the income and expenses, the paint show, training meetings, and publications which have been prepared or published by the Federation.

Tom said that there are 6600 members in the Federation. He also pointed out that education is one of the basic reasons for the Federation's existence. It is to provide education to its members as well as provide scholarships and scholarship funding for five schools that have a curriculum in Coatings. An Ad Hoc Committee has been appointed by President Jerome to study and make recommendations which the Federation can pursue to bring students into the Coatings industry, explained Mr. Kocis.

Several of the audio-visual programs that had been prepared by the societies and are used by others as training films were discussed. Also, pictures of the members of the various committees, such as Finance, Program, Corrosion, Manufacturing, Publication, etc., were shown.

The new brochure which was developed by the Southern Society for Coatings Technology and published by the Federation, was shown. "Know Paint Quality Before You Buy" is an excellent consumer guide to trade paint quality. Paint stores can pass out the brochure to their customers to help educate the consumer in paint quality.

Mr. Kocis explained that the Paint Research Institute (PRI) has undergone some critical self-evaluation and evaluation from Federation Society members and has reacted positively to the input it has received. They have a tape available which will give you a good insight into the organization.

Mr. Kocis said that the Roon Foundation awards have been increased to $3,000 this year. The Federation anticipates receiving about 23 papers to be entered in the competition this year.

The annual paint show in Detroit drew about 5,700 people, making it the largest show to date. Mr. Kocis showed slides of the award winning booths.

Mr. Kocis said Jules Bergman, the science editor of ABC will be the Keynote speaker at the Washington DC meeting this fall and Mark Russell will be the luncheon speaker on Friday. This should be another outstanding meeting and show. Next year, the meeting will be held in Montreal.

President Jerome outlined the reasons why they are interested in visiting all of the societies. These reasons are: understanding what the Federation is; why we joined together; benefits we as members should expect; and why our federation does what it does and what they expect from the membership.

Mr. Jerome was concerned that we are not getting young people into the industry. There are scholarships available, however, they are not able to interest young people into paint careers. An Ad hoc committee has been appointed to study the problem and come up with some other technique to interest people to enter the coatings industry. A book on the *History of Paint* is being prepared. The target date for the publishing is sometime in 1985.

An excellent talk on motivation was presented by Mr. Jerome. Bosses and employees have got to make it together, he said. Every person in one organization is in the same boat, they either float or sink together. You never sink half a boat. The Society and Federation is like a boat, it is every person's effort that keeps this boat afloat. Rewards come back to those who participate and they earn the respect and plaudits of their peers. Each of us should have goals and strive to reach them in 1982, stressed Mr. Jerome.

Man is revealed in a crisis, said Mr. Jerome. He is made day to day and when a crisis comes along he is just the sum total of what he has invested in himself, his character, his knowledge, and know how on all the days that preceded. You prepare for the future job by the way you do the present one. If you want to get ahead you just don't fill the job, you overflow the job. Many people don't understand the thrill of working on a Society Committee involved in a project that makes a contribution to the industry, to their jobs, and to themselves. The happiness and most abiding satisfaction will come to you thru work well done. Work well done will give you self-respect and you will earn the respect of others. It isn't that you don't think big enough, you don't work big enough, said Mr. Jerome.

HERB DAVIDSON, *Secretary*

PACIFIC NORTHWEST April

"Compliance Solvents Options for The Industrial Coatings Industry"

A 25-year pin was presented to Brice Supler, of John Fluke Co.

Violete L. Stevens, of Dow Chemical Co., discussed "COMPLIANCE SOLVENTS OPTIONS FOR THE INDUSTRIAL COATINGS INDUSTRY."

According to Ms. Stevens, there have been changes made in the Environmental and Clean Air Acts in the U.S. The State Limitation Plan replaces the rule 66 act in a minimum of solvent per gal. Compliance solvents do not generate smog in the atmosphere; two solvents are methyl chloroform and dichloromethene (Methylene Chloride). The Clean Air Act in 1977 is an achievement of N.A.A.Q.S.—that by 1987 a 0.12 PPM emission level is reached. Criteria of the act are mutagenacity, teratogenicity, carcinogenicity, chronic toxicity, epideiology, and environmental effect. Because of the low emissions, compliance solvents can almost be treated as water. Aluminum is not to be used. Costs are approximately 1½ times xylene, etc.

O. SCHMIDT, *Secretary*

PHILADELPHIA May

"Water-Borne Acrylic Elastomeric Roof Coatings"

"WATER-BORNE ACRYLIC ELASTOMERIC ROOF COATINGS" was presented by Joseph Lombardo, of Rohm and Haas Co.

Approximately 20 years ago, an entirely new class of roof coatings was developed called elastomers, said Mr. Lombardo. These new roofing materials, applied as fluids or sheet, have gained market share at the expense of conventional bituminous build-up roofing materials.

According to Mr. Lombardo, one group of materials used for these roof coatings is acrylics. Acrylic latex-based roof mastics are used as reflective/protective coatings over various substrates such as conventional bituminous build-up roofs, polyurethane foam, galvanized steel, concrete, wood, and asphalt roof shingles. Elastomeric roof mastics differ from paint because they expand and contract along with the roofing substrate

to which they are applied without rupturing, explained Mr. Lombardo.

The role of acrylics in the roofing industry and characteristics of the various performance properties expected of acrylics in roofing applications was discussed by Mr. Lombardo.

Q. Can you apply this over commercial asphalt felt?

A. The system is being applied over many bases. Not so much over felt as over a polyester mat laid on a first coat of elastomer still wet and then applying another coat of elastomer. This gives a better, more resiliant coating than asphalt felt.

Q. How about patching?

A. This is fairly easy with all water-based systems. A brush, roller, trowel, etc., can be used. Large cracks should be caulked or covered with a polyester mat as described before and then coated. These roofs are currently being given a 10-year warranty with the limitation that the roofer come back after 5 years and be allowed to repair cracks, etc.

Q. Do you have test result data?

A. We have 45 months of exposure on fences at Newtown, Pa. and all panels are holding up very well. We have a roof at our Bridesburg plant with over two years of exposure and it is still in excellent condition.

RALPH MYERS, *Secretary*

PIEDMONT — May

"Computer Selection of Solvent Blends"

Dr. Albert C. Rocklin, of Shell Development Co., discussed "COMPUTER SELECTION OF SOLVENT BLENDS."

Dr. Rocklin gave a brief history as to why solvent blend replacements have been sought through the years of coatings history. One such reason was the implementation of Rule 66. He mentioned three specific reasons for reformulation: (1) regulations, (2) unavailable or discontinued solvents, and (3) solvent cost. He discussed the solvent blend substitution principle, which basically states that in a "same" solids system to replace a solvent, one would be looking for same basic properties and same performance, but different composition.

The best computer program can be optimized by entering the most important solvent properties such as evaporation characteristics, solubility parameters, tractional polarity, and hydrogen bonding, explained Dr. Rocklin. Replacement blend can be computed for values considered important to the formulator. Dr. Rocklin stressed that the computer becomes a "tool" to the formulator. The replacement blend showed improved (meaning lower viscosity) equal or better blush resistance and a significant savings.

JIM HUSTED, *Secretary*

PITTSBURGH — May

"Design Considerations for High Solids Reactive Coatings"

New officers elected for 1982-83 were: President—William Cibulas, Mobay Chemical Co.; President-Elect—Michael Gillen, of Van Horn, Metz & Co., Inc.; Secretary—Cliff Schoff, of PPG Industries, Inc.; Treasurer— Joe Mascia, of Campbell Chemical Co.; and Society Representative—Ed Vandevort, of PPG Industries, Inc.

Dr. Loren Hill, of Monsanto Plastics and Resins, presented a talk entitled, "DESIGN CONSIDERATIONS FOR HIGH SOLIDS REACTIVE COATINGS."

Dr. Hill covered three main areas; viscosity of the unpigmented system, viscosity of the pigmented system, and cure. In a unpigmented system there are various ways to use the Glass Transition Temperature to lower viscosity. Lower molecular weight of the vehicle solution also will lower the viscosity. Careful selection of the pigments and testing of the pigmented coating is necessary, said Dr. Hill. During the initial baking cycle the viscosity will drop way down and you need flow control additives. Extra crosslinking vehicles will be needed because of the low molecular weight vehicle. Some of the crosslinking vehicle will be used to get to the typical molecular weight of standard coatings and the balance to get the cure.

MICHAEL GILLEN, *Secretary*

ROCKY MOUNTAIN — May

"Color Control Systems"

President Steve Crouse announced the slate of officers for 1982-83: President—Don Bagge, of George C. Brandt, Inc.; Vice-President—Don Shillingburg, of Union Oil of California; Secretary—Luis Garcia, of Kelly-Moore Paint Co.; and Treasurer—Larry Lewandowski, of J.D. Mullen Co.

Jim DeGroff, of Marketing Color Systems, discussed "COLOR CONTROL SYSTEMS."

Mr. DeGroff described computer color controls in paint formulations.

DON M. SHILLINGBURG, *Secretary*

ST. LOUIS — May

"Effective Paint Waste Treatment"

The following slate of officers was elected for 1982-83: President—Joseph J. Wrobel, Jr., of Ciba-Geigy Corp.; Vice-President—Robert J. Giery, of Spatz Paint Industries, Inc.; Secretary—William Truszkowski, of Mozel Chemical Products Co.; and Treasurer—Charles L. Grubbs, of Rockford Coatings.

A slide presentation entitled "THE WHYS AND WHEREFORES OF CARTRIDGE FILTRATION IN THE COATINGS INDUSTRY," was given by Donald S. Onnen, of AMF Cuno Division.

Edward M. Antonucci, of Drew Chemical Corp., discussed "EFFECTIVE PAINT WASTE TREATMENT."

ROBERT J. GIERY, *Secretary*

SOUTHERN MEMPHIS SECTION — May

"Cartridge Filtration in the Coatings Industry"

Election of officers for 1982-83 included: Chairman—Pat Parker, of Archway Chemical & Supply; Vice-Chairman—Brian Budzien, of United Paint Co.; Secretary/Treasurer—Jeff Dore, of Ashland Chemical Co.; and Social Chairman—Valerie Johnson, of Union Chemicals.

Donald Onnen, of AMF Cuno Division, spoke on "CARTRIDGE FILTERATION IN THE COATINGS INDUSTRY."

FSCT Membership Anniversaries

25-YEAR MEMBERS

Cleveland

Charles K. Beck, of Premier Industrial Corp.

Fred G. Schwab, of Coatings Research Group, Inc.

New England

Augustus H. Hermann, Society Honorary Member.

Thomas Manning, of Samuel Cabot, Inc.

Montreal

D.A. Connor, NL Chemicals Canada, Inc.

Pacific Northwest

Brice Supler, of John Fluke Co.

Elections

CLEVELAND

Active

BOATWRIGHT, JOSEPH H.—Sherwin-Williams Co., Cleveland, OH.
FIGOLI, ANDREW N.—Continental Products Co., Euclid, OH.
HUDDLESTON, ROBERT J.—Nordson Corp., Amherst, OH.
MEYERS, JOSEPH A.—Sherwin-Williams Co., Cleveland.
VO, NGOAN V.—Empire Plating Co., Cleveland, OH.
WIITA, RONALD E.—Thiele Kaolin, Wadsworth, OH.

GOLDEN GATE

Active

ANTHONY, WILLIAM B.—Glidden Coatings & Resins, Div of SCM Corp., San Francisco, CA.
FEGAN, CAROL A.—Midland Div. Dexter Corp., Hayward, CA.
KELLY, JAMES J.—O'Brien Corp., S. San Francisco, CA.
KENNEDY, J. PATRICK—Oil Systems, Inc., San Leandro, CA.
LONGMORE, JEFF—International Paint Co., S. San Francisco, CA.
VERGNE, ALVARO F.—Midland Div. Dexter Corp., Hayward.

Associate

KELLY, MARK W.—TCR Industries, Emeryville, CA.
SPENCER, DAVID R.—Dow Chemical Co., Walnut Creek, CA.

KANSAS CITY

Active

AYRES, ROBERT GORDON—Welco Mfg. Co., Inc., N. Kansas City, MO.
DISPENSA, NICK F.—Davis Paint Co., Kansas City, MO.
HAINES, ROGER E.—Farmland Industries, Inc., N. Kansas City, MO.

Associate

KELLY, EDWARD, A.—Ashland Chemical Co., Kansas City, KS.

LOS ANGELES

Active

ALLMAN, JACK C.—Whittaker Corp., Colton, CA.
DAVIES, MEL K.—Break-Free Division, Irvine, CA.
HEARST, PETER J.—Naval Civil Engineering Laboratory, Port Hueneme, CA.
JAKSTIS, ADOLPH M.—Mobay Chemical Corp., Irvine, CA.
KING, JOSEPH E.—McCloskey Varnish Co., Los Angeles, CA.
LITWIN, GERALD J.—Break-Free Division, Irvine.
THOMPSON, CARL V.—Consultant, Cerrifos, CA.
TROSKA, JAMES L.—Adcoat Inc., Placentia, CA.
VELASQUEZ, ANTONIO, A.—Engard Coatings Corp., Huntington Beach, CA.

Associate

PROBIZANSKI, ANNE M.—Ampro Technologies, Riverside, CA.
TAK, FREDLICH CHUN—Chung Wa Trading Co., Hollywood, CA.

LOUISVILLE

Active

KELLEY, JOHN R., JR.—Kelley Technical Coatings Inc., Louisville, KY.
OLSON, STEPHEN, S.—Louisville Varnish Co., Louisville, KY.

NEW YORK

Active

AUSTIN, HUGH C.—Reliance Universal, Somerset, NJ.
GENNA, ROBERT—Suffolk Cty Crime Lab, Bohemia, NY.
GREENE, MURRAY—Hawthorne Paint Co., Inc., Hawthorne, NJ.
HALL, RICHARD K.—Camvac International, Brewster, NY.
HYNES, LAURIE A.—Chemray Coatings Corp., Middlesex, NJ.
ILARIA, JOSEPH E.—International Paint Co., Inc., Union, NJ
MEYERS, FRANCIS H.—C.A. Venezolana De Pin, Valencia, Venezuela
SANTIMAURO, MARK D.—Benjamin Moore and Co., Newark, NJ.
SAVAGE, RICHARD L.—Boise Cascade, Lowville, NY.
RIBBECKE, LAWRENCE—PLR Consulting Service, Inc., Brooklyn, NY.

Associate

GANNON, M. E. GENE—Dow Corning Corp., Parsippany, NJ.
GICZY, VINCE R.—North American Paint Corp., Wanamassa, NJ.
GOVINDARAJU, JAGANNATH—Interrad Corp., Stamford, CT.
MICHALSKI, JOSEPH C.—AZ Products Co., Newark, NJ.
TOUHILL, DAVID M.—Pfizer, Inc., Easton, PA.

NORTHWESTERN

Active

MAHPOUR, SAIED—Warner Industrial, Minneapolis, MN.

Associate

BRUNETTE, BRUCE J.—Wagner Spray Tech., Minneapolis, MN.
CHILDERS, J. R.—Mobay Chemical Corp., Osseo, MN.
REILLY, JAMES F.—Horton Earl Co., St. Paul, MN.

Educator and Student

LIN, I-CHYANG—North Dakota State Univ., Fargo, ND.

PHILADELPHIA

Active

GUTTERIDGE, WILLIAM H.—Lawrence McFadden Co., Philadelphia, PA.
MILLER, GLENN F.—Lilly Industrial Coatings Inc., Paulsboro, NJ.
MILNE, JOHN S.—Kem Solv., Blue Bell, PA.
ROCCO, PETER J.—Glidden Coatings & Resins Div. SCM Corp., Reading, PA.
SHAW, KATHRYN G.—Hercules Inc. Wilmington, DE.
TINH, NGUYEN—Arco Chemical Co., Newtown Square, PA.

Associate

LAWRENCE, DAVID A.—Eastman Chemical Co., Downingtown, PA.
LESS, CHARLES M.—Rohm and Haas Co., Philadelphia, PA.
MARCUS, JAY—Phillips & Jacobs Inc., Philadelphia.
MCDONALD, PATRICK J.—Reichhold Chemicals Inc. Dover, DE.
MILLER, ROY—Kerr McGee Chemical, Parsippany, NJ.
NG, EDWARD—American Cyanamid Co., Haddonfield, NJ.
ROYAL, H. L. BOYER—H. M. Royal, Inc., Trenton, NJ.
ROYAL, TOM B.—H. M. Royal, Inc., Trenton.
SORTINO, RALPH L.—Neville Chemical Co., Pittsburgh, PA.

ROCKY MOUNTAIN

Active

MEADOWS, WILLIAM D.—Cyprus Industrial Minerals Co., Englewood, CO.

SOUTHERN

Active

BOCK, JAMES E.—Chemical Waste Mgmt. Fl., Pompano Beach, FL.
HUBICKI, PETER M.—Union Chemicals Div., Charlotte, NC.
KOEBERT, FRAN—Johnson Paints, Inc., Ft. Myers, FL.
ROBERTS, CURTIS C.—John L. Armitage Co., Tallatin, TN.

ROBERTS, DANIEL J.—Manufacturing Co., Orlando, FL.
SCHUSSLER, DAVID P.—Dupont Co., Pass Christian, MS.
STAHNKE, KENNETH F.—Chemical Waste Mgmt. Fl., Pompano Beach.
WILLHITE, JOHN—Gilman Paint and Varnish Co., Chattanooga, TN.

Associate

PENN, MELVIN L.—Kerr-McGee Chemical Corp., Decatur, GA.
SERNA, JAIRO—Devilbiss Latinomerca, Miami, FL.
TURNER, GERALD D.—Nyco Div. PMI, Marietta, GA.

TORONTO

Active

CHIU, SAM—Microcolor Dispersions Ltd., Toronto, Ont., Can.
FLETCHER, GEORGE A.—Continuous Colour Coat Ltd., Rexdale, Ont., Can.
KENNEDY, BRIAN—Home Hardware Stores Ltd., Paints Div., Burford, Ont., Can.
LEE, ISAAC T.—Inmont Canada Inc., Toronto, Ont., Can.
PETERSON, SUSAN—CIL Paints, Inc., Concord, Ont., Can.
ROYCE, JAMES WILLIAM—PPG Industries Canada Inc., Dundas, Ont., Can.
WARING, JOAN—BF Goodrich Co., Kitchener, Ont., Can.
ZAFAR, RASHID MIAN—Reichhold Ltd., Toronto, Ont., Can.

Associate

AMBURY, JOHN F.—Debro Chemicals, Rexdale, Ont., Can.
AWADALLA, STEVE M.—Canada Colors & Chemicals Ltd., Don Mills, Ont., Can.
BAIN, CHRISTOPHER—Microcolor Dispersions Ltd., Toronto, Ont., Can.
DELPLACE, STEVEN—Iroquois Chemicals, Mississauga, Ont., Can.
HANSON, PETER C.—Indusmin Ltd., Toronto, Ont., Can.
KING, DENNIS J.—Iroquois Chemicals, Mississauga, Ont., Canada.
LOANE, GREG—Loane Associates Ltd., Mississauga, Ont., Can.
PRITCHARD, PETER—L. V. Lomas Chemical Co., Ltd., Mississauga, Ont., Can.
SCHAFFER, JOSEPH F.—Colloids Canada, Inc., Toronto, Ont., Can.
SMITH, IAN M.—Kelco Specialty Colloids Ltd., Toronto, Ont., Can.
STANDEVEN, FRED—Dow Corning Canada, Inc., Mississauga, Ont., Can.
VARSAVA, DAN—Monsanto Canada, Ltd., Mississauga, Ont., Can.

WESTERN NEW YORK

Active

DEPIETRO, MICHAEL—Pratt & Lambert, Inc., Buffalo, NY.
HALTRECHT, MONICA M.—NL Industries, Inc., Tonawanda, NY.
WOLFF, JEFF S.—Hercules Inc., Akron, OH.

'Talks Available' Booklet Increased to 72 Selections

The 1982-83 listing of "Talks Available for Constituent Societies" contains a total of 72 presentations which are available for the upcoming meeting season. Divided into eight subject headings, the booklet presents 17 new titles.

The booklet, compiled and distributed to the Societies by the Federation, includes for each presentation: (1) Title; (2) Name of speaker; (3) Company affiliation; (4) Geographic areas where the talk is available; (5) Equipment needed; (6) Abstract; (7) Biographical sketch of the speaker; and, if applicable, (8) Where and when talk has previously been given.

The following presentations are listed:

Additives

"Role of Acetylenic Glycols in Water-Borne Coatings"—Air Products & Chemicals, Inc.

"Fumed Silica for the Rheology Control of High Solids Coatings"—Cabot Corp.

"Rheology Modifiers"—Rohm and Haas Co.

"Opaque Polymer"—Rohm and Haas Co.

"Driers for Water-Borne Coatings"—Tenneco Chemicals, Inc.

"Anti-Microbials Used in Coatings and Plastics"—Tenneco Chemicals, Inc.

Colors and Pigments

"List of Five Presentations on Color Control and Appearance"—Applied Color Systems, Inc.

"Non-Lead, Non-Chromate Corrosion Inhibitor for Alkyd Paints"—Buckman Laboratories, Inc.

"Non-Lead, Non-Chromate Corrosion Inhibitor for Latex Paints"—Buckman Laboratories, Inc.

"Enhanced Performance in Lower Cost Latex Flats"—Burgess Pigment Co.

"Quality with Thermo-Optic Silicates as the Foundation"—Burgess Pigment Co.

"Computer Color Formulation: Versatility and Ease of Utilization"—Diano Corp.

"Computer Color Matching—Getting More for the Investment"—Diano Corp.

"Extenders—The Inorganic Backbone of Flats and Primers"—Minerals & Chemicals Div. Engelhard Corp.

"Discrete Pigment Particle Technology"—Hilton Davis Chemical Co.

"Colorant Formulation: Pigment Selection"—CIBA-GEIGY Corp.

"Development of Computer Selected Blends"—CIBA-GEIGY Corp.

"New Mineral for Coatings"—Cyprus Industrial Minerals Co.

"Update on Talc in Coatings"—Cyprus Industrial Minerals Co.

"Talc—That Crazy White Stuff"—Cyprus Industrial Minerals Co.

"Organic Pigments: Past, Present, and Future"—Sun Chemical Corp.

"Pigment Dispersions, Ecology, and Economics"—Universal Color Dispersions.

Production

"The 'Whys' and 'Wherefores' of Cartridge Filtration in the Coatings Industry"—AMF Cuno Div.

"Portable Shipping Containers—Past, Present, and Future"—Clawson Tank Co.

"Carbon Black in Aqueous Coating Applications"—Columbian Chemicals Co.

"Dispersion of Carbon Black in Coating Systems"—Columbian Chemicals Co.

"Particle Size Reduction Techniques, Agitator Media Mills"—Netzsch, Inc.

"Inerting for Safety in Coatings Plants"—Neutronics, Inc.

"High-Speed Paint Filling"—Pfaudler Co., Subsidiary of Sybron Corp.

"Horizontal Media Mills"—Premier Mill Corp.

"Powder Handling with the Air-Pallet® Semi-Bulk Container System"—Semi-Bulk Systems, Inc.

"Latex Paint Spoilage vs. Plant Housekeeping"—Tenneco Chemicals, Inc.

"Attritor Grinding and Dispersing Equipment"—Union Process Inc.

"The Sandpiper"—The Warren Rupp Co.

Resins

"Film Surprises or Irregularities in Water-Borne and Higher Solids Industrial Systems"—Cargill, Inc.

"Two-Component, Water-Borne Epoxy Materials for Industrial Maintenance Coatings Systems"—Celanese Plastics & Specialties Co.

"Aluminum Cross-Linkers for High-Solids Coatings"—Manchem, Inc.

"Vinylidene Chloride Copolymers for Paint"—Pacific Scott Bader Inc.

"The Application of Water-Borne Industrial Finishes"—Spencer Kellogg Div. of Textron Inc.

"Water-Borne Resins for Trade Sales and Maintenance Coatings Meeting Low VOC Regulations"—Spencer Kellogg Div. of Textron Inc.

"Formulating for High Solids Industrial Coatings"—Spencer Kellogg Div. of Textron Inc.

"Formulating Urethanes Baked on Water-Dispersed Urethanes"—Spencer Kellogg Div. of Textron Inc.

"Water-Borne Maintenance Coatings"—Spencer Kellogg Div. of Textron Inc.

"High Solids Coatings—Past, Present and Future"—Spencer Kellogg Div. of Textron Inc.

Solvents

"Economic Recovery of Solvent Vapors"—DCI Corp.

"Recovery of Paint Wash Solvent—An Economic and Environmental Necessity"—DCI Corp.

"Chlorinated Solents—The Solvent Option for Low VOC Coatings"—The Dow Chemical Co.

"Solvent Recovery with the Pfaudler Wiped Film Evaporator Unit"—Pfaudler Div., Sybron.

"Computer Prediction of Evaporation of Aqueous Solvent Blends with Any Number of Cosolvents at Any Humidity"—Shell Development Co.

(Continued on page 69)

Hazardous Materials Exposition Scheduled for October 25-28

The second national technical conference and trade show devoted exclusively to hazardous materials management will be held October 25-28 at the Convention Center in Cincinnati, OH. The "Hazardous Materials Workshops and Exposition" is sponsored by the Hazardous Materials Management Association in conjunction with the Ohio Environmental Protection Agency.

Workshops and displays will cover the science and technology of storing, handling, and using nonradioactive hazardous substances and hazardous waste disposal. Already, 75 exhibitors have purchased space for the show. A program is being planned for the various workshops which will be featured.

For more information, contact The Hazardous Materials Management Association, 1406 Third National Bank Bldg., Dayton, OH 45202.

2nd World Congress on Bridge Coatings Scheduled for October

The 2nd World Congress on Coatings Systems for Bridges and Steel Structures has been scheduled for October 26–27, LaGuardia Marriott Hotel, East Elmhurst, NY. The conference is sponsored by the University of Missouri-Rolla in cooperation with the Institute for Bridge Integrity and Safety, the Federal Highway Administration, the Steel Structures Painting Council, and the Painting and Decorating Contractors of America.

The major themes of this year's event will be contaminants on steel surfaces, field and shop application, and new coating materials and techniques. Emphasis will be given to user experiences with conventional systems compared with new coatings systems.

The following presentations will be featured at the two-day conference:

Tuesday, October 26

"Introductory Address"—H. Sloane, New York City Dept. of Transportation.

"Relationship Between Surface Cleanliness and Paint Performance"—L. Igetoft, Swedish Corrosion Institute.

"Corrosion on Bridges"—C. Hare, Clive Hare Inc.

"Corrosion Protection for Thames Barrier"—A.K. Kidd, Sigma Coatings, Ltd.

"Coatings for Hand-Cleaned Structural Steel"—R. Deanin, University of Lowell.

"Specifications and Other Problems in Shop Painting"—B. Kase and R. Hess, High Steel Structures, Inc.

"Field Application and Overcoating of Zinc-Rich Coatings"—C. Ray, Georgia Institute of Technology.

"Pre-Qualifying Contractors for Structural Steel Painting"—N. Strauss, Certified Painting Systems, Inc.

"Unsaturated Polyester Coatings for Bridges"—N. Estrada, Reichhold Chemicals, Inc.

Wednesday, October 27

"Status and Role of New Alternate Corrosion Inhibiting Pigments"—J. Keane, Steel Structures Painting Council.

"Effectiveness of New Power Tool Cleaning Methods"—P. Hollister, 3M Co.

"Corrosion of Unpainted Weathering Steel: Causes and Cure"—G. Tinklenberg, Michigan Dept. of Transportation.

"Problems in Disposing of Lead-Based Bridge Paints"—L. Stevens, Massachusetts Dept. of Public Works.

"Water-Borne Maintenance Coatings: Formulation, Application, and Film-Forming"—R. Washburne, Rohm and Haas Co.

The session will also include accounts of actual field performance of new vs. conventional coatings on bridges. Participating highway departments include Maryland (G. Kolberg), Florida (R. Ramsey), Massachusetts (L. Stevens), West Virginia (J. O'Leary), Michigan (G. Tinklenberg), Maine (D. LeLand), and N.Y.—N.J. Port Authority.

Industry participants include H. Bennett, Subox Coatings, R. Hergenrother, Mobay Chemical Co., R. Washburne, Rohm and Haas Co., K. Haagenson, Buckman Laboratories, and C. Fuller, Reichard-Coulston.

Dr. Bernard Appleman, of Exxon Research and Engineering Co., is Program Chairman.

For additional information, contact Norma R. Fleming, congress coordinator, Arts and Sciences Continuing Education, University of Missouri-Rolla, Rolla, MO, 65401.

'Talks Available' Offers 72 Selections

"Computer Selection of Solvent Blends"—Shell Development Co.

"Evaporation During Sprayout of a Typical Water Reducible Paint at Various Humidities"—Shell Development Co.

Testing

"Current Use and Trends—Accelerated Weathering Tests in the United States"—Atlas Electric Devices Co.

"The Inside-Out Story of Exposure Tests"—Atlas Electric Devices Co.

"Exposure Evaluation: Part II—Bronzing"—CIBA-GEIGY Corp.

"Exposure Evaluation: Quantification of Changes in Appearance of Pigmented Materials"—CIBA-GEIGY Corp.

"An Irreverent Look at Computers and Their Relationship to the Lab, Sales, Office and the Boss"—Marblehead Testing Labs, Inc.

"Will Computerized Technology Solve the Dispersion Problem?"—Marblehead Testing Labs, Inc.

"Know Your Enemy—The Weather and How to Reproduce It in the Laboratory"—The Q-Panel Co.

"An Investigation of Abrasion Resistance"—Shamrock Chemicals Corp.

Environmental

"Effective Paint Waste Treatment"—Drew Chemical Corp.

"Environmental Update"—Sun Chemical Corp.

"Disposal of Hazardous Combustible Waste"—SYSTECH Corp.

Miscellaneous

"List of Presentations on Various Motivational, Technical, and General Topics"—The Warren Rupp Co.

Romeo Capanni, of Swiss Association, Elected President of FATIPEC, 1983–84

Romeo Capanni, of George Fey & Co. AG, St. Margrethen, Switzerland, has been elected President of FATIPEC for 1983–1984. He will assume office on January 1.

FATIPEC, founded in 1950, is the Federation of Associations of Technicians in the Paint, Varnish, Lacquer, and Printing Ink Industries of Continental Europe. It is composed of member associations in Belgium, France, Germany, Hungary, Italy, Netherlands, and Switzerland.

Seven hundred persons attended the XVIth Congress of FATIPEC in Liege, Belgium, in May. Ten plenary conferences and 60 lectures were presented under the general theme, "Evaluation and Determination of Film Properties of Organic Coatings, by the Use of Modern Analytical Methods." The Congress was chaired by the current President, Dr. Andre Toussaint, of the Belgian Association.

The annual meeting of the International Committee to Coordinate Activities of Technical Groups in the Coatings Industry was held during the Congress. Members of ICCATCI are: FATIPEC, Federation of Societies for Coatings Technology, Oil and Colour Chemists' Association, Oil and Colour Chemists' Association—Australia; Federation of Scandinavian Paint and Varnish Technologists, and the Japan Society of Colour Material.

FATIPEC and OCCA are discussing the possibility of the joint sponsorship of a European exhibition of raw materials, and processing & laboratory equipment, to be held every four years in the same location. Details will be announced later.

The XVIIthe Congress of FATIPEC will be held from September 23–28, 1984, in Lugano, Switzerland.

The Secretary General of FATIPEC is Christian Bourgery, c/o Maison de la Chimie, 28 Rue St. Dominique, 75 Paris (7), France.

ISCC-IES to Host Color Conference in Williamsburg, VA

The Inter-Society Color Council and its Member-Body, the Illuminating Engineering Society of North America, will jointly sponsor a Conference on Color and Illumination entitled, "Man Lights, and so, Colors his Environment," February 6-9 at the Colonial Williamsburg Lodge, Williamsburg, VA.

The Conference is directed toward satisfying the aims and purposes of the sponsoring societies: to promote communication between creative workers in coloring and in lighting; to understand, to enjoy, and to exploit to the benefit of all the enormous gamut of variations in coloration which may be brought about by joint control of colorant and illuminant. For this purpose, speakers have been selected from a wide variety of color and lighting related fields, providing a program of varied hue and dimension that will enrich the experience of every participant. Ample time will be reserved for open discussion and for informal presentation of new data and ideas.

The program includes the following presentations on Illumination and Color:

"Esthetics and Psychological Aspects of Lighting"—George Clark, of GTE Sylvania.

"Photography"—Roy DeMarsh, Of Eastman Kodak Co.

"Daylighting"—Ben Evans, of Virginia Polytechnic Institute and State University.

"Architecture"—Raymond Grenald, of R. Grenald Associates.

"Interiors"—Rita Harrold, of Westinghouse Electric Co.

"Energy Conservation"—Al Hart, of General Electric Co.

"Merchandising"—Bob Hillman, of Sears Roebuck and Co.

"Office Lighting"—Jim Kaloudis, of Meyer, Strong, and Jones.

"Public Places"—Candace Kling, of Kling Lighting Design.

"The Work Environment"—Allan Lewis, of the State University of New York.

"Paintings and Illustrations"—Joy Turner Luke, of Studio 231.

"The Theatre"—Jim Nuckolls, of Incorporated Consultant Ltd.

"The Museum"—Ed Robinson, of the Smithsonian Institute.

"Colorants and Color Matches"—Allan Rodrigues, of E.I. du Pont de Nemours and Co.

"Teaching Students of Architecture and Design"—Bob Smith, University of Illinois.

"Esthetics of Interior Spaces"—Alec Styne, of Recio and Styne.

Further information can be obtained from the General Chairmen, Charles W. Jerome and William A. Thorton, Westinghouse Lamp Div., One Westinghouse Plaza, Bloomfield, NJ 07003. For a descriptive brochure and registration form contact the Publicity Chairman, Dr. Fred W. Billmeyer, Jr., Dept. of Chemistry, MRC 217, Rensselaer Polytechnic Institute, Troy, NY 12181.

Paint Formulation Course Offered at UMR

The University of Missouri-Rolla, Rolla, MO will sponsor "Paint Formulation," September 13-17.

This 7th Introductory Short Course is designed for persons interested in the basic fundamental concepts of this science. It will cover basic raw materials and their influence on the performance characteristics of the finished coating; manufacturing and testing of coatings in the laboratory; limitations of plant production equipment and the variables that can be introduced when a coating is moved from the laboratory to the plant; simple cost accounting that allows beginners to start on a stable economic basis; and systems for reducing variables in screening series. Laboratory experiments will illustrate how to solve formulation problems. In an intensive lecture and laboratory situation, principles taught in lectures will be practiced and opportunity will be offered to test own ideas. Participants will learn how to solve formulation problems imposed by government regulations, using methods of calculating formulas that assure compliance. Course director is John A. Gordon, Jr. Cost for the course is $455.

For further information or to register please contact, Arts & Sciences, Continuing Education, UMR, Rolla, MO 65401.

NPCA 'Decorate With Paint Seminars' Aid Consumers

The National Paint and Coatings Association (NPCA), in cooperation with the Atlanta Paint and Coatings Association and the Atlanta Decorating Products Association, sponsored two "Decorate With Paint Seminars" on May 8, in Atlanta, GA. The seminars, which aided consumers in everything from choosing the correct paint color to proper surface preparation, were part of the NPCA's national "Picture it Painted" month program.

Speakers for the seminars included: Leonard Diamond, President of Goodman Decorating Co., who demonstrated painting techniques; Bonnie Bender, Manager of Color Marketing, PPG Industries, Inc., who discussed how color is the most important tool in decorating and offered consumer tips on selecting color schemes; Thad Broome, Technical Director, Precision Paint Corp., who explained the differences between the various types of paint and discussed how consumers can determine which one to use for their specific job; and Babs Moore, Atlanta area stenciler.

A slide program featuring how to decorate with paints and stains, which was produced by NPCA, was also presented.

Consumers attending the seminars received free packets of decorating information and a $5 certificate towards their next paint purchase.

SUNY to Sponsor Science and Technology Program

The State University of New York, New Paltz, NY, will sponsor its Fall Institute In Science and Technology program which includes four short courses beginning October 13 and continuing through November 4.

Included in the program are the following courses.

October 13-15—"Fundamentals of Adhesion: Theory, Practice and Applications" coordinated by Dr. Lieng-Huang Lee, of Xerox Corp., Webster, NY.

October 18-22—"Scanning Electron Microscopy and X-Ray Microanalysis: Theory and Practice in Materials Science" chaired by Dr. Oliver C. Wells, of IBM Thomas J. Watson Research Center, Yorktown Heights, NY and Dr. Alec N. Broers, of IBM East Fishkill Facility, Hopewell Junction, NY.

November 1-3—"Water-Soluble Polymers: Synthesis, Structure and Applications" chaired by Dr. George W. Butler, of the University of Florida, Gainesville, FL.

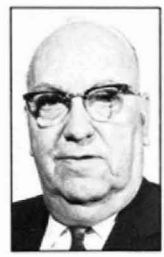
November 1-4—"Understanding Polymer Science: Synthesis, Characterization, Properties" chaired by Dr. Kenneth J. Smith, of State University of New York, Department of Chemistry.

For additional information, contact Dr. Angelos V. Patsis, Professor and Chairman, Chemistry Dept., State University of New York, New Paltz, NY 12561.

People

William H. Ellis, of Chevron Research Co., El Segundo, CA, was elected an Honorary Member of the Los Angeles Society at its June meeting. Mr. Ellis, a Past-President of the Society has served on numerous committees and was General Chairman of the 1972 West Coast Societies' Symposium. He also served as President of the Federation (1980-81) and is a member of the Board of Directors and Executive Committee. He is currently chairman of the Federation's Finance and Nominating Committees.

W.H. Ellis



W.W. Vasterling

H.M. Werner

J.E. King

Willard W. Vasterling was made an Honorary Member of the Kansas City Paint and Coatings Association. Mr. Vasterling, who is a Past-President of that association, was also President of the Federation of Societies for Coatings Technology in 1969-70.

Frederick Sullivan, Senior Project Leader for Arthur D. Little, Inc., Cambridge, MA, was named a 1982 recipient of the Award of Merit by ASTM. Mr. Sullivan, of Wilmington, MA, received the award in May during ceremonies hosted by ASTM Committee E-18 on Sensory Evaluation of Materials and Products in Quebec, Canada. He was cited for his widely recognized leadership in sensory testing methodology and consultation. Mr. Sullivan is a founding member of Committee E-18 and has served as its Chairman from 1972-76.

Dickson Y. Cannon has joined the Jones-Blair Co. as Technical Director. Mr. Cannon is a member of the Louisville Society.

Alexander Kitun has retired from General Printing Ink, a division of Sun Chemical Corp. He plans to continue association with Sun as an independent consultant under the firm name of Kitun and Associates, Inc., 678 Buena Vista Dr., Glen Ellyn, IL, 60137. Mr. Kitun has been involved with the coatings industry for 42 years. He is a member of the Chicago Society.

Nalco Chemical Co. has announced the promotion of **William F. Myszkowski** to Manager, Corporate Quality Assurance. He most recently served as Senior Technical Programmer Analyst.

Harold M. Werner, a consultant to the Coatings and Related Industries, was named a 1982 recipient of the Award of Merit by ASTM.

Mr. Werner, of Olmsted Township, OH, was honored in June during ceremonies hosted by ASTM Committee D-1 on Paint and Related Coatings and Materials in Toronto, Canada. He was cited for promoting the standardization of paint testing through Committee D-1, serving as its Secretary and Vice-Chairman for several terms, serving as Secretary of the Coordinating Committee for Flash Point, and participating in ASTM and International Organization for Standardization activities.

Mr. Werner has been associated with the Glidden Coatings and Resins Div. of SCM Corp. since 1942 when he joined the staff as a Varnish Chemist in Reading, PA. He held the positions of Group Leader of Resins and Polyesters, acting Chief Chemist of the Eastern Region, Technical Director of the Eastern Region, and Manager of Laboratory Administration. In 1972, he was named Manager of Quality Assurance, the position he held when he retired in February 1982. In 1975, he was given the temporary assignment of Operations Manager of Lackwerke Wulfing, a subsidiary of the Glidden-Durkee Div., Wuppertal, Germany.

Mr. Werner is a member of the Cleveland Society.

Joseph P. Vento has joined Bee Chemical Co. as Director of Marketing for the Business Products Division.

The Union Chemical Division, Union Oil of California, has announced the appointments of **John E. Acres** and **John W. Wood** to the position of Area Manager. Mr. Acres will assume responsibility for sales in the Birmingham, AL area and Mr. Wood will be responsible for the Dallas, TX region.

McCloskey Varnish Co. has announced the appointment of **Joseph E. King** to the position of Industrial Sales Manager for the Los Angeles, CA facility. He will assume responsibility for sales and pricing of industrial division products for California and the Southwest. Mr. King is a member of the Los Angeles Society.

Also announced by the firm was the appointment of **Ray Simons** to Director of marketing and Sales of Consumer Products.

PPG Industries, Inc., Coatings and Resins Division announced the following appointments in their Research and Development Department at the laboratory facilities located in Allison Park and Springdale, PA.

James A. Claar was appointed Research Associate. He began his career with PPG in 1969. Mr. Claar is a member of the Pittsburgh Society for Coatings Technology and the National Association of Corrosion Engineers.

Appointed Project Leader is **James F. Keeney,** a nine-year PPG employee. He is a member of the American Chemical Society and the Society of Manufacturing Engineers.

William G. Simeral, Executive Vice-President of E.I. du Pont de Nemours & Co., was elected Chairman of the Board of the Chemical Manufacturers Association at their annual meeting in White Sulphur Springs, VA. He succeeds **Paul F. Oreffice,** President and Chief Executive Officer of ther Dow Chemical Co. Other chairmen elected were: Vice-Chairman of the Board—**Edwin C. Holmer,** President of Exxon Chemical Co., and Chairman of the Executive Committee—**Louis Fernandez,** Vice-Chairman of the Board of Monsanto Co. **Robert A. Roland** was reelected President of the Association.

The 1982 Elisha Gray II Award was presented to **Clifford L. Tierney**, Manager of the Information Center at Whirlpool Corp., by the Whirlpool Chapter of Sigma Xi. Mr. Tierney was cited for his accomplishments in the field of Technical Information, specifically for his development of the Whirlpool Information Network (WIN) System, which is a means of sharing and utilizing technical information throughout the company. This program provides a format for documenting (by means of a brief technical summary) data relevant to a technical project and either communicating immediately, or storing and later retrieving these data.

C.L. Tierney

The Elisha Gray II Award is given annually to a member of the Whirlpool Chapter Sigma Xi who has achieved notable accomplishments in pure and applied science or engineering and/or has demonstrated outstanding management ability in fostering achievement in science or engineering.

Mr. Tierney is nationally recognized for his contributions to the field of Technical Communication. He has published several papers in leading journals in the field including the American Society of Information Science, and his work is included in two anthologies on communications. He organized a major workshop entitled "Written Technical Communication Involves More Than Writing," which was used at the Research Center and published nationally.

Mr. Tierney is a member of the Federation of Societies for Coatings Technology and serves on its Technical Information Systems Committee. He is also a member of the American Society for Information Science, the Society for Technical Communication, the Special Libraries Association, and is President of the Western Michigan Special Libraries Association.

George G. Moran has been appointed Vice-President, Far Eastern Operations, for Devoe Marine Coatings Co., division of Grow Group, Inc.

Dr. Benjamin C. Hui has been promoted to Group Leader, R&D Department, of ALFA Products, Danvers, MA.

Glidden Coatings & Resins, Div. of SCM Corp., promoted **Phillip K. George** to Plant Manager in Atlanta, GA. Mr. George was previously Manager-Facilities Planning at the Cleveland, OH operations.

Lynn G. Kraniak has joined the Pigment Division of Kerr-McGee Chemical Corp. as a Sales Representative in the Southern Region sales office, located in Tucker, GA. She will be responsible for the sales of the firm's Tronox® titanium dioxide pigments in Georgia, South Carolina, Alabama, eastern Tennessee, and northern Mississippi. Ms. Kraniak is a member of the Southern Society.

Also, **Melvin L. Penn,** who joined the Southern Region Sales Staff in 1981, will assume responsibility for pigments marketing in North Carolina and Florida.

As part of the acquisition of Denver-based KWAL Paints, Inc., by Standard Brands Paint Co., Torrence, CA, **Al Brainard** was appointed Operations Manager, responsible for coordinating all intra-departmental functions throughout the company.

Also announced were the following promotions: Controller **Rudy Slivka**, a 27-year employee, was named Secretary-Treasurer; and **Tom Stemple** and **Ben Sibbett** were appointed Regional Managers of the firm's southern and northern stores divisions, respectively.

At its May meeting, the Los Angeles Society presented Outstanding Service Awards to: **Dermont G. (Duke) Cromwell,** of Sinclair Paint Co.; **James R. Elliott,** of Elliott Enterprises, Inc.; **Robert A. McNeill,** of PPG Industries,; and **Trevellyan V. Whittington,** of Parke-Davis Co. They were recognized for their meritorious service to the Society and the local coatings industry. Messrs. Cromwell, McNeill, and Whittington are Society Past-Presidents.

David B. MacIntosh, Jr., has joined the Lukens Chemical Co., Inc., Westboro, MA, as a Sales Engineer, specializing in sales of chemicals and equipment to the rubber industry. He was previously employed by Neville Chemical Co. Mr. MacIntosh is a member of the New England Society.

The Powder Coating Institute, at its first annual meeting, elected the following officers for 1982-83. **Ron Farrell**, of Glidden Coatings & Resins, SCM Corp., was elected President; **Tom Scattoloni**, of Armstrong Products Co., was named Vice-President; and **Don Tyler**, of Volstatic, Inc., was elected Treasurer. Additional Board of Directors elected were **Hani Azzam**, of Interrad Corp.; **Sam Dawson**, of Nordson Corp.; **Charles Johnson**, of Ferro Corp.; **Bob Korecky**, of Polymer Corp.; **Glen Swanson**, of H.B. Fuller Co.; and **Charles Taylor**, of Goodyear Tire & Rubber Co.

Four Society Membership Chairmen were singled out for "Atta Boy" awards for having a total membership increase in their Societies of 20 or more persons. They are: **Helen Skowronska**, of the Cleveland Society; **Donald Montgomery**, of the Houston Society; **Lloyd Haanstra**, of the Los Angeles Society; and **Gilles Bernicky**, of the Montreal Society.

SCM Pigments has announced the retirement of **Eugene H. Ott,** Sales Representative for the New Jersey area, after 43 years in the coatings industry. Before joining the Pigments operation in 1966, Mr. Ott worked for Ferbert Schornderfer Co. and Synvar Corp. Mr. Ott served as President of the Federation of Societies for Coatings Technology in 1960-61, and is also a Past-President of the Cleveland Society for Coatings Technology. He is a member of the Philadelphia Society and the American Chemical Society.

Assuming the position as Sales Representative for the New Jersey area is **Max Florville.** He is a member of the New York Society.

Roger E. Drexel, Vice-President of the Du Pont Company's Polymers Products Department, has retired after 38 years of service. Dr. Drexel joined Du Pont in the Engineering Department and devoted much of his career to agrichemicals research and development. He was Research Manager for agricultural chemical research and process development; served as Assistant General Manager and General Manager in the Industrial and Biochemicals Department, and was named General Manager and later became Vice-President of the Biochemicals Division. Dr. Drexel most recently served as Vice-President of Plastics Products and Resins before assuming his present position of Vice-President. Succeeding Dr. Drexel is **Nicholas Pappas**, formerly Vice-President of the Fabrics and Finishes Department. Named to succeed Dr. Pappas is **John P. McAndrews,** President of the Remington Arms Co., Inc., a wholly-owned Du Pont subsidiary.

NL Chemicals/NL Industries, Inc., Hightstown, NJ, has announced the following appointments. **Harry C. (Bud) Jester** was promoted to Product Manager for anatase and nonpigmentary titanium dioxide. Prior to his appointment, Mr. Jester served as Area Process Control and Technical Group Leader. **David T. Maluchnik** was named Technical Sales Representative for the New England area and **James F. Mullowney** was appointed Technical Sales Representative for Southern California.

Gary Van deStreek (right), President of the Detroit Society, presents the "Man of the Year" Award to Emil Benson

Emil Benson, who was associated with the coatings industry for 37 years, was named "Man of the Year" by the Detroit Society at its meeting of May 25. Mr. Benson, who retired on June 1, was Technical Director of the Grow Chemical Group (now a part of Wyandotte Paint Products) in Pontiac for several years. He was President of the Society in 1964 and served as the Representative to the Federation Board of Directors from 1971–77.

Albert H. Siska has been named a Sales/Service Engineer for VEDCO® Powder Coatings, Coatings Division, Ferro Corp., based in Kalamazoo, MI. Also joining the division is **Lee B. Rodgers** as a Sales/Service Representative, headquartered in Birmingham, AL.

Henry W. Fishkin has been promoted to General Manager of Ferro Corporation's Coatings Division. Mr. Fishkin will have complete responsibility for the division's six business units and eight plant locations, as well as staff functions that support overall business activities. Prior to his appointment, Mr. Fishkin was Manager of Marketing and Business Operations for the division.

The Graphics Division of Borden Chemical has appointed Margo Auskaps as Production Manager for Specialty Dispersions and Coatings. **Phil Miller** was named Business Manager for Carbon Black Dispersions, Specialty Products Group. Both will be based in Cincinnati, OH.

Goodyear Research Division, Akron, OH, has promoted **Dane K. Parker** and **Eilert Ofstead** to the positions of Senior Research Associates.

Day-Glo Corp., Cleveland, OH, has announced the appointments of **Frank O'Daly** and **Ron Ehmke** to the positions of sales representatives for the Western Region.

Obituary

Arthur Bultman Holton, 75, died on May 26. He completed a distinguished career in paint science and technology when he retired in July 1971, as Vice-President and Technical Director of the Sherwin-Williams Co., Cleveland, OH, after a 38-year technical career with the firm. Mr. Holton earned a Bachelors Degree in Chemistry at the University of Illinois and attended graduate school at the University of Pittsburgh.

Mr. Holton was a member of the Cleveland Society of the Federation of Societies for Coatings Technology, the American Chemical Society, the National Paint and Coatings Association, and the Cleveland Association of Research Directors.

Cleveland Society Seeks Papers For 1983 Coatings Conference

The 26th Annual Technical Conference of the Cleveland Society for Coatings Technology will be held on March 22–23, 1983, at Baldwin-Wallace College in Berea, OH. The Conference, which has achieved national recognition within the past decade, and routinely welcomes attendees from throughout the United States, Canada, and South America, will be presented under the direction of the Society's Education Committee.

In recognition of the rapidly changing nature of the coatings industry, the Committee invites the submission of papers relevant to the theme "Advances in Coatings Technology." Given the broad interdisciplinary character of coatings technology, the Conference directors will welcome papers on all aspects of coatings science and engineering, including, but not limited to, formulation, testing, application, and characterization. Particular preference will be shown for papers which describe innovative systems or techniques which are not currently in use in the coatings industry, but which have potential impact in this area.

Preliminary abstracts should be submitted by September 15, 1982, to Richard R. Eley, Glidden Coatings & Resins Div. of SCM Corp., 16651 Sprague Rd., Strongsville, OH 44136.

The Society is offering a $300 prize for the best presentation.

Literature

Air Quality and Regulations

A task force of the American Institute of Chemical Engineers, as part of their continuing program of educating the public, has published "Air Quality Laws and Regulations," which deals with the problems of legislating air pollution control. The 10-page booklet identifies several technical factors that the nation's legislators must consider when amending the Clean Air Act, now before Congress. Limiting its discussion to control of stationery source emissions, the publication focuses on Parts C & D of the Act, which covers permitting procedures for the Prevention of Significant Deterioration (PSD) and Non-attainment areas. The booklet also raises issues such as to what degree should National Ambient Air Quality standard siting procedures consider factors like risk to public health, margins of safety, or cost/benefit analyses, and what are the difficulties of predicting long-range impact of new emission sources on air quality. For additional information, contact the AICE Public Relations Dept., 345 E. 47th St., New York, NY 10017.

Oxygenated Solvents

A 14-page booklet describing a wide range of oxygenated solvents: ketones, esters, alcohols, and glycol ethers, used in the formulation of higher solids coatings has been published. The literature illustrates how the selection of solvents for higher solids coatings, which help end-use applicators meet governmental solvent emission control standards, can affect application properties of the formulated coatings. Characteristics of low solids (conventional) and higher solids coatings are compared, and solvent selection criteria are discussed. The booklet contains sections on viscosity, density, surface tension, and volatility. Data on solvent effects are illustrated in graphs of viscosity-solids profiles and surface tension reduction. Additional information on solvent criteria, as well as EPA guidelines, are presented in tables. Solvents for higher solids electrostatic spray coatings are also discussed and electrical resistivities are listed. In addition, a comprehensive table of oxygenated solvent physical properties is given. Copies of the booklet, "Union Carbide Oxygenated Solvents for Higher Solids Coatings," F-48658, are available from Union Carbide Corp., Solvents & Intermediates Div., Dept. K4436, Danbury, CT 06817.

UV Absorbers

Uvinul® 408, a 2-Hydroxy-4-n-octoxybenzophenone which offers excellent activity and good compatibility with polyethylene, polypropylene, and ethylene vinyl acetate polymers, is featured in new literature. Information is provided which describes its use in protecting plastic items from ultraviolet degradation, providing maximum protection at minimal color affect. Uvinul® 408 also improves the outdoor weathering of both plasticized and rigid PVC and retards color degradation in polyesters, polycarbonates, acrylics, and polystyrene either under sunlight or fluorescent illumination. Additional information can be obtained by contacting Uvinuls® Dept., BASF Wyandotte Corp. 100 Cherry Hill Rd., Parsippany, NJ 07054.

Laboratory Coater

Literature is available which features a laboratory coater which simulates line speeds from 90 to 900 ft. per minute and is designed to coat sample panels up to 12" in width and 12" to 90" in length in substrate thicknesses ranging from .006" to .060". Application procedures and equipment features are highlighted. For additional information, write Gasway Corp., 5535 N.Wolcott Ave., Chicago, IL 60640.

Coatings Guide

The complete line of Sterling Chemical Coatings has been outlined in a new booklet published by Sterling Lacquer Manufacturing Co. The pamphlet, entitled the "black book," contains detailed specifications on the company's marine, aviation, and industrial polyurethane coatings. Set out in simple charts and sections, the booklet is easily used for product selection and application procedures for wood, metal, and fiberglass surfaces. The literature is designed to be particularly useful to applicators and other end users as a single-source reference on polyurethane coatings. Featured are sections on industry groups, with the topcoats, primers, catalysts, and related products for each group outlined. A companion piece to the pamphlet is the Sterling Color Card, featuring color ships of the company's 80 polyurethane topcoat colors. Both pamphlets are available from Sterling Lacquer Manufacturing Co., 3150 Brannon Ave., St. Louis, MO 63139.

Regulatory Chart

A new regulatory code identification chart for chemicals and solvents has been published. This four-color wall chart provides quick reference to D.O.T. identification numbers and labeling, C.A.S. registry names and numbers, and reportable spill quantities for more than 120 common solvents and chemicals. The chart covers many basic aliphatic and aromatic hydrocarbons, alcohols, amines, esters, ketones, glycols, halogenated solvents, acids, and a variety of other chemical products widely used by industry. For a copy of Bulletin 1502, write to the Industrial Chemicals & Solvents Div., Ashland Chemical Co., Dept. RC, P.O. Box 2219, Columbus, OH 43216.

HPLC Application Studies

A series of studies that describe methods development for high performance liquid chromatography (HPLC) using the new four-solvent technology is available from the duPont Co. The first study describes the basic statistical technique that uses mobile phase compositions of up to four solvents to optimize the selectivity and resolution of a separation. Other studies are based on this four-solvent approach, such as a universal procedure proposed for objective evaluation of all gradient liquid chromatographs, with emphasis placed on solvent delivery, accuracy, and precision; a description of certain instrument requirements for performing automated methods development; and a demonstration of specific applications of the technique. For copies of the studies, write duPont Co., LC, Analytical Instruments Div., Concord Plaza, McKean Bldg., Wilmington, DE 19898.

Corrosion Measurement System

A new application note entitled, "A Microprocessor-Based Corrosion Measurement System," is now available. The literature is based on a chapter in ASTM Special Technical Publication 127, "Electrochemical Corrosion Testing." It provides a detailed description of the design of a corrosion measurement instrument which includes a built-in 16-bit microprocessor. A discussion of how the instrument is used for a variety of corrosion characterization studies is also presented. For a copy, write EG&G Princeton Applied Research, P.O. Box 2565, Princeton, NJ 08540.

World Paint Industry: A Review

"The World Paint Industry: A Review 1980/81" has recently been published which examines the world recession and its effect on paint industries in various parts of the world. Two of the major questions the book focuses on are: What was its impact on output and profitability? and How did paintmakers manage to adjust to harsher economic realities? Various responses are outlined, ranging from attempts at capturing larger export markets to a technological solution. The Review also serves as a checklist of facts and figures from available published sources, summarized in 170 tables. The publication is, however, not merely a statistical kaleidoscope. It is expected to assist in sparking off ideas for new products and new markets. For additional information, contact Paint Research Association, Waldegrave Rd., Teddington, Middlesex TW11 8LD, England.

Functional Fillers

A new 24-page brochure describing Celite® functional fillers and their use in paint and coating manufacturing is now available. Emphasized is Celite diatomite which offers exceptionally high flatting efficiency. Discussed are the product features, including gloss and sheen comparisons of Celite grades, the effect of grinding on flatting efficiency, the use of Celite with other extenders, and the effect of anti-settling agents. The brochure is illustrated with charts detailing pigment formulations, typical physical properties, particle size distribution, and chemical analysis of Celite grades used in paint productions. Celite selector and performance charts are also supplied, as is a glossary. For a free copy of "Functional Fillers for the Coatings Industry," (INT-330), write Manville Service Center, 1601 23rd St., Denver, CO 80216.

Spectrogard™ Color System

The new Spectrogard Color System, operating both as a colorimeter and a spectrophotometer, is featured in recent literature. The system offers multiple color scales, illuminants and indices, nonsymmetrical tolerancing, delta lab plot, spectal display and spectral data at 10nm intervals. Highlighted are the system's uses which include: the appliance, building materials, ceramic, cosmetic, coatings, detergents, dyestuffs, food products, graphic arts, ink, paper, pharmaceutical, plastic, and textile industries. For more information, contact Pacific Scientific Co., Gardner/Neotec Instrument Div., Silver Spring, MD.

Progress Improvement Program

A full-color, eight-page brochure has been published describing the Process Improvement Program, PIP℠, a three-step engineering plan designed to raise a coating application system to peak performance through increased coating line productivity, improved finish quality, and more effective operational control. The literature features procedures, staff experience, and user-benefits. Photographs illustrate a variety of tests performed to ensure high-quality finishes and effective program implementation. For a free copy, contact G.L. Homlberg, Chemical Ctgs. Div., The Sherwin-Williams Co., 11541 S. Champlain Ave., Chicago, IL 60628.

NTIS 1981 Annual Index

The National Technical Information Service has announced the availability of its 1981 Annual Index on Materials Sciences. Featured is a keyword index which lists index entries, selected to indicate important ideas and concepts presented in reports dealing with adhesives, sealants, coatings, colorants, finishes, corrosion and corrosion inhibitors, elastomers, materials degradation and fouling, and plastics. Also, an accession number index and code-price table is featured. For additional information, contact U.S. Dept. of Commerce, NTIS, 5285 Port Royal Rd., Springfield, VA 22161.

Book Review

GLOSSARY OF CHEMICAL TERMS
Second Edition

Authored by
Clifford A. Hampel
and
Gessner G. Hawley

Published by
Van Nostrand Reinhold
New York, NY
$19.95, 306 pgs., 1982
ISBN: 0-442-23871-1

Reviewed by
Alan H. Brandau
DeSoto, Inc.
Des Plaines, IL

The authors intended this book to be a glossary of chemical terminology written for those who have an occasional exposure to the field of chemistry. It should not be compared to a comprehensive chemical dictionary designed for professional chemists and engineers. This second edition is revised and enlarged, since the first edition was published in 1976, to incorporate new terminology in the fields of energy and hazardous waste control. The volume includes definitions of chemical processes, all of the elements, major functional groups, and important compounds as well as noted individuals in chemistry. It also contains nonmathematical treatment of such basic phenomenons as polymerization optical rotation, orbital theory, and resonance. The definitions incorporated in this book are well written and, most importantly, easy to comprehend. This glossary would provide a good supplementary reference for chemists, but its strength is directed toward the audience for which it was written. Managers in the chemical industry would find this book to be a valuable asset as they are exposed to a steady stream of oral and written technical terminology from areas outside their expertise.

ETHYL ALCOHOL HANDBOOK
Fifth Edition

Published by
U.S. Industrial Chemicals Co.
New York, NY

Reviewed by
Granville D. Edwards
Shell Chemical Co.
Houston, TX

This book serves as a concise and handy reference on industrial ethyl alcohol. Anyone involved in purchasing the product or selecting the right product for a formulation, a chemical intermediate, or a process solvent will find the detailed tables and graphs a valuable source of information.

The book also presents a brief but interesting history of ethyl alcohol. For example, how many of you know that ethyl alcohol has probably been used by human beings as a beverage for at least 300 centuries, or that the generally accepted derivation of the word "alcohol" is from the Arabic "kuhl," or "kohol" meaning a very fine powder? The history brings us to present day with a discussion of tax laws and processes supplemented with schematic diagrams.

The different forms of industrial alcohol available are described and documented in detail along with the various degrees of governmental control and taxation of each form. The extensive reference data is supplemented with chapters on analytical test methods, storage and maintenance of quality and health and safety information.

Letters to the Editor

Technologist Disputes General Implications of Test Results

TO THE EDITOR:

I have made a thorough review of the Toronto Society's technical paper "Polymer and Paint Properties Affecting Wet Adhesion" which appeared in the November 1981 issue of JCT, and dispute the possibility of misleading general implications derived from some of the test results.

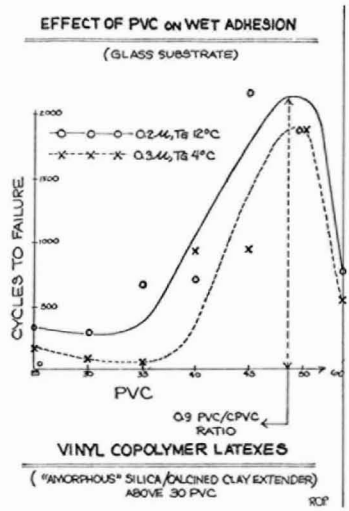
The results, which could be misleading, were derived from test method 1GP-138 used in studying variables such as PVC, mol. wt., and latex particle-size, etc.

As a coatings technologist located well beyond the U.S./Canada border, I had not been familiar with this Canadian Government 1GP-138 test method for wet adhesion of topcoats. As described in Appendix A (p. 63), the latex coating is applied in a single brush-coat and dried for only two hours (Method 103.1) over a single brush-coat of one-week aged alkyd enamel. Nowhere is there mention of latex-coating or alkyd enamel spread-rates, or the effect of wood porosity differences or the penetration and final gloss of the solvent-thinned alkyd enamel. These variables could conceivably have a great effect on wet adhesion of the thin coatings-films of latex topcoats air-dried only two hours prior to testing in the shower cabinet. Also, no mention was made in Appendix A about the minimum cycle-value for "passing." For example, data in Table 4 (p. 62) shows respective values of 800 and 1000 as passing for Paints G-4 and H-4; although the method states "scrub to failure or 3500 cycles." What is minimum passing—500?

My computations for formulations given in Appendix B show total solids of the formulations varying between 47.7 and 55.1 percent by weight (includes all additives). There also appears to be an error for the PVC of the interior flat (52% instead of 46%).

Within a given formulation-group-tested, the variables studied; such as: PVC etc., hopefully were adjusted to hold the volume-solids to a narrow range for as uniform a film-thickness as possible. Even if such were done, in a practical sense I question the Table 6 results (p. 62) for the PVA_c copolymer coatings employed in more normal thicker films with longer drying times.

For example, below is a plot from one of my experiments on the effect of PVC on wet adhesion of non w.a. type latex vinyl copolymer binders in coatings. They had been applied by drawdown blade over plate-glass and air dried for seven days in the laboratory. These results were presented at SYMCO '81 (Chicago Society) and they follow the trend shown for w.a. acrylics in Table 6—completely opposite to the results found for w.a.-PVA series in the Table 6 (JCT) data.



It has also been well documented that the length of dry of the alkyd gloss substrate (as well as effect of additives) greatly affects wet adhesion of latex topcoats, so that the one-week dry cycle of 1GP-138 method appears to be far from normal recoat conditions found in the field. Thus, I question the continued use of this test method for future Toronto Society work. Actually, most present wet-adhesion test methods show poor reproducibility except for the poorest and the exceptional paints. In between these extremes (perhaps 400 to 500 cycles) I have seen 40 PVC exterior coatings based on acrylic terpolymers exhibiting very satisfactory adhesion under soffits and on North Vertical siding of test buildings previously painted with glossy alkyd trim-type paints (aged in shade for six months).

There is no doubt that the authors have presented viable test data showing that proprietary vinyl/acrylic latexes can meet severe wet adhesion conditions when properly designed.

My argument, however, lies in the possibility that less-experienced latex-coatings formulators could make inaccurate generalizations from some of the results presented without adequate qualification by the authors of concerns expressed by this writer.

R.C. PIERREHUMBERT
Union Carbide Corp.,
Dallas, TX

Coming Events

FEDERATION MEETINGS

(Nov. 3–5)—60th Annual Meeting and 47th Paint Industries' Show. Sheraton Washington Hotel, Washington, D.C. (FSCT, 1315 Walnut St., Suite 832, Philadelphia, PA 19107).

1983

(Apr. 26–27)—Federation-sponsored seminar on "The Efficient Operation of an Up-to-Date Paint and Coatings Laboratory." Hilton Plaza Inn, Kansas City, MO. (FSCT, 1315 Walnut St., Philadelphia, PA 19107).

(May 19–20)—Spring Meetings. Society Officers on 19th; Board of Directors on 20th. Terrace Hilton Hotel, Cincinnati, OH. (FSCT, 1315 Walnut St., Suite 832, Philadelphia, PA 19107).

(Oct. 12–14)—61st Annual Meeting and 48th Paint Industries' Show. Queen Elizabeth Hotel, Montreal, Quebec, Canada. (FSCT, 1315 Walnut St., Suite 832, Philadelphia, PA 19107).

SPECIAL SOCIETY MEETINGS

(Sept. 22–23)—Montreal and Toronto Societies' Symposium. "Quality Control." 22nd in Montreal; 23rd in Toronto.

(Oct. 5)—Cleveland Society for Coatings Technology Manufacturing Committee Symposium on "The Use of Computers in the Manufacture of Coatings." Cleveland Engineering and Scientific Societies Bldg., Cleveland, OH. (Chairman Charles K. Beck, Premier Industrial Corp., 4415 Evelid Ave., Cleveland, OH 44103).

1983

(Feb. 7–9)—10th Annual "Water-Borne and Higher-Solids Coatings" Symposium sponsored by the Southern Society for Coatings Technology and the University of Southern Mississippi. New Orleans, LA. (Dr. Gary C. Wildman, University of Southern Mississippi, Southern Station, Boxz 5165, Hattiesburg, MS 39406).

(Feb. 23–25)—16th Biennial Western Coatings Societies' Symposium and Show. Hyatt Regency, San Francisco, CA. (Ted Favata, Chairman, Triangle Coatings Co., 2222 Third St., Berkeley, CA 94710).

(Mar. 22–23)—26th Annual Technical Conference of the Cleveland Society for Coatings Technology, "Advances in Coatings Technology," Baldwin-Wallace College, Berea, OH.

(Mar. 23–25)—Southern Society Annual Meeting. Peabody Hotel, Memphis, TN. (William E. Early, Piedmont Paint Mfg. Co., P.O. Box 6223, Stn. B, Greenville, SC 29606).

(May 5–7)—Pacific Northwest Society Symposium. Thunderbird Inn, Portland, OR. (Chairman Gerry McKnight, Lilly Industrial Ctgs. Inc., 619 S.W. Wood St., Hillsboro, OR 97123).

(June 10–11)—Joint meeting of Kansas City and St. Louis Societies. Holiday Inn, Lake of the Ozarks, MO.

OTHER ORGANIZATIONS

(Aug. 16–20)—"Physical Testing of Paints and Coatings" Short Course. University of Missouri-Rolla, Rolla, MO. (Norma R. Fleming, UMR, Rolla, MO 65401).

(Sept. 12–17)—American Chemical Society's 184th National Meeting. Kansas City, MO. (A.T. Winstead, ACS, 1155 Sixteenth St., N.W. Washington, D.C. 20036).

(Sept. 13–17)—"Introduction to Paint Formulation" Short Course. University of Missouri-Rolla, Rolla, MO. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, UMR, Rolla, MO 65401).

(Sept. 14–16)—"Industrial Painting Processes" Clinic. Society of Manufacturing Engineers. Denver Hilton Hotel, Denver, CO.

(Sept. 18–21)—Canadian Paint and Coatings Association. 70th Annual Convention. Four Seasons Hotel, Toronto, Ont. (R. Murry, CPCA, 515 St. Catherine St. W., Montreal, Que., Canada H3B 1B4).

(Sept. 20–24)—"Advanced Paint Formulation—Industrial" Short Course. University of Missouri-Rolla, Rolla, MO. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, UMR, Rolla, MO 65401).

(Sept. 21–23)—"Radiation Curing VI" Conference and Exhibition sponsored by the Association for Finishing Processes of the Society of Manufacturing Engineers. Ramada O'Hare Inn, Des Plaines, IL. (Susan Buhr, Technical Activities Dept., SME, One SME Dr., P.O. Box 930, Dearborn, MI 48128).

(Sept. 26–Oct. 1)—"Basic Corrosion" Short Course sponsored by the National Association of Corrosion Engineers. Atlanta Dunfey Hotel, Atlanta, GA. (NACE, P.O. Box 218340, Houston, TX 77218).

(Sept. 26–Oct. 1)—"Corrosion Prevention by Cathodic Protection" Short Course sponsored by the National Association of Corrosion Engineers. Atlanta Dunfey Hotel, Atlanta, GA. (NACE, P.O. Box 218340, Houston, TX 77218).

(Sept. 26–Oct. 1)—"Corrosion Prevention by Coatings" Short Course sponsored by the National Association of Corrosion Engineers. Atlanta Dunfey Hotel, Atlanta, GA. (NACE, P.O. Box 218340, Houston, TX 77218).

(Sept. 27–30)—Steel Structures Painting Council Committee Meetings. Sheraton at Incline, Pittsburgh, PA. (Dean M. Berger, Gilbert/Commonwealth, P.O. Box 1498, Reading, PA 19603).

(Sept. 29–Oct. 1)—"Surfair '82"—Conference on surfaces' treatments in aeronautical and aerospace industries sponsored by *Surfaces* magazine. Cannes (French Riviera), France. (Thierry Delmotte, *Surfaces*, 46, Rue Ampere, 75017 Paris).

(Oct. 5–7)—9th International Naval Stores Conference. Mayflower Hotel, Washington, D.C. (Pulp Chemicals Assoc., 60 East 42nd St., New York, NY 10165).

(Oct. 6–8)—"Production Planning and Inventory Management" Seminar. Colony Square Hotel, Atlanta, GA. (National Paint & Coatings Association's Meetings & Conventions Div., 1500 Rhode Island Ave., N.W., Washington, D.C. 20005).

(Oct. 11–13)—10th Congress of the Federation of Scandinavian Paint and Varnish Technologists. Copenhagen, Denmark. (G. Christensen, Sadolin & Holmblad Ltd., Holmbladsgade 70, DK-2300, Copenhagen S, Denmark).

(Oct. 13–15)—"Fundamentals of Adhesion: Theory, Practice and Applications" Course. State University of New York, New Paltz, NY. (Dr. Angelos V. Patsis, SUNY-New Paltz, Chemistry Dept., New Paltz, NY 12561).

(Oct. 17–21)—Nuclear Quality-Assured Coating Work Course sponsored by the Institute of Applied Technology, Pittsburgh, PA. (Carmen A. Rivera, IAT, P.O. Box 32331, Washington, DC 20007).

(Oct. 18)—"Fire Resistant Coatings: The Need for Standards" Symposium. Philadelphia, PA. (Symposium Chairman Dr. Morris Lieff, County College of Morris, Dover, NJ 07801).

(Oct.18–22)—Scanning Electron Microscopy and X-Ray Microanalysis: Theory and Practice in Materials Science" Short Course. State University of New York, New Paltz, NY. (Dr. Angelos V. Patsis, Dept. of Chemistry, SUNY, New Paltz, NY 12561).

(Oct. 25–29)—Hazardous Materials Workshops and Exposition. Cincinnati's Convention Center, Cincinnati, OH.

(Hazardous Materials Management Association, 1406 Third National Bldg., Dayton, OH 45402).

(Oct. 26–27)—"New Coatings Systems for Bridges and Steel Structures" World Congress. LaGuardia Marriott Hotel, East Elmhurst, NY. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, University of Missouri-Rolla, Rolla, MO 65401).

(Oct. 31–Nov. 2)—"Women in Coatings—Meeting the Challenges" Seminar. Washington, D.C. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, University of Missouri–Rolla, Rolla, MO 65401).

(Nov. 1–3)—National Paint and Coatings Association. 95th Annual Meeting. Washington Hilton Hotel, D.C. (Karen Welch, NPCA, 1500 Rhode Island Ave. N.W., Washington, D.C. 20005).

(Nov. 1–3)—"Water-Soluble Polymers: Synthesis, Structure, and Applications" Short Course. State University of New York, New Paltz, NY. (Dr. Angelos V. Patsis, Dept. of Chemistry, SUNY, New Paltz, NY 12561).

(Nov. 1–4)—"Uncerstanding Polymer Science: Synthesis, Characterization, Properties" Short Course. State University of New York, New Paltz, NY. (Dr. Angelos V. Patsis, Dept. of Chemistry, SUNY, New Paltz, NY 12561).

(Nov. 8–10)—Sixth International Technical Conference on Polymers sponsored by the Mid-Hudson Section of the Society of Plastics Engineers, Inc. Nevele Country Club, Ellenville, NY. (General Chairman Dr. Maung S. Htoo, IBM Corp., Dept. 350-001-1, P.O. Box 950, Poughkeepsie, NY 12602).

(Nov. 9–10)—"Electrocoat/82". Westin Hotel, Cincinnati, OH. (*Products Finishing* Magazine, 600 Main St., Cincinnati, OH 45202).

(Nov. 9–11)—"Refresher for Painting Contractors, Maintenance Engineers and Inspectors" Short Course. Sheraton St. Louis Hotel, St. Louis, MO. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, University of Missouri–Rolla, Rolla, MO 65401.

(Nov. 10–12)—First International Technical Conference on Polyimides sponsored by the Mid-Hudson Section of the Society of Plastics Engineers, Inc. Nevele Country Club, Ellenville, NY. (General Chairman Julius M. Schiller, IBM Corp., D/2K3, B/032-1, Boca Raton, FL 33432).

(Nov. 12–14)—National Decorating Products Association 35th Annual Show. Superdome, New Orleans, LA. (Lillian Smysor, NDPA, 9334 Dielman Industrial Dr., St. Louis, MO 63132).

(Nov. 14–19)—"Basic Corrosion" Short Course sponsored by the National Association of Corrosion Engineers, Houston Dunfey Hotel, Houston, TX. (NACE, P.O. Box 218340, Houston, TX 77218).

(Nov. 14–19)—"Corrosion Prevention by Cathodic Protection" Short Course sponsored by the National Association of Corrosion Engineers, Houston Dunfey Hotel, Houston, TX. (NACE, P.O. Box 218340, Houston, TX 77218).

(Nov. 14–19)—"Corrosion Prevention in Oil and Gas Production" Short Course sponsored by the National Association of Corrosion Engineers, Houston Dunfey Hotel, Houston, TX. (NACE, P.O. Box 218340, Houston, TX 77218).

(Nov. 15–19)—ASTM D33 Coatings for Power Generation Facilities and UNCWC Utilities Nuclear Coating Work Committee Meeting. Huntington Sheraton, Pasadena, CA. (Dean M. Berger, Gilbert/Commonwealth, P.O. Box 1498, Reading, PA 19603).

(Nov. 16–18)—"Estimating Workshop for Painting Contractors" Short Course. Sheraton St. Louis Hotel, St. Louis, MO. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, University of Missouri–Rolla, Rolla, MO 65401).

(Nov. 29–Dec. 3)—"Principles of Industrial Coatings" Short Course. Sheraton St. Louis Hotel, St. Louis, MO. (Norma Fleming, Senior Coordinator, Arts & Sciences Continuing Education, University of Missouri–Rolla, Rolla, MO 65401).

(Dec. 7–9)—Fifth Annual Western Plastics Exposition. Long Beach Convention Center, Long Beach, CA. (Western Plastics Exposition, 1625 17th St., Unit 2, Santa Monica, CA 90404).

(Dec. 14)—"Powder Coatings: How It Will Work for You" Workshop. Fort Worth, TX. (Susan Buhr, Technical Activities Dept., Society of Manufacturing Engineers, One SME Dr., P.O. Box 930, Dearborn, MI 48128).

1983

(Jan. 17–21)—"Design and Evaluation of Industrial Hygiene Ventilation Systems" Short Course. Rocky Mountain Center for Occupational and Environmental Health, University of Utah, Salt Lake City, UT. (K. Blosch, University of Utah, Bldg. 512, Salt Lake City, UT 84112).

(Jan. 23–27)—Semi-Annual Meeting of the American Society for Testing and Materials Committee D-1 on Paint and Related Coatings and Materials. Dutch Inn, Lake Buena Vista, FL. (ASTM, 1916 Race St., Philadelphia, PA 19103).

(Jan. 26)—"New Concepts for Coating Protection of Steel Structures" Symposium sponsored by ASTM Committee D-1 on Paint and Related Coatings and Materials and the Steel Structures Painting Council. Lake Buena Vista, FL. (Cochairman R.F. Wint, Hercules Incorporated, 910 Market St., Wilmington, DE 19899).

(Feb. 6–9)—Conference on Color and Illumination sponsored by the Inter-Society Color Council and the Illuminating Engineering Society of North America. Colonial Williamsburg Lodge, Williamsburg, VA. (General Chairmen, Charles W. Jerome and William A. Thorton, Westinghouse Lamp Div., One Westinghouse Plaza, Bloomfield, NJ 07003).

(Apr. 18–22)—Corrosion/83 sponsored by the National Association of Corrosion Engineers. Anaheim, CA. (NACE, P.O. Box 218340, Houston, TX 77218).

(May 23–25)—ASTM D-33 Coatings for Power Generation Facilities Committee Meeting. Galt House, Louisville, KY. (Dean M. Berger, Gilbert/Commonwealth, P.O. Box 1498, Reading, PA 19603).

(May 24–26)—8th Annual Powder and Bulk Solids Conference/Exhibition. World Congress Center, Atlanta, GA. (Cahners Exposition Group, 222 W. Adams St., Chicago, IL 60606).

(June 15–18)—Oil & Colour Chemists' Association Biennial Conference on "The Efficient Use of Surface Coatings." Viking Hotel, York, England. (R.H. Hamblin, Director and Secretary, OCCA, Priory House, 967 Harrow Rd., Wembley, Middlesex, HAO 2SF, England).

(Aug. 31–Sept. 8)—20th Commission Internationale de l'Eclairage Congress. RAI Congress Center, Amsterdam, The Netherlands. (U.S. National Committee, CIE, c/o National Bureau of Standards, Washington, D.C. 20034).

(Sept. 28–Oct. 1)—Oil & Colour Chemists' Association's Silver Jubilee Convention and Exhibition. Southern Cross Hotel, Melbourne, Australia. (O.C.C.A.A., 1983 Pacific Coatings Convention, C/- Tioxide Australis Pty. Ltd., Private Bag 13, Ascot Vale, Victoria, 3032, Australia).

(Oct. 11–13)—"Finishing '83" sponsored by the Association for Finishing Processes of the Society of Manufacturing Engineers. Cincinnati Convention Center, Cincinnati, OH. (Susan Buhr, AFP/SME Administrator, One SME Dr., P.O. Box 930, Dearborn, MI 48128).

1984

(Sept. 23–28)—XVIIth Congress of FATIPEC (Federation of Associations of Technicians in the Paint, Varnish, Lacquer and Printing Ink Industries of Continental Europe). Lugano, Switzerland. (C. Bourgery, Secretary General, FATIPEC, Maison de la Chimie, 28 Rue St.-Dominque, 75 Paris (7), France).

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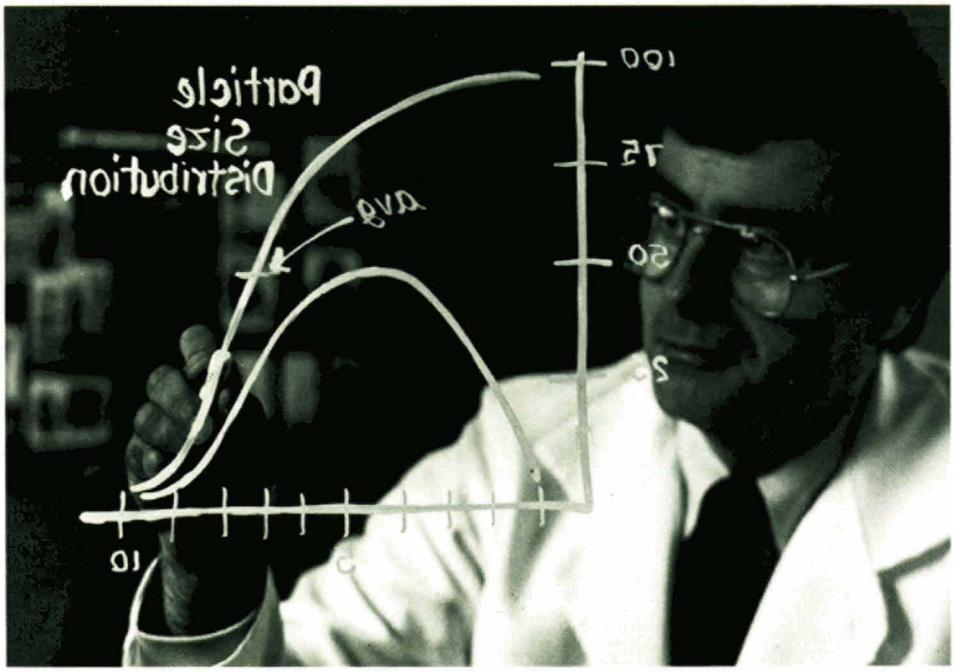

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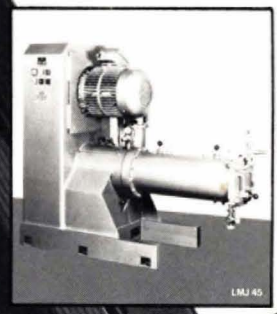

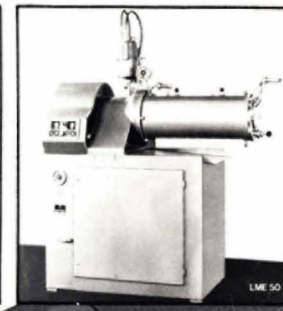

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