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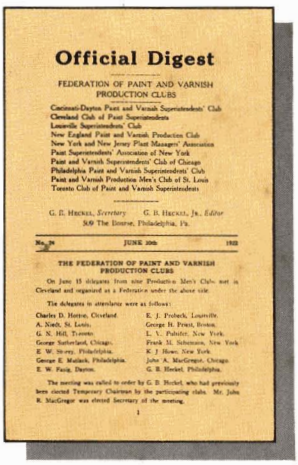
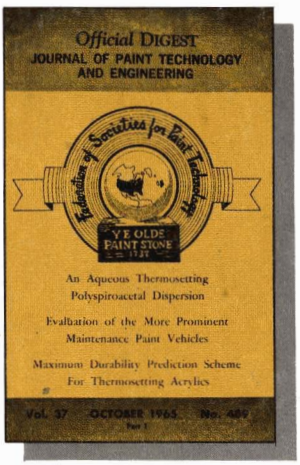
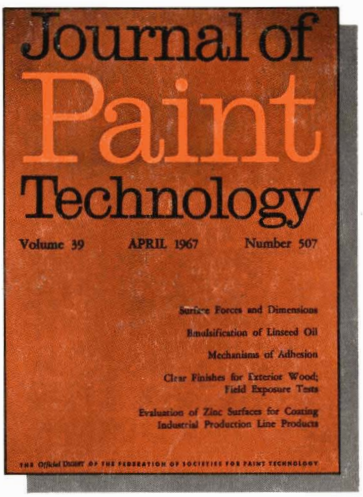
JANUARY 1976

jct JOURNAL OF COATINGS TECHNOLOGY*

Volume 48 Number 612







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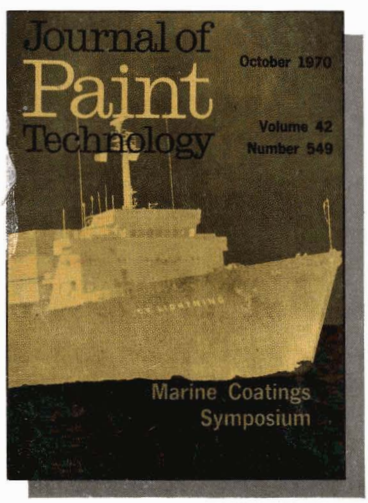

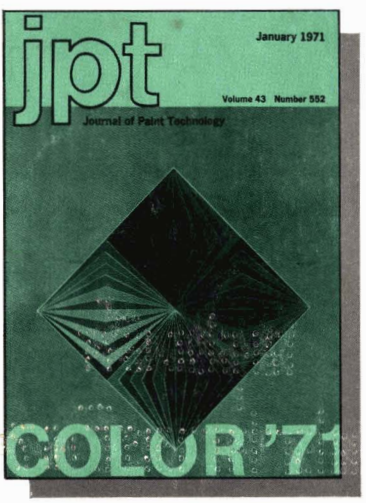

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JANUARY 1976

JOURNAL OF COATINGS TECHNOLOGY

Volume 48 Number 612

Features

Federation Activities

Departments

E JOURNAL OF COATINGS TECH-GY is published monthly by the ation of Societies for Coatings ology at 1101 Knox Ave., Easton, 8042. **Editorial and executive of-are located at 1315 Walnut St., elphia, Pa. 19107. Phone: (215) 507.**

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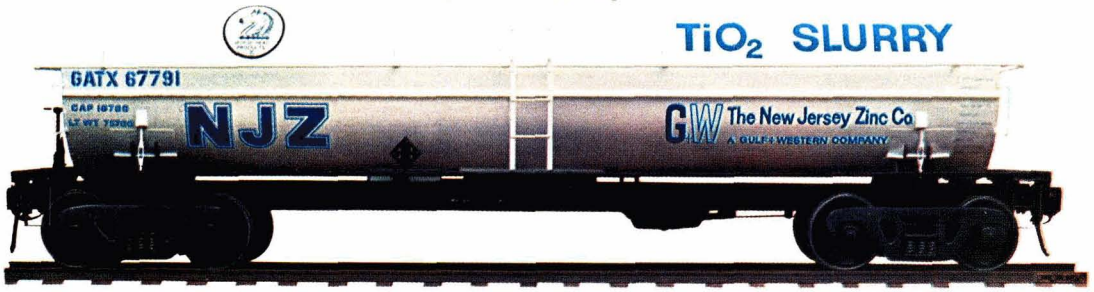
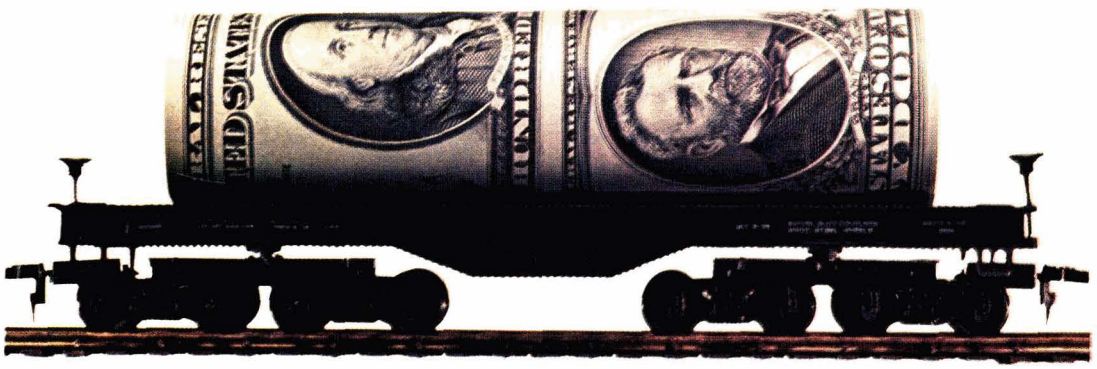


as cold, hard cash



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THE JOURNAL OF COATINGS TECHNOLOGY is published monthly by the Federation of Societies for Coatings Technology at 1101 Knox Ave., Easton, Pa. 18042. **Editorial and executive offices are located at 1315 Walnut St., Philadelphia, Pa. 19107. Phone: (215) 545-1507.**

The annual dues for members of the Federation of Societies for Coatings Technology, $10.00, includes a subscription to this publication. Membership in the Federation is attained through prior affiliation with and payment of dues to one of its 25 Constituent Societies. Non-member subscription rates are:

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1 Year	$16.00	$22.00
2 Years	$29.00	$40.00
3 Years	$40.00	$56.00

When available, single copies of back issues of the JOURNAL OF COATINGS TECHNOLOGY or the *Official Digest* are priced as follows: $2.00 each for current calendar year issues; $3.00 each for all other issues.

Comment

New Name in the Coatings Industry

In keeping with the change in name of the Federation and the broadened scope of its coverage, our publication is now the JOURNAL OF COATINGS TECHNOLOGY.

As the cover art depicts, the name and format of the Federation's official publication have undergone a series of changes over the years, all designed to more adequately identify with the readership served, as well as to make for a more attractive and readable journal.

Meantime, we've been making changes in content. While the main editorial section continues to feature the technical presentations whose excellence has been the hallmark of the publication for more than 50 years, we have been expanding the departmental items (People, Literature, Coming Events, Book Reviews), and have added such new features as News from Washington and News from the British Paint Research Association, to supplement our regular coverage of Federation and Society activities. And we plan to introduce additional features to round out editorial coverage that is aimed at providing more and better information on what's going on in the industry.—TAK

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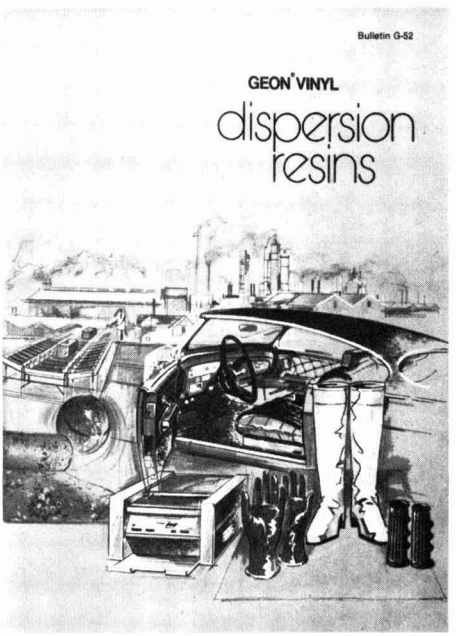

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Abstracts of Papers in This Issue

EFFECT OF TEMPERATURE ON COMPOSITION OF COPOLYMERS OF MALEIC ANHYDRIDE AND STYRENE—R. B. Seymour and D. P. Garner

Journal of Coatings Technology, 48, No. 612, 41 (Jan. 1976)

Alternating copolymers of styrene and maleic anhydride were prepared by heating an equimolar mixture of the two monomers at 80°C in the presence of small amounts of AIBN (azobisisobutyronitrile)

$$[(CH_3)_2C(CN)-N=N-C(CN)(CH_3)_2]$$

Low molecular weight random copolymers with more than 90% styrene were obtained when excess styrene was present at polymerization temperatures above 130°C. High concentrations of initiator were required for good yields of product at these high temperatures. The presence of a charge-transfer complex at room temperature was demonstrated by NMR and UV spectrophotometric techniques. The equilibrium constant for this complex decreased with temperature and was essentially zero at temperatures above 135°C.

HYDROSILYLATION OF METHYL ELEOSTEARATE—S. F. Thames, B. G. Bufkin, S. J. Jen, J. M. Evans, and J. S. Long

Journal of Coatings Technology, 48, No. 612, 46 (Jan. 1976)

Hydrosilylation of both methyl alpha and beta eleostearate yields either mono or dihydrosilylated products depending upon the stoichiometry of the reactants. Monohydrosilylation proceeds by 1,2 addition to the conjugated triene system of the alpha isomer and apparently occurs on the 13,14 double bond with the silicon atom attached to carbon 13. Techniques employed in the elucidation of the mode of orientation which included infrared and ultraviolet spectroscopy, elemental analysis, and chemical modification of the hydrosilylated substrates do not allow differentiation between 1,2 addition to the 9,10 double bond, 1,2 addition to the 13,14 double bond and 1,6 addition to the conjugated triene in the beta isomer. However, the double bonds remaining are apparently conjugated with the silicon atom located in an allylic position. Such reactions open new routes to novel fatty acid derivatives.

ARE CONVENTIONAL TRADE SALES FORMULATING PRACTICES WASTEFUL?—F. B. Stieg

Journal of Coatings Technology, 48, No. 612, 51 (Jan. 1976)

Vehicle nonvolatile generally is the most expensive of the basic components of a paint system, so it is axiomatic that economy in paint formulation requires that pigmentation levels be as high as is consistent with quality demands. It is the burden of this discussion that conventional formulating practices have been unnecessarily wasteful of vehicle nonvolatile both by formulating at lower-than-necessary PVC levels, and by the use of materials that unnecessarily lower the critical PVC.

MINIMUM FILM FORMING TEMPERATURES OF EMULSION VEHICLES AND LATEX PAINTS—R. F. Patella

Journal of Coatings Technology, 48, No. 612, 60 (Jan. 1976)

The determination of the minimum film forming temperatures (MFFT) of emulsion vehicles and latex paints is essential for the successful development of commercial products. To market saleable products, it is necessary to know at what temperature the polymer or paint film will coalesce to form a continuous film.

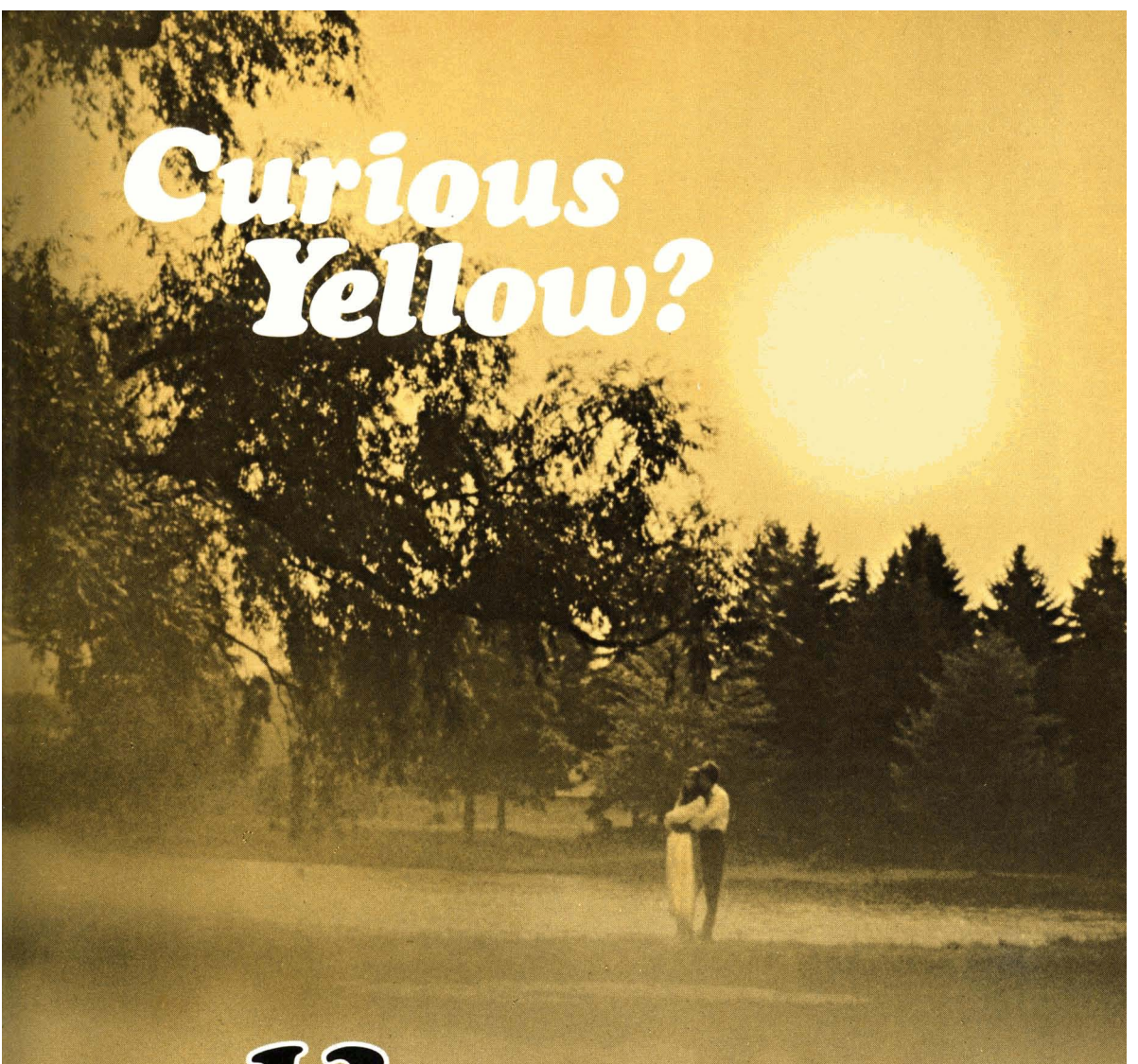
The method described herein makes it possible to simultaneously determine the minimum film forming temperatures of multiple latex vehicles and latex paints. This method thereby significantly reduces the time and effort required for determining the MFFT of polymers and paints as described in ASTM D-2354-68. Reproducibility of this method has been determined to be ± 2°F. In addition, this method is not limited to temperatures below 77°F (25°C).

REGULATIONS REGARDING PAINT PRODUCTS — THEIR CLASSIFICATION AND LABELING REQUIREMENTS—M. N. McCoulloch

Journal of Coatings Technology, 48, No. 612, 62 (Jan. 1976)

Title 49, Code of Federal Regulations, places on all shippers of hazardous materials certain regulations concerning classification, description, packing, marking, and labeling requirements for many formulations of paint, enamel, lacquer, stain, shellac, varnish, and their removing, reducing, or thinning compounds, when these materials are offered for transportation. Also regulated are aerosol products when vapor pressure in the container exceeds 40 PSIA at 70° F, or exceeds 104 PSIA at 130°F, or for a flammable material with vapor pressure exceeding 40 PSIA at 100°F. The regulations apply with force of Federal law to shippers by all modes of transportation, and are administered by the Department of Transportation.

This paper discusses the Department of Transportation regulations relating to the transportation of hazardous materials, with particular emphasis on the shipper's requirements for paint, lacquer, stain, varnish, liquids, their removing, reducing, and thinning compounds, and those paint-related aerosol products which meet the definitions of hazardous materials included in the regulations. The stated purpose of the regulations is to minimize the danger to life and property incident to transportation of hazardous materials. It is the duty of the shipper to make the regulations effective and to instruct his employees in the requirements of the regulations.



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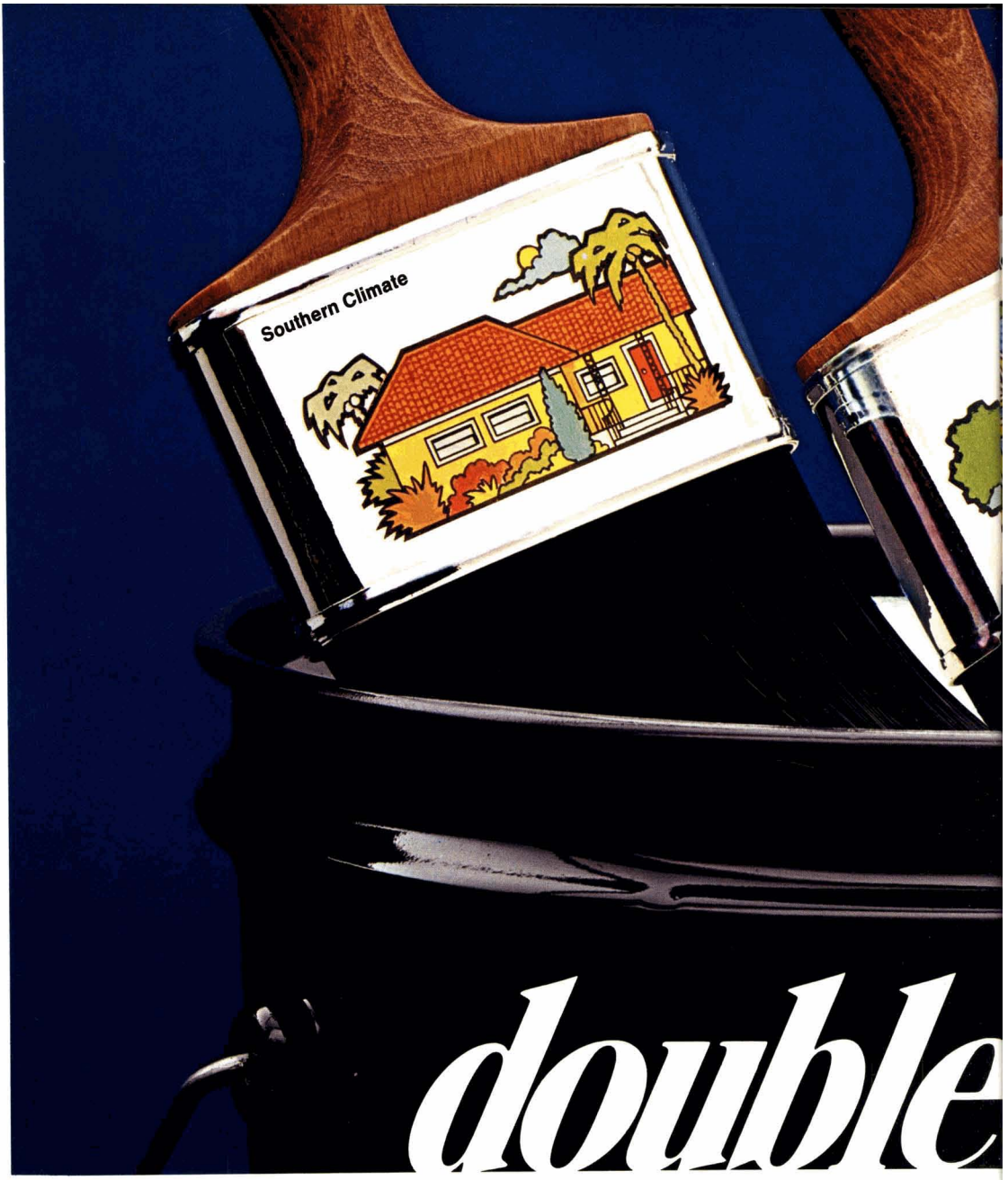

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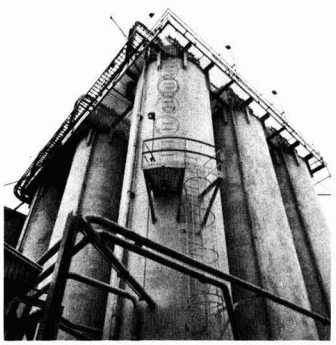

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Three Societies Win MMA Awards for Notable Achievements

Three Constituent Societies were cited for notable achievements during 1975, and were the initial recipients of the newly established MMA Awards at the recent Federation Annual Meeting in Los Angeles.

The winning entries were submitted by the Southern, Pacific Northwest, and Houston Societies.

The awards recognize notable achievements by Constituent Societies of the Federation, other than for Society papers presented at the Annual Meeting.

There are three categories of awards, based on membership size of the Societies.

Each category winner receives $350 in cash plus an appropriate engraved plaque.

Outstanding Educational Program

The Southern Society was cited in Category A for the excellence of its educational program at the University of Southern Mississippi.

The Society's Education Committee works very closely with USM's Department of Polymer Science, to whom the Society has contributed in excess of $17,000 for student scholarships over the last four years. In addition, the Society donated proceeds from the 1975 symposium on "Water-Borne and High-Solids Coatings" (which it co-sponsored with USM) to the Polymer Science program—a total of $7000. This money will be utilized for recruitment of outstanding students, purchase of additional equipment, and the general improvement of the Polymer Science Department.

In 1973 the Society set up an Industrial Advisory Committee to work with the Department of Polymer Science, to better correlate the needs of the coatings industry with the curriculum offered at USM. Originally, members were mostly from the Southeast, but the committee now includes industry personnel from the Southwest, Midwest and East. This program has provided a strong industry-academic interface which has been extremely valuable in educating students in the specific needs of the industry. This committee also helps in raising funds for the Department and in recruiting students.

The program has helped stimulate a growing demand for USM graduates. In the past four years, 95% of all graduates of the Department of Polymer Science have entered the coatings industry. And there has been an increase in the number of graduates each year. Eleven students graduated with B.S. degrees this past June, and four with advanced degrees. Of these 15 students, 11 are employed in the coatings industry and three are continuing their education.

Currently underway is establishment of a "Southern Society for Coatings Technology Room" at USM. This facility will feature publications relative to the coatings industry, A/V programs prepared by the Federation, Color Aptitude Test Set, etc. These will be available to all members of the Southern Society on a loan basis, as well as to Polymer Science Department students.

Specification Manual Cited

The Pacific Northwest Society won first prize in Category B for the work of its Seattle Section's Specification Committee in assisting the Seattle-King County Chapter of PDCA to develop a Specification Guide Manual.

The project began in 1972 when the Specification Committee met with the Puget Sound Paint and Coatings Association and the Seattle-King County Chapter of the Painting and Decorating Contractors of America to discuss the development of a Master Painter and Decorator's Guide Specification for a two-year program.

The Specification Committee worked up an outline of steps necessary to produce satisfactory standards for the most commonly used paint items. Assignments were made to Committee members to develop specification standards for the 18 selected items. Numerous meetings were held to discuss, refine, and finalize these standards before transmitting them to the special committee established by the Puget Sound Paint and Coatings Association for review and recommendation. Responses from the Association were evaluated by the Specification Committee and tentative standards were promulgated in April 1973. Finalization of the standards was accomplished in late May 1973, and submitted with the Association's approval to PDCA, who subsequently included them in the Manual.

The Specification Committee expended approximately 800 manhours developing, reviewing, and obtaining concurrences of the standards. Additionally, the Committee was asked to assist in revising Chapter 2 of the proposed Manual, "Evaluation and Choice of Paint Systems."

This effort, requiring 400 committee manhours, was accepted by PDCA and is the specified chapter in the Manual.

PDCA then requested assistance in developing Chapter 4, "General Information and Finishing Schedule," Chapter 5, "Exterior Painting and Finishing Schedules," and Chapter 6, "Interior Painting and Finishing Schedules." The Committee spent over 300 manhours analyzing and evaluating coating systems to determine the minimum standards required for satisfactory appearance and durability. These efforts were finalized, presented to PDCA and adopted as Chapters 4, 5, and 6 of the completed Manual.

As the final contribution to the project, the Committee was requested to review 23 Recommended Product lists submitted by interested paint manufacturers for inclusion in Chapter 7. This review involved approximately 300 manhours to evaluate compliance with product standards and to identify specification references for some 50 items not covered by the 18 major standards previously developed. Accordingly, wording was clarified and some items were eliminated or consolidated with others, culminating in a "Product List" of 53 items.

The revised lists, with pertinent Committee remarks and questions, were returned by PDCA to the responding companies for acceptance and clarification where indicated. All were returned after appropriate revision and became part of Chapter 7 of the Manual.

The "Architectural Specification Manual" was published early in 1975 and is proving to be an important tool used by architects and other specifiers in the Pacific Northwest.

Problem Solving Report Wins Prize

The Houston Society won first prize in Category C for its report, "Problem Approaches in Non-Technical Terms."

The report discusses some of the

well-known general approaches to problem solving, then develops procedures for coping with day-to-day problems encountered in the operation of a paint plant at the departmental or line supervisor level.

The procedures were applied to major problems reported by line supervisors in various departments of eight paint companies of varying size in the Houston area. The departments selected for the survey were: Purchasing; Receiving; Paste Mixing; Grinding; Thinning and Tinting; Quality Control; Filling, Labeling and Packaging; and Shipping.

The responses ranged from highly general (personnel problems) to very specific (iron oxide difficult to grind on Cowles); however, they did follow a general trend within each department.

Fundamental in the solution of the problems is the use of the tools of communication, planning and scheduling, and control to get the people involved to handle the materials in such a manner to accomplish the goals desired in the necessary time.

Seven Societies Competed for 1975 Awards

A total of seven Societies entered the 1975 competition. In addition to the three winners, entries were submitted by Los Angeles, Montreal, Philadelphia, and Toronto.

The Los Angeles Society reported on its educational activities, key effort of which is a Technician Training Program presented at Los Angeles City College. Offered continuously for more than 25 years as a four-semester lecture and laboratory course of study, this program has served a real need in providing formal education to individuals interested in paint technology. Over the years, almost 2000 students have participated.

City College is part of the Los Angeles Community College system, which also includes the Los Angeles Trade Technical College. This school is oriented more specifically toward educating students in specific industrial skills. The Society's Education Committee works closely with the faculty at the Trade Technical College to improve the Technician Training Program. Establishment of an Industry Advisory Committee has resulted in development of a full two-year course of study leading to an Associate of Science Degree in Paint Technology.

The Montreal Society's entry in the competition was its slide/tape presentation on "High-Speed Dispersion," which covers a practical and theoretical approach to the subject.

The objective of the project was to produce an audio/visual presentation of value to technical and production employees based on sound practical and technical information on dispersion as applied to the manufacture of an alkyd and a latex paint.

Carried out by the Society's Manufacturing Committee, the production includes 60 color slides and a 20-minute tape, with accompanying script. The presentation was donated to the Federation and is currently being marketed to the industry.

The Philadelphia Society entry was its Annual Seminar program, the first activity of its kind sponsored by a Constituent Society.

Initiated in 1960, the seminars are a project of the Society's Technical Committee, who selects the topics and format for each program.

Originally the seminars were held at academic institutions. Two-hour lecture/discussions were held one evening per week for five to seven consecutive weeks. A dinner preceded the lecture. In 1967 the meeting site moved to ASTM heaquarters in downtown Philadelphia, and lectures were scheduled in the afternoon and evening of one day with dinner included in the registration fee. The format was again altered in 1969 to add a morning session, and include lunch with the registration fee.

In 1973 neighboring Societies and others outside the metropolitan area expressed the desire for relocation to a site more accessible. Accordingly, in 1974 the seminar was moved to the Cities Service Research Center on the New Jersey Turnpike, and has enjoyed increased attendance.

The finances of the seminars have always been designed to educate the members at no cost to the Society, rather than to generate a profit.

The Toronto Society submitted its educational courses sponsored at George Brown College.

Employees and new entrants to the coatings industry are offered a variety of part-time courses. On the average, approximately 100 students register each year.

The educational activities at George Brown College are coordinated through a Coatings Advisory Committee, which consists of members of the Toronto Society, members from the Canadian Paint Manufacturers Association, Ontario Paint Association, and college staff.

Course presentations are provided by specialists from the industry in addition to staff from the college. A coatings laboratory is being developed exclusively for these programs and will be made available for the activities of the Technical Committee of the Society.

Meanwhile, efforts are continuing to establish a full-time coatings course at the college.

Principles Governing Awards

The MMA Awards are for notable achievements in the field of education, manufacturing and training procedures, technology, public service, and for other achievements deemed proper and desirable by the MMA Awards Committee. Not eligible are Society papers offered for presentation at the Federation's Annual Meeting, and previously submitted entries.

The awards are to be presented at the Federation Annual Meeting, but it is not mandatory that an award be presented to any or all categories each year.

The President of any Society wishing to enter the competition must send a letter of intent to the MMA Awards Committee Chairman (Ben Chatzinoff, Quaker City Chemicals, Inc., Cottman Ave., and Milner St., Philadelphia, Pa. 19135) by March 31. A full description of the Society's activity to be considered for the awards must be submitted by the Society President no later than August 31.

The MMA Awards were established in 1975 by Materials Marketing Associates a national marketing group of manufacturers' representatives. The group is composed of the following: Kennesaw-Wilcox, Atlanta, Ga.; Lukens Chemical Co., Boston, Mass.; The Cary Co., Chicago, Ill.; A. Mueller Co., Cleveland, Ohio; Ribelin Distributors, Inc., Dallas, Tex.; Matteson-Ridolfi, Inc., Detroit, Mich.; George C. Brandt, Inc., Kansas City, Kan. and St. Paul, Minn.; E. T. Horn Co., Los Angeles and San Francisco, Calif.; C. Withington Co., Inc., New York, N.Y.; Van Horn, Metz & Co., Inc., Philadelphia, Pa.; Walsh & Associates, Inc., St. Louis, Mo.; Apco Industries Co. Ltd., Toronto, Ont.; and Shanahan's Ltd., Vancouver, B.C.

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FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

Fall 1975 Council Meeting

Forty-five members of the Federation Council attended the Fall Council Meeting held in Los Angeles, Calif., on October 31, 1975. The following members were present:

Officers

President ..... J. C. Leslie
Pres.-Elect ..... William Dunn
Treasurer ..... Neil S. Estrada

Society Representatives

Baltimore ..... John Emmerling
Birmingham ..... R. A. J. Allan
Chicago ..... Victor M. Willis
C-D-I-C ..... William Mirick
Cleveland ..... Michael W. Malaga
Dallas ..... William F. Holmes
Detroit ..... Emil F. Benson
Golden Gate ..... A. Gordon Rook
Houston ..... Willy C. P. Busch
Kansas City ..... Terryl F. Johnson
Los Angeles ..... Allan R. Yerby
Louisville ..... Joseph A. Bauer
Montreal ..... Hy Kredentser
New England ..... Robert Perry
New York ..... John J. Oates
Northwestern ..... Lowell F. Wood
Pac. N'west ..... John A. J. Filchak
Philadelphia .. J. Richard Kiefer, Jr.
Piedmont ..... James A. Bohlen
Pittsburgh ... William Spangenberg
Rocky Mt. .... Edmund H. Peterson
St. Louis ..... Howard Jerome
Southern ..... Robert F. Hall
Toronto ..... A. Clarke Boyce
Western N.Y. ..... Eugene LeVea

Other Members

S. Leonard Davidson
William H. Ellis
Herbert L. Fenburr
Milton A. Glaser
Harold B. Gough
Lyman P. Hunter
Hugh W. Lowrey
Robert W. Matlack
Amos T. Montanye
Raymond R. Myers
George L. Poy
Martin E. Schleicher
Harry A. Scott, Jr.
Jean P. Teas
Roy W. Tess
Joseph W. Tomecko
Willard W. Vasterling

Guests

James McCormick
Harry Poth
Ruth Johnston-Feller
Herman Lanson

Staff

Frank J. Borrelle

After Executive Vice-President Frank J. Borrelle reported a quorum present, the report of the 1975 Spring Council Meeting was approved as published in the July 1975 JOURNAL OF PAINT TECHNOLOGY.

Reports Of Officers

PRESIDENT LESLIE

During my tenure, I have visited every member Society and most sections. Despite the high cost of travel, the demands of time away from the job, the physical demands on the body, and the difficulties in planning, I feel personal visits to the Societies are a vital function of a Society Officer. The visits have been of great benefit to me and to the Federation.

I was priviledged to attend the OCCA Conference in England and to visit the Birmingham Club. I also attended the Annual Meeting of the Canadian Paint Manufacturers Association and the Annual Convention of the Mexican Manufacturers of Paints and Inks.

The year 1974-75 has been one of an inflationary recession and the budget was carefully prepared with that fact in mind. We hope it will remain realistic, all contingent upon the success of the West Coast meeting.

The Mexican group is still in the process of completing the necessary application steps to become a member society of the Federation and will soon submit the required papers.

Travel plans have been altered for the officers and staff for 1975-76 to spread time demands over a greater

portion of the year. Cooperation in the plan by most Societies has been good.

The staff and officers continue to enjoy close relations with NPCA and I wish to thank the Association, not only for its support of the Federation, but for the leadership in our industry in helping us to "survive" in this period of restrictions and regulations.

In retrospect, the year has been one of elation and frustration, one of joy and honor, yet at times depressing and discouraging, and perhaps of some misguided goals. Through it all shines the labor, enthusiasm, capability, and friendship of the Federation staff and my blessing goes to every one of them and to my fellow officers.

J. C. LESLIE
President

PRESIDENT-ELECT DUNN

During my year in office, I visited, in the company of another officer or staff member, eight societies, the Southern Society Annual Meeting, and the Southwestern Paint Convention, and attended meetings as designated by the office or committee commitments.

During Society visits, discussions are held with local officers prior to the general membership meetings. A comprehensive summation of the past year's activities and future plans of the Federation are given. A report of the visitation to both the executive and general meetings is prepared and filed by the Federation officers and staff to provide history and continuity for future visits.

Our visits have been well received and have proved extremely valuable in strengthening the bonds between the Constituent Societies and the Federation.

These visitations have also given me the opportunity to evaluate, on a personal basis, potential new committee people, and resulted in the appointment of 12 new committee chairmen for 1976, along with several "chairmen-in-training."

The selection of the 1975-76 committees is now completed, and I wish to express my personal thanks to all the incumbent chairmen and the new appointees who have volunteered to serve the Federation. PRI Board of Directors slate has also been completed, with no less than five new appointees included.

The past year, as President-Elect, has given me the chance to meet and greet many of you, and has been the source of much assistance as well as inspiration, which enabled me to carry out my present duties, and will be of invaluable help in my term as President.

I wish to express my personal thanks and appreciation to the officers and executive members of the Societies for the courtesies extended during my visitations. My most sincere thanks to the Federation staff, Board of Directors and the Council, and Trustees of PRI who extended their fine cooperation, assistance and guidance, which not only helped to lighten my duties, but also made this a year of much personal pleasure and gratification.

WILLIAM DUNN
President-Elect

TREASURER ESTRADA

The Treasurer's activities for the year have been relatively routine and pleasingly unburdensome. Visits in conjunction with other officers and staff have been made to the following Societies: Philadelphia, Los Angeles, Golden Gate, Pacific Northwest, Toronto, Northwestern and the Southern Society's Spring Meeting. The opportunity of renewing old acquaintances and making new ones is especially important to the Treasurer, since this provides a backlog of possible candidates for Committee appointments in his succeeding year as President-Elect.

Active and capable Committees are vital to the operation of the Federation. The time and effort devoted to Committee activities by dedicated Society members is a very significant saving in costs of providing the services expected of the Federation. The funding of Committee activities for 1976 will be established at the Annual Meeting in Los Angeles, rather than waiting for the adoption of the 1976 Budget, which will be done traditionally early in 1976. This will allow the new Committees for 1976 to start operations immediately after the 1975 Annual Meeting and thus be even more effective.

I would like to express my appreciation to the Federation staff, the other officers and to the Federation members who have all helped make my job so enjoyable and, hopefully, satisfactory.

NEIL S. ESTRADA
Treasurer

EXECUTIVE VICE-PRESIDENT BORRELLE

For the first time in more than two decades, the Federation will have a new headquarters office address. Effective November 6, 1975, it is: 1315 Walnut St., Philadelphia, Pa. 19107. The new location is one block from the 121 S. Broad St. building which is being evacuated by the owner. The new office is more attractive than the old and 30% larger in area.

This report will summarize major staff activities and responsibilities for the year.

PUBLICATIONS

Journal of Paint Technology: The news is good in that advertising sales are running much higher than last year. We expect to close the year with advertising income well in excess of the budget.

We have caught up with the backlog of editorial matter, making it possible to publish acceptable papers more promptly. Sincere thanks are extended to the Editorial Review Board of the Publications Committee for their good work during the year.

JPT circulation is as follows: Member subscribers — 6229; nonmember subscribers—2491; complimentary—91. Geographically, it is: U.S.—6330; Canada—654; other countries—1827. The total, 8811, compares favorably with 8683, which was reported last year at this time.

Since May, subscribers in the U.S. have received their JPT with the address label affixed to the front cover, rather than to an envelope. The latter was eliminated in order to decrease costs of postage and handling. Complaints about damaged copies have been minimal.

Year Book: The 1975 edition was mailed on March 18, and a similar release date is planned for 1976. We continue to seek ways to hold the line on the costs of producing this annual directory.

Federation Series: Although a few new units may be in various stages of preparation, none will be published this year. The next one, No. 23 on "Interior Finishes," may be published by spring 1976. On assignment from the Educational Steering Committee, Society Educational Committees are reviewing all units in order to determine to what extent any need to be updated.

Federation Paint Show Program: There is good advertising news with this publication, too. Sales have exceeded 1974.

Paint Dictionary: This handy reference volume, long in the works by a dedicated group from the Philadelphia Society, may be published in 1976.

Exposure Standards Manual: The Technical Committee of the Philadelphia Society continues to work with ASTM D-1 on the revision of this photographic manual. Several new photos will be introduced.

COLOR APTITUDE TEST SET

In order to fill back orders, 250 sets of the 1964 edition of the CAT Set were purchased from Munsell Color Co. in 1973. To date, 165 have

been sold and the inventory should last through 1976. Also in 1973, the Federation purchased (from Munsell Color Co.) enough color chips to produce 1000 versions of a new and completely revised CAT. Originally targeted for release in 1976, the new unit will probably not be available until 1977. Nick Hale, color consultant, is preparing a proposal regarding the step-by-step production of the new Color Aptitude Test Set.

Memberships

The names of 6011 members (4585 Active, 1165 Associate, 261 other) were published in the 1975 Year Book. Since then the Societies have submitted additional members (364) as follows: Baltimore—23, Birmingham — 7, Chicago — 3, C-D-I-C — 22, Cleveland—9, Dallas—1, Detroit—16, Golden Gate—11, Houston—9, Kansas City—7, Los Angeles—28, Louisville—13, Montreal—22, New England—20, New York—12, Northwestern—16, Pacific Northwest—31, Philadelphia—38, Piedmont—8, Pittsburgh —2, Rocky Mountain—3, Southern—52, St. Louis—4, Toronto—3, and Western New York—4.

Our sincere thanks to Society membership chairmen for a fine job this year.

The Cleveland Society has again polled the Constituent Societies re. a standardized membership renewal form to accompany annual dues notices. This was discussed at the Society Representatives meeting on May 16, 1975. At that time, staff stated that it is in favor of any idea which will improve membership services and which will make its JPT readership audit and circulation audit more economical to handle.

The plan as proposed as practiced by the Cleveland Society is a good one, but from the Federation point of view, its success hinges on unanimity of acceptance. Also, Societies should understand that these forms will not replace the typed membership roster submitted to staff each year—at least for the time being.

Our present computerized mailing file is maintained out-of-town and is primarily a subscription/circulation system rather than a more sophisticated one which some associations have.

We are looking at ways to improve our program.

Paint Research Institute

As Assistant Treasurer of PRI, it has been a pleasure for me to acknowledge the following contributions to PRI this year: *Societies*: Baltimore, Chicago, Dallas, Detroit, Golden Gate, Kansas City, Los Angeles, Montreal, New England, New York, Pacific Northwest, Philadelphia, Southern, Toronto. *Paint Associations*: National Paint and Coatings, Baltimore, Detroit, Ontario. *Individuals*: W. B. Bate. *Corporations*: Ashland Oil Canada, Ltd., Canada Varnish Co. Ltd., Canadian Industries, Ltd., Cargill, Inc., Celanese Canada Ltd., Dominion Colour Corp. Ltd., Dumar Paints & Chemicals Ltd., Harrison & Crosfield (Canada) Ltd., Inmont Canada Ltd., L.V. Lomas Chemical Co., Ltd., MacLean-Hunter, Ltd., Mobay Chemical Co., Mobil Paint Canada, Ltd., Monsanto Co., Benjamin Moore & Co. Ltd., National Starch & Chemical Co. Ltd., Northern Paint Co. Ltd., Para Paints Ltd., PPG Industries, Inc., Reichhold Chemicals (Canada) Ltd., Rohm and Haas Co., Shell Chemical Co., Selectone Paints Ltd., Tioxide of Canada Ltd., Union Carbide Corp., N L Industries, Inc.

The Federation is certainly grateful to all for their support of PRI.

Communications

The main Federation/Society network communication is the Newsletter, and nos. 47 through 53 have been released this year. On appropriate occasions, the Newsletter is also mailed as a publicity/promotion piece to advertisers and exhibitors.

From time to time, the staff is pleased to supply information of value to our Societies. For instance, in July we sent U.S. Societies a summary of significant Federal income tax principles applying to their organizations. The communication was prepared by our attorneys and was intended to familiarize each Society with IRS requirements.

Last year, we tried to compile a listing of Society dues and monthly meeting dinner prices and sent a letter to each Society asking for this information. The response was so poor that we gave up. Another try was made this year and in spite of several reminders, three Societies have yet to reply. We will try again — one more time.

On the whole, the staff maintains very good communication channels with most Societies.

Awards

Thanks are extended to the Materials Marketing Associates and the Dry Color Manufacturers Association for offering two new awards to the Federation: MMA Awards for notable achievements by Constituent Societies and the DCMA Award for the best paper about the theory, use, or effect of color in coatings. Initial presentations will be made at the 1975 Annual Meeting.

Audio Visual

The Federation's first audio/visual program, "Causes of Discoloration in Paint Films," was made available for sale ($30.00) in the spring. Two more are expected soon: (1) "High Speed Dispersion" by the Montreal Society and (2) twelve Laboratory Test Methods being produced as a complete package by the Educational Committee.

As requested by the Board of Directors, all programs were reviewed by Gerry Allyn, our A/V Coordinator, and Tom Kocis, of staff.

Mr. Allyn has prepared a "Guide to the Preparation of A/V Programs" (which the Federation will make available) and will also conduct a "Slide/Tape and Paper Preparation Clinic" at the Annual Meeting.

Annual Meeting and Paint Show

From all indications, the Federation's "premiere" Annual Meeting and Paint Industries' Show on the West Coast will be a successful one, although no attendance records will, of course, be broken.

Because of the state of the economy and location of this year's event, total convention income was budgeted lower than in 1974.

New exhibitors in the Show are: Desert Sunshine Exposure Tests, Ebonex Corp., Modern Paint and Coatings, Manchem Ltd., Mooney Machine Mfg. Co., National Utility Service, O'Brien Industrial Equipment Co., Productos de Zinc Y Plomo S.A. de C.V., and Synres Chemical Corp.

Once again, the Federation has donated an exhibit space to each of the following: ASTM D-1, National Association of Corrosion Engineers, North Dakota State University, and University of Southern Mississippi. NACE has already given the Federation two spaces in its March 1976 show in Houston.

Twenty-Sixth Society

The Associacion Nacional de Fabricantes de Pinturas y Tintas A.C. in Mexico has expressed interest in becoming a Federation Society. Earlier this year all necessary papers and information to make application were mailed to the Mexican group. Unfortunately, there have been several communication interruptions which have delayed the processing of this matter in accordance with the Federation's Standing Rules. President and Mrs. Leslie attended the annual convention of ANFPYT in early October.

Society Visits

Generally in the company of one officer, I visited the following Societies in 1974-75: Kansas City, Baltimore, Chicago, Northwestern, Montreal, Philadelphia, St. Louis, Louisville, Southern, Cleveland, Detroit,

Southwestern Paint Convention, C-D-I-C, Pacific Northwest Symposium, Rocky Mountain, Los Angeles, and Joint St. Louis-Kansas City meeting. I also recently made a solo visit to Houston and Dallas as the start of the 1975-76 schedule.

Tom Kocis was also on the tour, and he visited Baltimore, New York, Philadelphia, Southern, Piedmont, New England, Pittsburgh, Western New York, and Los Angeles.

We extend our thanks for the fine hospitality shown us during these trips about the country.

A letter of request re the 1975-76 visitation schedule was sent to all Societies in early June. To date, half have replied, and using these as the base, the visitations by officer/staff have been set. As indicated in my spring report, there will be modifications in order to save both dollars and time. Examples: no more than two to a visit and one when it is practical to do so; Society sections to be visited every other year.

After two years on the circuit, I have observed mixed reactions to the monthly meeting visits made by Federation officials.

Do the Societies really want an annual visit from the Federation? Wouldn't every second year be just as effective? Especially if every travel dollar saved were redirected to the Federation's *raisons d'etre*: communications, education, and research.

And, as Herbert E. Hillman points out in his September JPT Letter to the Editor, the fewer demands of travel and time on the Federation Officers, the more candidates we might have for these honored positions.

Council Meeting

The order of the Spring Board and Council Meetings was reversed this year to a more logical sequence of the Council on Friday, the Board the next morning. This has improved and speeded up communications between the two groups.

We are still hopeful that the Spring Council Meeting will become more significant than the three-hr session it is now. It seems that an additional or expanded activity could be added to that weekend to make it more productive.

Committees

Staff is always eager and willing to work with Federation committees and it has been our pleasure to cooperate with several active ones this year. For example:

Definitions: Tom Kocis regularly attends the evening meetings of this committee, and Chairman Stan LeSota has met with the staff on two occasions. We are delighted (certainly no more than Stan) that the "Paint Dictionary" may be a reality in 1976.

Educational: We have assisted Chairman Harry Scott with meeting plans, and the preparation and distribution of publicity, records of meetings, etc. Arrangemens have been made for the November 20 and 21 meetings of Society Educational Committee Chairmen in Cleveland.

Meeting (Host): Frank Martin organized his committee of 60-70 Los Angeles Society members into a well-coordinated team. Staff is grateful for their assistance.

Program: This committee was chaired by another member of the Los Angeles Society, John A. Gordon, Jr. He vigorously directed and blended the work of his committeemen into a well-balanced program and it was our pleasure to work with them.

Publications: This is the committee with which staff (through Rosemary Falvey, JPT Managing Editor) maintains the closest contact all year long. Our thanks to Chairman Tom Miranda for helping us keep a very effective and cooperative line of communication between Philadelphia and Benton Harbor, Mich.

Technical Advisory: We are very happy to see this committee finally get off the ground. Staff was so impressed with Mr. Lauren's appraisal of our "Sagging Technical Backbone" that his letter to Technical Advisory Committee members was made the "Comment" page in August JPT.

Other Organizations

The Federation maintains membership in the following organizations: Inter-Society Color Council, ASTM D-1, Society of National Association Publications, Joint Paint Industry Coordinating Committee, American Society of Association Executives, and the National Association of Exposition Managers. The staff represents the Federation at annual meetings of these organizations when economically convenient to do so.

Staff

The Federation staff is the same as reported to you in the spring. It has been our pleasure to have administered your office this past busy year and if there is any way we can improve our service, kindly let us know. Please do visit us at 1315 Walnut St. if you get to Philadelphia during the Bicentennial.

Frank J. Borrelle
Executive Vice-President

Society Representatives Report

John J. Oates, of the New York Society, and Chairman of the Society Representatives, presented the following report from the meeting of the Society Representatives, held prior to the Council Meeting.

(1) The Society Representatives recommend that the proposal of the Corrosion Committee, with respect to financial support for the steel Structures Painting Council, be given serious consideration by the Finance Committee and the Federation Board.

(2) The Society Representatives have noted that serious questions have arisen about the structure and functioning of the Federation, related to its meeting the needs of the industry and the Federation membership, and recommend that the Board instruct the Planning Committee to review the following points: (a) The usefulness of the Federation Council as presently functioning; whether a change in seating arrangements, the size of the group, expanded meeting time, etc., might encourage wider communication, leading to more effective action; (b) Whether through the Federation's assumption of more of the expenses of attendance at Committee and Council meetings, wider membership participation might be encouraged. (A poll of the Society Representatives indicated that the considerable extra expense of participation in Federation activities is, by and large, borne by the employer and not the local Society, and that this can severely restrict the choice of Committeemen and Society Representatives); (c) In recognition of the finite resources available to the Federation, it is suggested that the Planning Committee examine the degree to which the Paint Research Institute might be supported primarily through individual and corporate grants, rather than relying, as in the past, essentially on Federation funding; (d) the role of the Federation as the technical arm of the industry, in attacking problems of ecology, consumer safety, etc., vis-a-vis the NPCA. Much confusion exists among the Society Representatives and the membership on the precise responsibilities of each of respective organizations in these areas.

(3) Terryl F. Johnson, of the Kansas City Society, was elected Chairman of the Society Representatives for 1976. John A. J. Filchak, of the

Pacific Northwest Society, will be Secretary.

(4) James A. Bohlen, of the Piedmont Society, was elected to a three-year term on the Board of Directors.

Elections

NOMINATING COMMITTEE

The nominating Committee presented its slate of officers as follows:

President-Elect — Neil S. Estrada, of Golden Gate Society (Reichhold Chemicals, Inc.).

Treasurer — John J. Oates, of New York Society (Troy Chemical Corp.)

Four nominees for two 3-year terms on the Board of Directors:

(1) Ruth Johnston-Feller, of Pittsburgh Society (Consultant).

(2) Herman J. Lanson, of St. Louis Society (Consultant).

(3) Elder C. Larson, of Houston Society (Shell Development Co.).

(4) James A. McCormick, of Baltimore Society (Leidy Chemicals Corp.).

By motion properly made, seconded, and approved, all nominations were declared closed.

APPOINTMENTS

The Federation Past-Presidents appointed Martin E. Schleicher (Western New York Society), of Bisonite Co., to a two-year term on the Board of Directors.

The Society Council Representatives appointed James A. Bohlen (Piedmont Society), of Sherwin-Williams Co., to a three-year term on the Board of Directors.

VOTING

Messrs. Estrada, Oates, Schleicher, and Bohlen were duly elected to their respective posts.

A secret ballot was conducted for the two 3-year terms as members-at-large on the Board of Directors, and Messrs. Larson and McCormick were elected.

Paint Research Institute

Progress reports on 11 research grants funded in 1974 were given in the annual report of Dr. Raymond Myers, Research Director, published in the May 1975 issue of JPT.

In my last report to Council, a listing of 13 grants then in effect was given. Since that date, four projects have been completed (Dr. Rudin at Waterloo, Dr. Thames at Southern Mississippi, Dr. Eyring at Utah, Dr. Pittman at Alabama) and one has been renewed for one year (Dr. Winters at Fairleigh Dickinson).

Considerable discussion has been held this year on the operations and objectives of PRI and the types of possible organizations for conducting research and educational activities on behalf of the paint industry. Dr. Howard Gerhart headed the PRI Study Committee concerned with these matters. There was a substantial majority opinion that research emphasis on a very few selected topics is more fruitful than supporting a great variety of projects. At present, the selected areas where improvements are needed are: (1) corrosion control by polymeric coatings; (2) mildew defacement of coatings; and (3) hiding by use of microvoids.

PRI has pioneered in the technique of research by prospectus; this involves the selection by the Trustees of an area where fundamental scientific breakthroughs are needed to overcome problems; the selection of a panel of scientists specializing in the specific field (such as microbiology) and scientists specializing in coatings; the preliminary use of questionnaires to delineate topics for discussioin among the scientists; the holding of an encounter session of the scientists where specific topics of needed research in the chosen area are selected; the solicitation of specific research proposals by means of a prospectus; and, finally, the selection of research projects that appear capable of providing answers to the problem topics that are delineated in the prospectus.

The prospectus on corrosion issued in 1973 brought forth 39 proposals. In 1971 a prospectus on mildew control was generated; this has been updated as the result of an encounter session in June 1975. This new prospectus (MIDOS) was published in the September 1975 issue of JPT, and we are now soliciting specific research proposals in the areas deemed worthy of support as delineated in the prospectus.

Dr. Myers has been honored by his selection as 1975 Mattiello lecturer. He also has spoken before the Gordon Conference on Coatings. In continuation of efforts to bring the PRI story to the industry, Dr. Myers spoke before the Scientific Committee of NPCA and the Chicago, Northwestern, Pacific Northwest, Louisville, Toronto and Western New York Societies. I have given talks on PRI to the Baltimore, Houston and Dallas Societies.

Additional publications of PRI Proceedings in JPT have brought the total published in the Journal to 117.

An effort will be made to work with the Corrosion Committee of the Federation to coordinate their applied research with corrosion projects conducted by PRI. We hope to utilize basic PRI research knowledge to help structure practical applied corrosion projects.

ROY W. TESS, *President*

[*During the Annual Meeting, contributions for the Paint Research Institute were presented to Dr. Tess by the Cleveland, Northwestern, Chicago, Houston, Louisville, and St. Louis Societies, and by the Chicago Paint and Coatings Association. The Baltimore, Dallas, Detroit, Golden Gate, Kansas City, Los Angeles, Montreal, New England, New York, Pacific Northwest, Philadelphia, Southern, and Toronto Societies had presented their contributions to PRI earlier in the year — Ed.*]

Committee Reports

BY-LAWS

[*See Page 33 in this issue — Ed.*]

A. F. VOSS/AMERICAN PAINT JOURNAL AWARDS

Nine Society papers were submitted in 1975. The winners were:

First Prize ($200) — "Adhesion of Latex Paints—Part I" — Montreal Society.

Second Prize ($150) — "Adhesion of Latex Paints to Chalky Substrates" — Baltimore Society.

Third Prize ($100) — "Single Pigment Paints" — Philadelphia Society.

Fourth Prize ($50) — "Corrosion Inhibiting Pigments Used in Aqueous Coatings" — New England Society.

MORRIS COFFINO, *Chairman*

BRUNING AWARD

The 1975 Armin J. Bruning Award was presented to Gerould Allyn (retired from Rohm and Haas Co.), Moorestown, N. J.

[*See December JPT — Ed.*]

CORROSION

Activity is continuing on two projects in cooperation with the SSPC:

(1) "Surface Preparation Profile" — Results have shown why average profile and maximum profile measurements made by various means have given widely divergent results. There appears to be capability to prepare standard methods of measuring profile by a choice of methods, all of which can be correlated by light microscopy as a referee method. The range of methods investigated include dial gage, comparator, stylus analyzers, magnetic gages and pneumatic gages.

Scanning electron microscopy work continues to illuminate the mechanisms of profile formation, the type of profile obtained by different surface preparation methods, and the probable controlling factors in profile height. Such variables are size of media, type of media, substrate thickness, and angle of incidence. Hackles are formed mainly from metallic media.

Salt fog tests, in progress on vinyls, epoxies, zinc rich systems, alkyds, and chlorinated rubbers tend to throw new light on conventional assumptions regarding the differences between brush off, commercial, near white, and white metal. The effects of profile height are also different than might be expected from practical speculation. Only preliminary results are in.

(2) "Performance of Alternate Coatings in the Environment" (PACE) — This project has progressed to the point where the various alternates have been outlined, along with evaluation procedures. Such alternates include surface preparation, exempt solvents, and nontoxic pigments.

Some features of PACE are: (a) open evaluation, providing a wide choice of paint systems; (b) results expressed in generic terms with complete identification of each product; (c) extensive controls.

ASTM D-01 (Reported by Lothar Sander):

(1) ASTM is cooperating with SSPC on project PACE.

(2) The highway people are concerned with visual standards for shot-blasted steel.

(3) Preliminary results from "Top Coating Zinc Rich Prmers" indicate epoxies have best adhesion over zincs in fresh and salt water. The zincs in fresh water wash before topcoating, and a wash primer as a tie coat will be evaluated.

ROBERT J. KLEPSER, *Chairman*

DEFINITIONS

The preface for the "Paint/Coatings Dictionary" has been completed for presentation at the Annual Meeting. [*See December JPT — Ed.*]

A final draft should be completed by the end of the year and proofs will be reviewed by the Committee, as well as selected experts in the field.

Our target, which will have to be confirmed by the publisher, is to have printed books by October 1, 1976—a bicentennial edition.

STANLEY LESOTA, *Chairman*

EDUCATIONAL

SLIDE/TAPE PROGRAM

A proposal for the production and packaging of Volume I of the Training Series was approved by the Board in May 1975. The finished package will be on display in the Federation booth during the Annual Meeting, and orders will be taken at that time.

Production on Volume II of this series can begin almost immediately, as some Societies already have slide/tapes under development.

WESTERN REGIONAL MEETING

On May 24, 1975 the Educational Committee Chairmen from the Western Region (Los Angeles, Rocky Mountain, Golden Gate and Pacific Northwest Societies) met in San Francisco. The purpose of the meeting was to coordinate the educational activities of the associated societies. Paul Payne, the Western Region representative on the Educational Steering Committee, was the Chairman. The meeting was extremely beneficial to those attending and was a continuing effort to provide available information on educational activities to the respective Societies.

It also provided a very worthwhile medium for the input of information to the Federation, and particularly to the Educational Committee, of the needs and desires of the member Societies. This is a very critical item as we continue our program to expand and meet these needs. It is another effort to provide continuity to the total activities of the various Societies. I certainly hope that we can see in the very near future, a further expansion of this program to other regions, and I strongly recommend this to Council as a future consideration.

Charles Miyada, of the Los Angeles Society, has been selected to replace Paul Payne as the Regional Chairman and as a member of the Steering Committee of the Educational Committee for 1976.

SCHOLARSHIP PROGRAM

The awards for the Scholarship Program for 1975-1976 school year have been made to North Dakota State University, University of Southern Mississippi, and University of Detroit. The program at High Point College has been discontinued because of lack of students. Twenty-four scholarships have been awarded at these schools in the name of the Federation. Six of the scholarships going to students at the University of Southern Mississippi have been to students whose parents are affiliated with the coatings industry. This is a very encouraging trend and, though only one of the recipient's father is a Federation member, it does begin to look like we have a worthwhile program to attract young people to our industry.

ANNUAL MEETING PROGRAM

The Educational Committee program for the Annual Meeting will consist of two papers, presented by graduate students of the University of Southern Mississippi and North Dakota State University. Dr. Zeno Wicks and Dr. Gary Wildman will participate.

FEDERATION BOOKLETS

Release has been secured for a booklet on "Interior Architectural Finishes," and this should be submitted to Federation headquarters very shortly. Authors have been secured for all subjects as outlined in my report to the Spring Council Meeting and work is progressing on these units. A systematic program review of previously published booklets is underway by the Educational Committee Chairmen.

COMMENTS

The meeting of the Society Educational Committee Chairmen scheduled for September was postponed until November 21 because a number of the Societies did not have their Chairmen selected for the coming

year. Once again I stress the importance of Committee Chairmen serving for two years as a minimum in order to maintain continuity and effective effort. You will receive information about this meeting, and I hope that you will discuss with the Educational Committee Chairman of your Society the planning and direction you feel should be taken.

Through the past few years, with the splendid cooperation of the local Educational Committee Chairmen, the Council, and the Board of Directors, a reorganization has taken place in the Federation's educational activities. I do think that we have a good, firm foundation in the structure of the Educational Committee, for it is tied very closely to the needs and desires and effort of the local Societies.

H. A. SCOTT, *Chairman*

EDUCATIONAL AD HOC COMMITTEE

[*At the May 17, 1975 Board meeting, President Leslie appointed a committee to meet and study the recommendation of Educational Committee Harry Scott that an additional member be added to the Federation headquarters staff to provide more assistance in carrying out educational programs. Appointed to the committee and charged with submitting a report to Council were: Educational Committee Chairman Scott, Manufacturing Committee Chairman Eugene LeVea, Immediate Past-President Michael W. Malaga, and Executive Vice-President F. J. Borrelle.*]

A meeting of the committee was held on June 11 in Cleveland. Unfortunately, Mr. LeVea was unable to attend.

Messrs. Borrelle, Malaga, and Scott did contribute various observations concerning Federation/Society educational programs. They concluded that if Federation/Society educational objectives are to be fulfilled and continued, coordinated, and promoted in an effective manner, then this can best be accomplished by a person on staff serving in a Field-Secretary type of position.

It is known that Mr. LeVea subscribes to a different point of view and because of the lack of his input into the discussion, the committee could not submit a report which would truly reflect the opinions of all its members.

We therefore refer this matter back to Council.

HARRY SCOTT, *Chairman, Educational Committee*

[*After presentation of the Ad Hoc Committee report, there was much discussion by Council Members on the need for additional staff support of committee activities. A show of hands indicated a general consensus that a person should be added to staff to serve in a technical/administrative role, and that further deliberations on the matter should await specific recommendations by the Planning Committee.*]

ENVIRONMENTAL CONTROL

As reported for the Spring Council Meeting, the Environmental Control Committee held a meeting April 28 and 29 in Southfield, Mich. At this meeting, we reviewed a document from the Environmental Protection Agency, Office of Solid Waste Management Programs, entitled, "Assessment of Industrial Hazardous Waste Practices: Paint and Coatings Manufacture, Solvent Reclaiming, and Factory Applied Coatings Operations." Our comments in regard to this review were written by Gabe Malkin, and submitted to EPA.
[*Copies are available from Federation headquarters office — Ed.*]

Although the summer period was rather slow, we are continuing to keep up with the ever-changing environmental regulations.

Mr. Malkin deserves special thanks for his many efforts on behalf of the Federation to make our position on environmental problems known in both public hearings and letters to the appropriate agencies.

The Environmental Control Committee heartily endorses the Federation's appointment of Mr. Malkin as its official "Delegate to NPCA and Governmental Agencies (Environmental Control)."

SAMUEL D. YANKEE, *Chairman*

HECKEL AWARD

The 1975 George Baugh Heckel Award was presented to Gerould Allyn, retired from Rohm and Haas Co., Philadelphia, Pa. [*See December JPT — Ed.*]

FRANCIS SCOFIELD, *Chairman*

INTER-SOCIETY COLOR COUNCIL

A new Constitution, By-Laws, and Standing Rules are being submitted for approval to the voting delegates of the Member Bodies of the ISCC. These have been approved by the Chairmen of the ISCC Committee. There are really no major changes except an increase from five to nine in the number of Directors on the Board and their rotating election at yearly intervals of three each year to serve three-year terms. This method replaces the election of five new Directors every two years. The Vice-President is replaced by a President-Elect, serving the same two-year term of office. Other changes include the establishment of Standing Rules in addition to By-Laws, which more clearly define the organization and operation of the Council.

Of interest to FSCT members is a new Subcommittee on Color Acceptability, a problem submitted by the Color and Appearance Division of the Society of Plastics Engineers, which was tentatively approved by the ISCC Board at its August meeting. The purpose of this new Problems Subcommittee is to establish and present physical samples of color acceptability limits for a sampling of colors. Acceptability, in the industrial world particularly, is different from perceptibility, the basis on which most of the color difference formulas are based. For example, lightness differences are generally more acceptable (or less objectionable) although equally perceptible, than chroma (i.e., saturation) differences. The samples will be prepared in paints, using typical, good industrial pigment formulations, so will be of interest to paint people, particularly those manufacturers and customers who do not use color measuring instruments and color difference formulae as a basis for acceptability. Two levels of tolerance will be considered: close tolerances and commercial tolerances.

Of possible interest to FSCT members is a program being presented to the Optical Society of America (OSA) at its Fall Meeting in Boston by the Problems Committee of the ISCC, describing the organization and activities of the ISCC Problems Committee. The OSA is one of the Member Bodies of the ISCC, as is the FSCT. The purpose of the program for OSA is the description of the problems currently being studied

President and Mrs. Leslie represented the Federation at the Biennial Conference of the Oil and Colour Chemists' Association, held June 17-21 at Scarborough, England. Shown at the Conference are L. O. Portin (President of Scandinavian Federation of Paint and Varnish Technologists), Mrs. Portin, J. Roire (President of FATIPEC), Mrs. L. H. Silver, L. H. Silver (President of Oil and Colour Chemists' Association), Mrs. J. C. Leslie, President Leslie, Mrs. A. T. S. Rudram, and A. T. S. Rudram (President Designate of OCCA)

by the ISCC. The same or a similar program could be presented next year for the FSCT. The Program includes an explanation of the organization and operation of the Problems Subcommittees and a description of the types of new problems which are brought to the ISCC, presented by the Problems Committee Chairman, Ruth M. Johnston-Feller, and descriptions of the Problems Subcommittees for Art by Raymond Spilman, Coordinator for Arts and Sciences, for Colorants by Robert F. Hoban, Coordinator for Colorants, Dyes and Pigments, for Color Science Problems by Dr. Franc Grum, Coordinator for Color Standards and Color Measurement, and for Pictorial Reproduction Problems by Calvin S. McCamy, Coordinator for Graphic Arts and Photography. The Problems Subcommittee Activities are the heart of the ISCC through which the Council members receive the benefits of color specialists from all disciplines and areas of color interest. If FSCT members are interested in learning more about the wide variety of interests and problems represented by the ISCC, contact the Chairman and a program similar to that arranged for the OSA will be arranged for the FSCT.

Almost any color problem, from whatever point of view, can be referred to experts represented in the Council. FSCT members are urged to present their problems to the ISCC. Membership of the FSCT in the ISCC entitles its membership to these advantages.

In addition to the delegates from the 28 member bodies (generally 10) there are about 550 individual members from all over the world, 16 living honorary members, and representatives from the AIC, the International Color Organization. Individual membership is open to all, and entitles members to subscription to the bi-monthly Newsletter.

The program for the Williamsburg Conference on Colorant Formulation, January 1976, has been finalized, and promises to offer an excellent update on this subject. Registration is limited to 100 attendees, because of limited facilities.

RUTH JOHNSTON-FELLER, *Chairman*

LIAISON

The committee has arranged with a travel agent to plan a possible charter or group flight to the FATIPEC meeting at Cannes May 2-7, 1976. Federation members are given an opportunity to state tentative plans for travel to Europe at that time and preferences as to vacation travel prior to May 2 or after May 7. On the basis of these declarations, we can determine the feasibility of reduced rates.

For the Annual Meeting we were able to have four speakers from overseas Societies. With respect to the once-active question of scheduled international exchanges of progress reports among the countries, only two Societies have formalized this procedure. We are recipients of eight Reviews of literature on Environmental Control. This is kindly furnished via surveys made at the Scandinavian Paint/Ink Research Institute and the Paint Institute TNO at Delft. This courtesy is appreciated.

The Committee has obtained authors to represent the Federation at the FATIPEC meeting in May 1976 and the SLF meeting at Helsinki in October 1976.

H. L. GERHART, *Chairman*

MANUFACTURING

The Manufacturing Committee held a meeting in Pittsburgh on September 19.

First item on the agenda was the selection of a vice-chairman to insure the continuity of the committee. Omer Petts, Jr. will be the Vice-Chairman for the coming year.

There have been several complaints about the scheduling of our three presentations concurrently at the Annual Meeting. Apparently there is considerable interest in our programs, and many people would like to attend all of them. Accordingly, concurrent manufacturing sessions should be avoided in future programming.

The next meeting of this committee will be in St. Louis, Missouri on March, 18 and 19, 1976. This will be a two day meeting and will include two plant tours.

The second meeting of 1976 is tentatively scheduled for July 22 and 23, in Newark, New Jersey.

Much discussion centered on what this committee is specifically doing to help all paint manufacturers, including the larger companies.

The relative merits and shortcomings of the Federation and the Association as they pertain to manufacturing were discussed at some length.

The following ideas were developed: Can we suggest ideas that are currently in use in other industries that may be beneficially used in the paint industry? And, can we work up a presentation on where automation economically replaces hard work?

Gabriel Malkin reported that two of the slide/tape presentations are being reviewed by members of the Review Subcommittee.

Len Magnusson reported that the equipment utilization formula is still in the works, and should be completed in the near future.

Ray Tackett's quality control laboratory project is also delayed, but being worked on.

Alun Morris volunteered to work on the tank cleaning task force assignment. This will be directed to the simpler methods of tank cleaning for the smaller manufacturer. Carroll Scholle will help with this project.

The committee has been given three "practical" papers to review for publication in the Journal.

S. T. Greer of PPG spoke to the committee for approximately 45 minutes.

He asked the question, "What is the Federation and the Manufacturing Committee doing for the paint industry?" He then suggested several areas where he felt that we could be of service to the industry.

(1) Disposal of waste water. We should go to EPA for a grant to do research on this problem area.

(2) Decanter waste problems. How do we handle them?

(3) Work with suppliers to solve problems, e.g., materials handling. Tell the suppliers what the industry wants and urge them to supply to our needs. (Slurry TiO_2).

(4) Dispersion optimization. Define problems and attempt to find answers.

In general, Mr. Greer recommended that this committee get more involved in the problems directly affecting industry as a whole.

Further discussions as to new directions for the manufacturing committee led to decision to take advantage of the work previously done on waste disposal and set up a research project on waste water disposal. The project would be designed to develop technology for disposing of process water waste from a paint plant in an environmentally acceptable manner, and at the same time produce, if possible, a profitable product from the residue. The project would involve: (1) technology search; (2) waste analysis; (3) theoretical technology; (4) experimental evaluation; (5) development of market.

The estimated cost would be $30,000 for the first year.

Implementation of this research project, or another like it, is essential to the continued growth of the Manufacturing Committee in service to the coatings industry.

EUGENE LEVEA, *Chairman*

MMA AWARDS

Initial presentation of Materials Marketing Associate Awards in recognition of notable achievements by Constituent Societies was made at Los Angeles Annual Meeting.

The winners were:

Class A — Southern Society (Excellence of Educational Program).

Class B — Pacific Northwest Society (Development of Specification Manual).

Class C — Houston Society (Report on Approaches to Problem Solving).

Each award is $350 cash, plus an engraved plaque.

BEN CHATZINOFF, *Chairman*

[*See pages 16 and 17 this issue—Ed.*]

MEMBERSHIP

Since the publication of the 1975 Yearbook, an additional 364 new members have been added to the Federation roster; this represents an increase of 6% over the last reported total of 6011. It should be mentioned that six Societies made noteworthy increase: Pacific Northwest—16.7%; Southern — 15.8%; C-D-I-C — 14.1%; Baltimore — 11.8%; Philadelphia — 11.8%; Montreal — 10.0%.

Whether this addition of new members is evidence of an upswing in the economy of the industry remains to be seen; it does represent second efforts since the beginning of 1975.

While giving due notice of elections of new members, it is hereby suggested that more public (media) recognition be given to the granting of 25-year memberships by the respective Societies; pictures of golf outings are merely passing ego boosters!

By charting attendance of members (active, associate and others) at future meetings, Societies may come to learn the interests of their members that indirectly help to attract old and new members. Another appeal is made at this time to improve the links of communication between the other related Federation Committees and the Membership Committee, as well as between Societies.

Finally, more thought must be given to attracting younger members and new members from end users of products of the coatings industry.

HORACE S. PHILIPP, *Chairman*

METRIC SYSTEMS

The study of adaption of colorizer systems for metric use was continued. A paper on this subject will be given during the coming season to the Toronto Society. No results are available yet on the study of conversion costs, but it is hoped to have some before the end of the year.

Liaison with NPCA's metric task force was maintained, and a plant tour of Samuel Cabot, Inc. (at NPCA's last meeting in Boston on Sept. 18) was attended. This firm is the first U. S. paint plant which has converted operations to metric, apparently very successfully so.

Contributions to "Metric Corner" in JPT were continued. A survey of likely metric bag sizes to replace the 50-lb bag was held in the Toronto Society. A good response was obtained, and the results of the poll are overwhelmingly in favor of the 25-kg bag as a replacement of the 50-lb bag.

E. L. HUMBURGER, *Chairman*

PAINT INDUSTRIES' SHOW

For the second time, plaques were distributed to exhibitors showing number of years of participation at our shows, for display at their respective booths. A total of 102 raw material and equipment manufacturers occupy 210 exhibit spaces. In addition, there are five complementary exhibits.

The C. Homer Flynn awardees for outstanding exhibits at the 1975 Show were:

Single or Double-Booth Exhibitor — ICI United States, Inc., Wilmington, Del.

Multiple-Booth Exhibitor — Union Carbide Corp., New York, N. Y.

REGINALD GILTROW, *Chairman*

PLANNING COMMITTEE

[*There was no report submitted by the Planning Committee for the Fall Council Meeting. However, there was much discussion of the recommendations made by the Committee at its February 15, 1975 meeting. It was the expression of Council that further consideration should be delayed until the Planning Committee meets again, refines its recommendations, and submits a report at the 1976 Spring Council Meeting.*]

PROGRAM

Goals selected for the 1975 Annual Meeting program were: to have a diversified program that would have something helpful for any FSCT member or society regardless of size, location, or field of specialization; to emphasize topics that would interest both Federation and Association members for the Wednesday opening session; to emphasize Federation Committee work wherever possible — to that end, we incorporated special programs of the Educational Committee, Technical Information Systems Committee, and the Manufacturing Committee.

The unstable state of the economy interfered with several phases of the program, especially that part given over to overseas papers. On the other hand, more Constituent Societies came up with papers (nine in all), which is an improvement over some past years.

One innovation came with the appointment of Harry Poth, Program Chairman for 1976, who accepted Vice-Chairmanship of the 1975 committee. As such, he has been kept fully informed of all phases of the committee action. This will not only help him in his job next year, but it provided backup to insure continuity. This progression should be arranged each year by the President and President-Elect.

JOHN A. GORDON, JR., *Chairman*

PUBLICATIONS

A meeting of the Publications Committee was held at Federation Headquarters on May 21, 1975. A number of significant items were reviewed:

Journal Name Change—The Publications Committee concurs with the name change to JOURNAL OF COATINGS TECHNOLOGY.

Review Procedure—Efforts will be directed to reduce reviewing time to a maximum of six weeks.

Manuscript Backlog—We are fairly well caught up on manuscripts. The Annual Meeting presentations should contribute to a continuing supply of papers.

Scientific Quarterly—This project has been set aside for now due to monetary considerations, but will be reviewed from time to time.

Foreign Contribution—An effort has been made to encourage foreign contributions to the Journal.

Federation-Sponsored Symposia — Suggestions have been made to sponsor more symposia, since other groups are assuming this role. A suggestion has been made to the Planning Committee for recommendations to the board.

Content—Considerable discussion was held on the subject-matter balance of the Journal. A suggestion to give priority emphasis to papers reflecting current interest was well received and is being implemented.

Student Section—Efforts to obtain student papers have been unrewarding, but we shall continue attempts to remedy this.

Federation Booklets—Efforts are underway to have a total of 30 booklets published in the series, and then consider revision of the earlier issues.

Book Reviews—These are becoming a regular Journal feature — 10 have been published from May 1974 through September 1975.

Journal Cover—The Publications Committee extends congratulations and appreciation to the Staff for the enlightened covers and new format of the Journal.

Journal Mailing—The use of envelopes for mailing the Journal was discontinued at a considerable cost saving to the Federation.

The 1976 Publications Committee and Editorial Review Board have been updated and are ready to serve the Federation in the coming year.

THOMAS J. MIRANDA, *Chairman*

ROON AWARDS

A total of 12 papers was submitted in the 1975 competition. Winners were:

First Prize ($750) — "Photochemistry of Pigments. Studies on UV Curing and Energy Transfer" — S. Peter Pappas and Walter Kuhhirt, of North Dakota State University, Fargo, N. D.

Second Prize ($500) — "Calculation of Absorption of UV Radiation by Photosensitizers in Pigmented Ultra-Violet Curing Coatings" — Zeno W. Wicks Jr. and Walter Kuhhirt, of North Dakota State University, Fargo, N. D.

Third Prize ($350) — "Water and Solvent Evaporation From Latex and Latex Paint Films" — Don A. Sullivan, of Shell Development Co., Houston, Texas.

Fourth Prize ($150) — "Interaction of Triazine Crosslinked Acrylic Films and Detergent Solutions" — Dennis G. Anderson and Edward J. Murphy, of DeSoto, Inc., Des Plaines, Ill.

There are usually a few papers that, for one reason or another, are not actually submitted, even though the author earlier indicated his intention to do so. The two most common reasons are the inability of the author to complete the work in time, and the inability to obtain company permission to publish. The latter problem usually arises in those cases where the final results of the experiments achieve much greater significance than had originally been anticipated. There were five papers this year that failed to reach the actual competition for these two reasons.

Actually, it was a very good year, since, of the 12 papers submitted, eight were chosen for presentation at the Annual Meeting in Los Angeles. We trust that this increased interest in the Roon Awards competition will continue. The Committee is requesting that the wording of the Principles Governing the Roon Awards be revised to show the actual per cent values assigned in the ratings. These values have been used by the Committee for many years and the authors should be aware of them.

Section (10) would now read:

"(10) Papers will be rated with emphasis on: (a) Originality (40%); (b) Scientific Importance (20%); (c) Practical Value (20%); and (d) Quality of Composition (20%)."

R. G. FORTENER, *Chairman*

SPECIFICATION

While there has been considerable activity by a number of Societies in the Specification area throughout the past 10 years, I believe some of the reactions generated by Mr. Thomas J. Accamando's (Chairman, New York Society's Specification Committee) inquiry to all Societies, are pertinent. Consequently, this report features responses from Society Specification Committee Chairmen on the following questions:

(1) Is your Specification Committee active?

(2) Is your Committee for Federal Specs only?

(3) Does it include State Specs?

(4) Does it include City Specs?

(5) Does it include Local Municipal Specs?

(6) Do you work with Purchasing Agencies?

(7) Do you work with local Government Laboratory Personnel?

Total responding Societies, 15 out of 25.

Concerning the first question of activeness, seven Societies (Pittsburgh, Philadelphia, Chicago, Southern, C-D-I-C, Cleveland, and the Pacific NW) reported they were active, while the Northwestern Society responded semi-active. (Also, we should conclude that the New York Society was active, since it initiated the questionnaire).

An interesting feature of the survey was that four of the Societies reporting being inactive responded that their activities dealt only with Federal Government Specifications, while most of the active Societies reported involvement with other specifications. However, these involvements in most cases were requested by the specification writing activities and were not solicited by the Society's Specification Committees. This "wait to be called on" posture is examplified by the following comment from a Society Specification Committee Chairman: "We will review any specs sent to us but we do not actively solicit specs from local Governments."

Some other revealing comments:

"I have been Chairman of the Specification Committee for 3-4 years. It has been inactive in this area due to poor support from individuals and companies who feel it is time spent by individuals to poor cause. Most of the companies in this Society do not cater to Specification products."

"The Specification Committee has been mostly inactive for 4 or 5 years. On occasion a Federal Specification is circulated for review, but our local experience has shown little effect on sending comments to GSA thru the Federation Specification Committee. It is my feeling that the present GSA procedure of writing up a spec then asking for comments is not effective. But as long as the GSA doesn't have funds, qualified personnel, and laboratory facilities, they will continue to 'write specifications'."

"Actually our local Society exhibits very little interest in this activity. I fear it has degenerated to a level where I am pretty much 'a committee of one' and I am fairly sure no one would notice if I failed to continue activity."

While these comments have validity, and illustrate why some Societies are inactive, they are essentially admissions of passiveness. Other more aggressive Societies have had significant success in the development of Federal, State, and Local Government Specifications and will continue to do so.

Particularly pertinent to the comment concerning GSA specifications is the new Value Incentive Clauses that GSA is now including in most supply contracts. This clause gives the individual manufacturer an opportunity to improve specifications, through direct input to GSA and provides a means for reimbursement of the development work. It can also increase the margin of profit on GSA business and involve the industry in Government life-cycle costing programs through consideration of collateral savings.

JOHN A. J. FILCHAK, *Chairman*

TECHNICAL INFORMATION SYSTEMS

Committee member Hans K. Rauschou Nielsen continues to be the chief source of supply for contents of major paint/coatings journals published abroad. As stated in the spring report to Council, negotiations to obtain directly from European publishers advance copies of proof- or tear-sheets of contents/abstracts did not produce the desired results. Instead, publishers objected to the listing of John Crerar Library as a source of copies — on the grounds of copyright infringement.

For the past six months, this library listing has been omitted, and has been replaced by the names and addresses of publishers of individual periodicals covered. It is time to attempt a second contact with publishers early in 1976 — hopefully with better results.

COATINGS TECHNOLOGY INFORMATION SOURCES BOOKLET

The booklet has not progressed beyond the rough draft stage described in the spring report. However, the member who had volunteered to write the booklet has left TISCO and joined the Federation's Educational Committee for 1976. With this transfer to the Educational Committee whose duties include supervision of the Federation's Series of booklets on Coatings Technology, the would-be author may well resume work on the booklet.

ANNUAL MEETING PROGRAM

The committee is sponsoring a Seminar on Communications for the 1975 Annual Meeting.

HELEN SKOWRONSKA, *Chairman*

DELEGATE TO NATIONAL FIRE PROTECTION ASSN.

The Sectional Committee on Coatings Manufacture met, revised, and rewrote NFPA No. 35, "Organics Coatings Manufacturing Standard."

This new Standard is now being prepared for publication on October 7, 1975, as part of the 1976 Technical Committee Report. This report, when published, will be available for public comment up until December 5, 1975. After that time, it will be put into final form for action at the annual NFPA meeting in May of 1976.

When the new standard is available, plant managers and plant engineers in the coatings and resins industry can obtain a copy of this standard by writing to National Fire Protection Association, 470 Atlantic Ave., Boston, Mass., 02210.

RICHARD J. HAVILAND, *Delegate*

DELEGATE TO STEEL STRUCTURES PAINTING COUNCIL

The Federation is an active supporting member of SSPC again this year. The SSPC Annual Meeting was held September 30 and October 1 in Pittsburgh. This year marks the 25th Anniversary of SSPC. For this occassion, the meeting format was more of a seminar rather than just business and committee reports, with many nonmembers present.

John Keane continues to serve SSPC as Director of Research and Senior Fellow of Carnegie-Mellon University.

Federation co-sponsored projects, "Surface Preparation Profile" and "Performance of Alternate Coatings in the Environment" (PACE), continue. These subjects are covered in the Corrosion Committee Report.

One very important facet of SSPC activity is the Advisory Committee

work. The current activity of these Committees may be summarized as follows:

(1) Zinc Rich Paints — A compositional specification has been drafted. This basically centers around the level of zinc in the dry film. Performance criteria have been set up around a salt fog exposure. The salt fog test is the only accelerated test that could be correlated to 10 years' actual exposure. Topcoating zinc primers has revealed many variables as factors. There are only preliminary results at this time.

(2) Chlorinated Rubber — A state-of-the-art report has been written. It is proposed that the SSPC specification system be revised to include primer, high build midcoat, and finish. Formulating guidelines and performance criteria are being drafted.

(3) Silicone Alkyd — Three specifications have been drafted—topcoat, system over new steel, and system over previously painted steel.

(4)Epoxy Polyamide — The currency of the SSPC is being checked utilizing a comparison with the MIL-C-2441 system. Also under evaluation is a vinyl modification for improved topcoating.

(5) Aluminum — A thixotropic aluminum formulation is in development.

(6) Urethane Paints — A guide to urethane paints is in draft.

(7) Coal Tar Epoxy — Consideration is being given to deleting compositional requirements from the SSPC spec, which is presently based on C-100. Also under consideration are alternate formulating approaches—Rule 66, etc.

The presence of many nonmembers at this meeting, who are technologists in the paint industry and members of the Federation, afforded lively discussions on many of these subjects. Because of this exposure, a larger cross-section of our industry has had an opportunity to see the work SSPC does and the impact it has on our industry. Hopefully, this exposure will translate to increased Federation support.

ROBERT J. KLEPSER, *Delegate*

SOCIETY REPORTS

Annual reports from the Societies were presented at the Council Meeting and complete copies were distributed to every member of Council. Following are pertinent highlights as taken from submitted reports for 1974-75.

BALTIMORE

Setting up technical library . . . . Contributed $250 to PRI . . . . Technical Committee prepared paper for presentation at Annual Meeting . . . . Will hold February seminar on "An Update on Emerging Technologies."

BIRMINGHAM

Membership remains at 120, with an increasing percentage of younger members . . . Average attendance at monthly meetings is 45, with 85 attending January lecture on "Water-Thinnable Industrial Finishes" . . . Ladies were invited, for first time, to lecture on "Decoration of Glassware;" event was well attended, and will be repeated in coming year . . . Federation President J. C. Leslie addressed a special meeting of the Society and presented a scroll from the Federation to Frank Suddaby, who retired from the paint industry after holding office with the Birmingham Club continuously since 1958.

CHICAGO

Membership now totals 855 . . . Study in progress to determine if benefits derived from a yearbook would balance the high cost of publication (last published in 1971) . . . Contributing $1,000 annually to Scholarship Fund at North Dakota State University; at present, two full-time students are receiving support

On visit to the Birmingham Club, President Leslie presented a scroll on behalf of the Federation to Frank Suddaby, in recognition of his holding office with the Club continuously since 1958

. . . Contributed $500 to PRI . . . Technical Committee is preparing update of "Infrared Spectroscopy" . . . SYMCO's "Focus on Fundamentals and the Future" was successful, but attendance was down somewhat due to state of economy . . . A Leadership, Development Conference on "Creativity, Innovation, Communication, and Motivation" drew attendance of 135 . . . For 1976, SYMCO will be held March 9-10; topic will be "Coatings: Past, Present, and Future — 1776 to 2176" . . . Bicentennial project is underway, involving local schools and a house-painting program.

CLEVELAND

Technical Committee prepared paper for presentation at Annual Meeting . . . Made $600 donation to PRI . . . Will hold February symposium on "Latex Paints: Principles and Practice" . . . Completed two slide/tape productions for Federation Educational Committee's Training Series.

DALLAS

Sponsoring series of lectures, given prior to monthly dinner-meetings by Dr. Margaret Willoughby, Professor of Chemistry, University of Texas at Arlington . . . Contributed $1,000 to PRI.

DETROIT

Contributed $250 to PRI . . . Continuing sponsorship of lecture and lab courses on coatings technology at Polymer Institute of University of Detroit . . . Working with Detroit Paint and Coatings Association to establish a modern coatings lab at the Polymer Institute . . . Planning underway for a 1977 technical seminar.

GOLDEN GATE

Membership has increased 15% over 1974 . . . Monthly meetings were alternated between San Francisco and the East Bay in attempt to increase attendance; while a different group attended, total attendance remained about the same . . . Manufacturing Committee presented a seminar in June on "How to Survive in '75," which was well attended . . . Educational programs continue at San Jose Regional Vocational School and John Adams School in San Francisco; the San Jose day course currently has 40 students attending, while the night class on Fundamen-

tals of Color Matching has 27 students enrolled; John Adams evening course continues to do well, with enrollment of 26 . . . Education Committee completed two productions for Federation Educational Committee's Training Series; also attempting to set up a career promotional program at San Jose for school counselors . . . Society continuing to work closely with The Bay Area League of Industrial Associations to better monitor efforts by various regulatory agencies that affect the industry . . . Contributed $500 to PRI.

HOUSTON

Hosted Southwestern Coatings Convention, which attracted 325 members and guests . . . Contributed $673 to PRI . . . Education Committee will sponsor January symposium on "New Coating Concepts" . . . Completed production on presentation for Federation Educational Committee's Training Series.

KANSAS CITY

Annual dues are now $100 per member, which includes dinners for the nine monthly meetings . . . Contributed $150 to help replace testing equipment for Rolla Short Courses . . . Hosted St. Louis-Kansas City Joint Meeting in June, which had attendance of 158 members and guests . . . Contributed $150 to PRI . . . Paper presented on behalf of Society at Annual Meeting.

LOUISVILLE

Attendance at 1974-75 meetings averaged 90 members and guests . . . Held successful May symposium . . . Two papers presented at Annual Meeting on behalf of Society . . . Educational Committee sponsoring monthly lectures at University of Louisville's Speed Scientific School . . . Contributed $500 to PRI . . . Completed presentation for Federation Educational Committee's slide/tape Training Series.

LOS ANGELES

Monthly meetings averaging attendance of 120 — increase of 20% over 1974; in effort to continue increasing attendance, three meetings will be held at different locations in coming year . . . Financial support extended to North Dakota State University, Coatings Section of the City of Commerce Public Library, and Los Angeles Trade Technical College (who now offer an Associate of Arts degree in Paint Technology); Federation slide/tape presentation on "Causes of Discoloration in Paint Films" was purchased for Commerce Library . . . Donated $8100 to scholarship program for 11 students . . . Educational Committee completed slide/tape presentation for Federation Educational Committee's Training Series . . . Paper presented on behalf of Society at Annual Meeting . . . Contributed $500 to PRI . . . Cooperated with Southern California Paint and Coatings Association in causing a delay by State Air Resources Board to reclassify organic solvents . . . Preparations underway for Western Coatings Societies' Symposium and Show, to be held in Los Angeles in March of 1977.

MONTREAL

Contributed $300 to PRI . . . Education Committee sponsored course in elementary paint technology . . . Manufacturing Committee preparing French version of slide/tape production on "High Speed Dispersion" . . . Continuing practice of sending copies of monthly newsletter to presidents of other Societies . . . Presenting paper on behalf of Society at LA Annual Meeting.

NEW ENGLAND

Membership increased by 25 Active and 20 Associate . . . Technical Committee prepared paper for presentation at Annual Meeting . . . Sponsoring college accredited evening course in coatings technology at Lowell Technological Institute . . . Contributed $200 to PRI.

NEW YORK

Membership has increased to 545 . . . Average attendance at eight monthly meetings was 146 . . . Mattiello Trust Fund, formerly used to support Mattiello Library at Polytechnic Institute of New York, was modified to permit support of future Mattiello Memorial Seminars, to be held annually; first was conducted in March on "Advances in Substantially Solvent-Free Coatings" . . . Education Committee sponsored two courses at local colleges during the year: "Basic Course for Lab Technicians" and "Fundamentals of Coatings Technology, I and II" . . . Contributed $250 to PRI . . . Will institute bestowal of 25-year membership pins to qualified, long-term members of the Federation.

NORTHWESTERN

Added 16 new members to roster . . . Donated $500 to North Dakota State University . . . Held monthly meeting at NDSU, featuring technical reports by students on research projects . . . 130 registrants attended March symposium on "Surface Preparation and Application of Industrial Coatings" . . . Contributed $400 to PRI.

PACIFIC NORTHWEST

British Columbia Section, Seattle Section, and Portland Section all produced slide/tape presentations for Federation Educational Committee Training Series . . . BC Section sponsored advanced course on "Latices and Latex Paints and Alkyds" and a new course on "Modern Surface Coatings;" basic technology course was recently started, and a short course is being prepared for presentation by high school and technical institute teachers . . . Portland Section held three seminars in place of formal courses; topics were "Driers and Additives," "Surfactants in Coatings," and "Rheology" . . . Seattle Section sponsoring short course on basic coatings technology at Pacific Lutheran University, and is preparing a short course for paint technicians for presentation at a local trade school . . . Society contributed $425 to PRI . . . Specification Committee cooperated with Seattle-King County Chapter of PDCA in production of Specification Manual . . . Completed four-year study on effect of moisture content in Douglas Fir plywood at time of painting on exterior coating durability . . . Symposium in May drew attendance of 229.

PHILADELPHIA

Added 51 new members . . . Seminar on "High Solids Liquid Coatings" was a technical and financial success . . . Technical Award certificates were presented to J. Richard Kiefer and Seymour Mark . . . Made contribution of $300 to PRI . . . Technical Committee prepared paper for presentation at Annual Meeting.

PIEDMONT

High Point College has dropped polymer and coatings course due to lack of students . . . Education Committee is planning a technician's course at Guilford Technical Institute.

In Memoriam

ADDISON, EARL H. — Hydrosol Co. (Chicago)

ARNOT, W. J. — A & W Paints, Ltd. (Birmingham)

BARUCH, ALAN P. — Ashland Chemical, Inc. (C-D-I-C)

BERNSTEIN, GREGOR — Cabot Corp. (New England)

BLEDSOE, HARRY B. — KWAL Paints Inc. (Rocky Mountain)

BLOOM, SAMUEL A. — retired (Baltimore)

BURROWS, RAYMOND C. — Ashland Oil Ltd. (Toronto)

DAVIDSON, RUBY IRENE — Major Paint & Varnish Co. (Los Angeles)

EAKINS, ELMER E. — retired (Philadelphia)

FASIG, EDGAR W. — Lowe Brothers Paint Co. (C-D-I-C)

FEDERHEN, HERB — retired (New England)

FRANKLIN, HARRY — retired (New York)

FOOTE, R. G. — retired (Detroit)

GOOEL, RICHARD A. — Standard Detroit Paint Co. (Detroit)

HAMMOND, ROY — Cal Ink Chemical Co. of Canada Ltd. (Toronto)

HILL, G. NORMAN — Llewellyn Ryland Ltd. (Birmingham)

HUGH, CHARLES S. — Hercules, Inc. (Philadelphia)

LAMM, VINCE — Forman Ford Co. (Northwestern)

LAWALL, WILLARD M. — U. S. Coast Guard (Baltimore)

LASOVICK, DANIEL — Trancoa Chemical Corp. (New England)

MCHATTIE, JAMES — Cabot Carbon Ltd. (Toronto)

MCWHORTER, CHARLES R. — KNS Co. (Chicago)

O'LEARY, DR. LAWRENCE A. — retired (Golden Gate)

PEDAREE, JOSEPH A. — Glidden Durkee Div. SCM Corp. (Dallas)

PORTER, A. J. — Mobil Chemical Co. (Louisville)

ROMANOFF, SAUL — Pioneer Paint & Lacquer Corp. (New England)

SANDERSON, JOHN MCE. — retired (New York)

WOOD, PAUL W. — Paul Wood Whse. (Golden Gate)

ZIMMERMAN, AL — retired (Los Angeles)

PITTSBURGH

Completed slide/tape production for Federation Educational Committee's Training Series, and planning second contribution . . . Co-sponsored with Carnegie-Mellon's Chemical Engineering Dept. a symposium on "Coatings Research in U.S.A. and Germany."

ROCKY MOUNTAIN

Produced two presentations for Federation Educational Committee's Training Series . . . Held seminar on environmental topics which was highly successful.

SOUTHERN

Annual Meeting again featured session in which students from University of Southern Mississippi's Department of Polymer Science presented results of their research projects . . . Sponsored "Water-Borne and High Solids Coatings" symposium at USM, which attracted 140 registrants; financial success of symposium enabled Society to contribute $7,000 to USM Scholarship Fund . . . Additional contribution of $4600 was made to USM Scholarship Fund; to date, 32 students have graduated from the Department of Polymer Science, and 95% are employed in the coatings industry . . . Contributed $500 to PRI . . . Presented three members with 50-year pins.

ST. LOUIS

Jointly sponsored annual meeting with Kansas City Society . . . Sponsoring course on coatings technology at Washington University . . . Initiated speakers' exchange bureau with local chapter of Construction Specifications Institute . . . Contributed $400 to PRI . . . Established "Gateway Service Award" to recognize members who have made outstanding contributions to the Society, Federation, or local coatings industry.

TORONTO

Continuing to sponsor coatings courses at George Brown College . . . Monthly meetings averaging 130 attendance . . . Set up Scholarship Fund to aid students at George Brown College . . . Contributed $747 to PRI . . . Held seminar on "New Trends in Coatings Technology" . . . Dropping classification of Associate membership . . . Honored incoming Federation President Bill Dunn at special monthly meeting.

Year-End Report of the By-Laws Committee

In accordance with Article XIV of the Federation By-Laws, the By-Laws Committee submitted the following amendments incorporating proposed changes to the By-Laws.

The first amendment was adopted at the Fall Council Meeting on October 28 and became effective immediately upon adoption.

The second amendment will be presented for adoption at the 1976 Spring Council Meeting.

ADOPTED

The following amendment was adopted at the Fall Council Meeting on October 28, and became effective immediately upon adoption.

ARTICLE IX
OFFICIAL PUBLICATIONS

WHEREAS the change in name of the Federation to the Federation of Societies for Coatings Technology has caused inconsistency in the name of the Federation's official publication, and

WHEREAS the submission of the following change in name was approved by the Board of Directors meeting in Cleveland on February 16, 1974, be it

RESOLVED that Article IX, Official Publications, of the By-Laws which now states "The Federation shall publish the 'Journal of Paint Technology' and other publications which the Board of Directors deem necessary or desirable" be amended to read "The Federation shall publish the 'Journal of Coatings Technology' and other publications. . ." and be it further

RESOLVED that wherever the name "Journal of Paint Technology" appears in other parts of both the Constitution and the By-Laws, the name be changed to "Journal of Coatings Technology."

TO BE PRESENTED FOR ADOPTION

The following amendment will be presented for adoption at the 1976 Spring Council Meeting on May 14 in Toronto.

ARTICLE III
ORGANIZATION

SECTION B—BOARD OF DIRECTORS

WHEREAS it is generally understood that the Federation members on the Board of Directors are to be Active Members of the Federation, and

WHEREAS Article III, B states "The Board of Directors shall consist of the President, President-Elect, and Treasurer of the Federation, six members-at-large, the most recent eligible Past-President, two additional eligible Past-Presidents, three eligible Society Representatives, and the President of the Paint Research Institute.", be it

RESOLVED that Article III, B be amended with a sentence added which states, "Active Membership shall be required for all members of the Board of Directors, except that the President of the Paint Research Institute and Past-President members may hold any class of membership in the Federation."

[An amendment to the proposed amendment was offered, to strike the word "eligible" from all three places in the first paragraph of Section B.

The amended motion was seconded and approved, and the proposed amendment received first reading.]

HARRY POTH, *Chairman*
By-Laws Committee

Roon Awards Competition Offers $1,750 in Prizes For Winning Technical Papers Presented in 1976

The Roon Foundation Awards, established in 1957, will be continued and the best technical papers offered for presentation at the Federation's 1976 Annual Meeting in Washington, D.C. will be eligible for cash prizes—$1,750—donated by Leo Roon, former President of Nuodex Products Co., and a Director of the Roon Foundation.

Richard G. Fortener, Chairman of the Federation's 1976 Roon Aawards Committee, stated that the papers submitted in competition for the Awards must: (1) Be of such caliber that they will reflect a step forward in real scientific contribution to the coatings industries; (2) Be directly related to the protective coatings industry; and (3) Be a contribution of one individual or no more than two individuals, both of whom shall be associated in the same company, laboratory, or university.

The schedule of prizes is as follows: First — $750; Second — $500; Third — $350; and Fourth — $150.

The 1976 Annual Meeting of the Federation will be held in Wasington, D.C. from October 27-29, and the deadline date for receipt of papers will be June 1.

1975 Awards

First Prize ($750) — "Photochemistry of Pigments. Studies on UV Curing and Energy Transfer" — S. Peter Pappas and Walter Kuhhirt, of North Dakota State University, Fargo, N. D.

Second Prize ($500) — "Calculation of Absorption of UV Radiation by Photosensitizers in Pigmented Ultra-Violet Curing Coatings" — Zeno W. Wicks Jr. and Walter Kuhhirt, of North Dakota State University, Fargo, N. D.

Third Prize ($350) — "Water and Solvent Evaporation From Latex and Latex Paint Films" — Don A. Sullivan, of Shell Development Co., Houston, Tex.

Fourth Prize ($150) — "Interaction of Triazine Crosslinked Acrylic Films and Detergent Solutions" — Dennis G. Anderson and Edward J. Murphy, of DeSoto, Inc., Des Plaines, Ill.

Principles Governing the Roon Awards

These awards, established in 1957 by Mr. Leo Roon, a Director of the Roon Foundation, are for the best technical papers (other than those by a Constituent Society of the Federation) submitted for presentation at a Federation Annual Meeting.

Papers to be considered for the competition will be those by individuals associated with the organic coatings industry, including raw material suppliers and educational institutions.

The Federation, as sponsor of the competition, will supervise the judging of the papers. The principles governing the awards are as follows:

(1) The papers shall be of such caliber that they will reflect a step forward in real scientific contribution to the coatings industries. The papers shall describe original work which has not been previously published or presented.

(2) Papers must be directly related to the protective coatings industry.

(3) The paper shall be a contribution of one individual or no more than two individuals (both of whom shall be associated in the same company, laboratory or university). None of the work shall originate from, be guided by or be any part of a Coatings Technology Society. These awards shall in no way detract from the cooperative efforts of Societies, Technical Committees and their convention papers.

(4) An Award Committee shall consist of five members who shall be appointed by the President of the Federation.

(5) The committee is not obligated to award prizes if in its opinion none of the submitted papers are of a caliber to be worthy of such recognition.

(6) The submitted papers may be presented at the Annual Meeting with the consent of the President of the Federation and the Chairman of the Program Committee. Although it is the intent of the Roon Awards that winning papers will be presented at the Annual Meeting papers accepted for presentation and papers awarded prizes are separate and distinct. An invitation from the Program Committee to present his paper should not be construed by an author as an indication that the Roon Committee has awarded his paper a prize.

(7) Winning papers will be published in the Journal of Coatings Technology, which has prior rights to publication of all submitted papers.

(8) The papers shall be concise and informative discussions of up to approximately 6,000 words. Papers greatly exceeding this length should be divided into more than one paper. Multiple entries in the competition from a single author are acceptable. It is requested that manuscripts be prepared in accordance with Journal of Coatings Technology style, as outlined in the Guide for Authors. Copies are available from the Federation office in Philadelphia upon request.

(9) A 75 to 100 word abstract shall accompany the paper.

(10) Papers will be rated with emphasis on: (a) Originality (40%); (b) Scientific Importance (20%); (c) Practical Value (20%); and (d) Quality of Composition (20%).

(11) The Awards will be open to anyone involved in study of or engaged in work related to the protective coatings industries, including paint, varnish and lacquer manufacturers, raw material suppliers, research laboratories and universities. (The committee, however, will not accept papers which involve raw material sales promotion or are self-serving in regard to exploiting a proprietary product.)

(12) The prizes will be as follows: First — $750; Second — $500; Third — $350; and Fourth — $150.

(13) It is requested that all papers be accompanied by company or educational institutional clearance for publication.

(14) Those planning to submit a paper in 1976 must let the Chairman (R. G. Fortener, Celanese Coatings Co., P. O. Box 99038, Jeffersontown, Ky., 40299) know by March 1. He must have seven publication manuscripts by June 1.

(15) The 1976 Awards, and accompanying certificates, will be presented during the Annual Meeting in Washington, D. C.

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News from Washington

Bicentennial Year Looks Good For the Chemical Industry

William J. Driver, President of the Manufacturing Chemists Association, has expressed optimism for the chemical industry's prospects for 1976.

In a statement on the outlook for the coming year, Mr. Driver noted that while the industry had a relatively poor first half in 1975 (profits dropped 15%), shipments had shown more strength in the second half and profits show some signs of recovery, and estimates project that both sales and profits will be up significantly in 1976.

Most chemical producers continue to be concerned about coping with overly-restrictive governmental regulations, higher raw material and energy costs, and the latent issue of reduced capital availability, which shows no sign of diminishing. These problems make company planning more difficult, said Mr. Driver, and the industry will need its traditional initiative and resourcefulness to maintain progress.

Based on U. S. Department of Commerce data, the industry's value of total shipments of chemicals and allied products for 1975 is estimated at $85 billion, a 5% increase over 1974. The Federal Reserve chemical production index decreased approximately 7% from 1974.

Data from a survey of 31 members of the Manufacturing Chemists Association show that chemical sales may increase 17% in 1976 over 1975. About 20% of the companies indicated that sales increases could equal or exceed 30%, and 20% thought sales would not increase more than 10%. Net income after taxes may rise 20%.

Operating cost increases in 1976 are expected to vary from 7% for transportation and distribution costs to 15% for fuels and electrical energy. Raw materials, wage rates and construction costs could each be up 9%.

The MCA survey showed a wide range of changes anticipated in 1976 capital expenditures. About one-fourth of the companies plan either no change or decreases, while one-fourth expect a 25% or more increase over 1975. The median increase was 15%. Two-thirds of the firms will spend 50 to 80% of their capital investment on new plants. The rest plan to concentrate on modernization of facilities.

The U. S. Department of Labor's wholesale price index for chemicals rose 50% during 1974. After a 4.5% rise during the first three months of 1975, the index remained essentially unchanged for several months. The net rise during 1975 will be about 5%.

According to Labor Department figures, total chemical industry employment was up about 2% in 1974. It has averaged 4% lower in 1975 vs. 1974. MCA survey companies anticipate a median increase of 3% in 1976.

Surveyed companies forecast an 11% increase in research and development expenditures. A small minority plan no change in 1976, and 45% plan increases of 15% or more.

The chemical industry had a record high trade balance in 1974 of $4.8 billion. The trade balance for 1975 will be close to this figure. The MCA survey indicates an export rise of 9% in 1976. The companies were asked if imports were impacting substantially on the U. S. chemical industry and on the company's domestic sales; 15% thought there was substantial impact on the chemical industry and 10% saw impact on their own sales.

Initial EPA Mercury Decision Is Favorable

EPA Administrative Law Judge Bernard D. Levinson, in a decision viewed favorably by the National Paint and Coatings Association, ruled on December 12 that the paint and coatings industry should be allowed to continue its use of phenylmercurials in latex paint products.

The next step in the Mercury Proceedings is a review of Judge Levinson's determination by Russell Train, Administrator of the Environmental Protection Agency. Under administrative law procedures, Mr. Train can accept or reject Judge Levinson's findings. If they are rejected, Train's decision can be appealed to the U.S. Court of Appeals.

In an action culminating almost four years of administrative proceedings, Judge Levinson concluded that *registrations should not be canceled for phenylmercurial compounds used as in-can preservatives and as fungicides in exterior water-based paints and coatings.* He said that when used in accordance with widespread and commonly accepted practice, they will not generally cause unreasonable, adverse effects on the environment.

At the same time, Judge Levinson concluded that the *registrations of phenylmercurials for use in oil-based paint should be canceled.* He said the evidence showed that adequate and effective non-mercurial mildewcide substitutes are available for oil-based paints.

EPA originally canceled the registrations of all pesticidal uses of mercury in March 1972. Subsequently, the EPA cancellation order was appealed by the suppliers of these compounds. NPCA requested and was permitted to participate actively in these proceedings on behalf of all the members who expressed strong need to continue the use of phenylmercurials as bactericides and mildewcides in paints and related coating products.

Research Project to Study Health Aspects of Trichloroethylene

The Manufacturing Chemists Association has announced that it will administer an agreement with Industrial BIO-TEST Laboratories for research dealing with the occupational health aspects of trichloroethylene.

The project calls for long-term inhalation studies by BIO-TEST on mice and rats at a cost of more than $400,000.

Six companies are sponsoring the research on the chemical, which is used in dry cleaning, degreasing, printing inks, coatings and adhesives. The companies are: Canadian Industries Limited; Diamond Shamrock Corp.; Dow Chemical U. S. A.; Ethyl Corp.; Hooker Chemicals & Plastics Corp.; and PPG Industries, Inc.

The objective of the research is to provide updated and expanded information that will further ensure public and employee health protection.

NPCA Issues Definitions And Charts on Silica

A Safety and Health Bulletin which details for the first time complete definitions of the various forms of silica has been issued by the National Paint and Coatings Association.

The Bulletin was compiled by the Silica Manufacturers Ad Hoc Committee, a sub-group of the NPCA's Occupational Health Task Force. The group, formed in February 1974 to consider the properties of the amorphous silicas as distinguished from the crystalline silicas, is comprised of manufacturers of silica.

Initial search of available reference material had shown that comprehensive definitions of the various materials did not exist, and the work of the Committee fills this gap. The Bulletin contains definitions of such substances as silicon and silica, as well as amorphous silica and synthetic amorphous silica. A graphic illustration of the relationships between the various silicas in the form of a "Silica Tree" is also included — the first time that these materials have been so defined and their relationship illustrated for the paint and coatings industry.

Copies of the Bulletin may be obtained by contacting Richard Murry, NPCA, 1500 Rhode Island Ave., N. W., Washington, D.C. 20005.

22 Draft Health Standards Available from OSHA

OSHA has announced the availability of the draft technical portion of job health standards for 22 toxic substances. The drafts, after review, may be published in the *Federal Register* as proposed job health standards.

The 22 drafts, part of the joint OSHA/NIOSH Standards Completion Project, published as two sets, would regulate the following substances:

Set I; acetylene tetrabromide, allyl chloride, chlorobenzene, chlorodiphenyl (54% chlorine), 1,1-dichloroethane, epichlorohydrin, 1,1,2,2-tetrachloro-1,2-difluoroethane, 1,1,1,2-tetrachloro-2,2-difluoroethane, 1,1,2,2-tetrachloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, 1,2,3-trichloropropane, and trifluoromonobromomethane.

Set J; arsine, carbon tetrachloride, diazomethane, o-dichlorobenzene, diethylamine, dimethylamine, ethylene dichloride, methyl chloroform, tetrachloroethylene, and 1,1,2-trichloroethane.

The three-year standards completion project, announced March 18, 1974, will result in more complete job health standards for most of the toxic substances for which OSHA now prescribes only threshold limit values; NIOSH contemplates continuing to develop separate criteria documents for other substances.

The new standards will include requirements for monitoring employee exposure, medical surveillance, methods of compliance, handling and use of the substances, employee training, recordkeeping, and sanitation and housekeeping. Exposure limits for the substances to be covered by the new standards will not be changed in the proposals.

The draft technical standards, available for public review and purchase at OSHA's Technical Data Center and at any OSHA field office, reflect only the technical intent of NIOSH and OSHA and do not necessarily contain the specific language that will appear in the proposed standards.

Public comment concerning the drafts, or the program in general, should be submitted to the Docket Officer, Docket SCP-9 (Set I) or Docket SCP-10 (Set J) Standards Completion Project, OSHA, Room N3620, U. S. Department of Labor, 3rd St. and Constitution Ave., NW, Washington, D.C. 20210. Additional opportunity to comment will be provided when the standards are proposed.

Notice of availability of the draft technical standards for the 22 substances appeared in the *Federal Register* on Nov. 20.

ICC Asked to Reconsider Rules on Credit Extension

NPCA is seeking reconsideration of the Interstate Commerce Commission's recently proposed rules on the extension of credit to shippers by motor and rail carriers. The action was taken at the direction of the Transportation and Distribution Committee.

The proceeding is titled *Ex Parte* No. 73, Extension of Credit to Shippers by Rail Carriers, and *Ex Parte* No. MC-1, Extension of Credit to Shippers by Motor Carriers.

The new regulations require modification of rail and motor carrier credit rules in individual tariffs. Under the new rules, the initial seven-day credit period after presentment of a bill would be assessed a service charge of 1% of the amount of the bill and subject to a minimum service charge of $10. Carriers may not grant credit to any shipper failing to pay presented freight charges within the 30-day period. If presented by U. S. mail, the seven-day period runs from the date of the postmark.

In its petition for Intervention and Reconsideration filed December 4, 1975, NPCA stated its objections to the ICC's Report and Order, decided August 5, 1975 and served August 29, 1975. The new rules were also published in the September 8, 1975 issue of the *Federal Register*.

NPCA cited the unreliability of present postal service and said that imposition of the new requirements would create administrative chaos and economic waste for shippers and carriers alike.

"The proposed rule," said the Association, "is tantamount to a general freight rate increase of 1%. Taking that view, the amount of the penalty specified by the revised rules is excessive, posing a substantial economic burden on paint and coatings shippers."

NPCA called the administrative recordkeeping in processing many billings simultaneously as "cumbersome," and contrary to principles of efficiency and accuracy.

Plastics Institute to Hold Coatings Course on March 2-4

The Plastics Institute of America will offer a new course, "Polymers for Decorative and Durable Coatings," to be held March 2-4 at the University of Louisville, in Louisville, Ky.

The course will present the latest information on finishings and coatings for plastics, metals, and woods, and on the ability of such coatings to withstand exposures ranging from a frigid arctic environment to a severe marine tropical environment.

Directing the course will be Dr. N. Thornton Lipscomb, Professor of Chemistry, and Dr. Dean O. Harper, Associate Professor of Chemical Engineering.

Fee is $310 for PIA members, and $360 for nonmembers.

For additional information, contact the Plastics Institute of America, Castle Point Station, Hoboken, N. J. 07030.

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GUIDE FOR AUTHORS

INTRODUCTION

THE JOURNAL OF COATINGS TECHNOLOGY is published monthly by the Federation of Societies for Coatings Technology. Some 6,000 technical men of the paint industry—associated with 25 Constituent Societies in the United States, Canada, and Great Britain—make up the membership of the Federation.

The purpose of the JOURNAL is the advancement of knowledge of the formulation and manufacture of paints, varnishes, lacquers, resins, and related coatings. Its worldwide circulation is about 9,000.

Papers should present new or original data of either a practical or scientific nature. Papers written in a manner which tend to promote proprietary products are specifically not acceptable. Papers must meet the standards of the JCT Editorial Review Committee and are accepted with the understanding that they are contributed exclusively to the JOURNAL OF COATINGS TECHNOLOGY and that the material has not been published elsewhere.

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(1) Marshall, N. J., *Official* DIGEST, *29*, No. 391, 792 (1957).

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PROCEEDINGS/NUMBER 118

Effect of Temperature On Composition of Copolymers Of Maleic Anhydride and Styrene

R. B. SEYMOUR and D. P. GARNER
University of Houston*

Alternating copolymers of styrene and maleic anhydride were prepared by heating an equimolar mixture of the two monomers at 80°C in the presence of small amounts of AIBN (azobisisobutyronitrile)

$$[(CH_3)_2C(CN)-N=N-C(CN)(CH_3)_2]$$

Low molecular weight random copolymers with more than 90% styrene were obtained when excess styrene was present at polymerization temperatures above 130°C. High concentrations of initiator were required for good yields of product at these high temperatures. The presence of a charge-transfer complex at room temperature was demonstrated by NMR and UV spectrophotometric techniques. The equilibrium constant for this complex decreased with temperature and was essentially zero at temperatures above 135°C.

KEY WORDS: Styrene-maleic anhydride copolymers; Alternating copolymers; Random copolymers; Charge-transfer complex; Characterization of copolymers by pyrolysis GC and DSC.

INTRODUCTION

The copolymer of styrene and maleic anhydride which was first prepared by Wagner-Jauregg[1] in 1930 continues to be of interest to the coatings industry. For example, the use of this commercially available film-forming polymer in epoxidized linseed oil coatings was discussed in a recent issue of this journal.[2]

It has been shown that while dead copolymers were obtained when a mixture of styrene and maleic anhydride was copolymerized in a good solvent such as acetone, insoluble macroradicals were obtained in a poor solvent such as benzene.[3] The criterion for obtaining macroradicals is that the difference in the solubility parameter of the solvent and polymer be at least 1.8 Hildebrand units (H).[4] The solubility parameter of the styrene-maleic anhydride copolymer is 11.2 H.

It has also been shown that the rate of polymerization in heterogeneous solvent systems is fastest when the difference in the solubility parameter of solvent and copolymer is close to 1.8 H. It has been postulated that in the first step in heterogeneous solution polymerization, the propagation is similar to that in homogeneous solution polymerization. However, after the growing macroradical coils and precipitates, subsequent propagation is dependent on the diffusion of the monomer into the occluded macroradical. Thus, the rate of diffusion will be fastest when the insoluble coil is swollen by a moderately good solvent.[4]

Block copolymers of styrene-maleic anhydride and styrene have been produced either by copolymerizing in benzene ($\delta = 9.2$ H) in the presence of more than an equimolar proportion of styrene, or by adding styrene to the precipitated macroradicals.[5] However, since the polystyrene block ($\delta = 9.0$ H) is soluble in benzene, the block macroradicals terminate by coupling when the weight of the block exceeds 30% of the total weight of the original macroradical. However, since polyacrylonitrile ($\delta = 12.5$ H) is more polar, block copolymers having long blocks of acrylonitrile are readily prepared in benzene.[6]

This work is based on PRI Fellowship No. 46.
* Department of Chemistry, Houston, Tex. 77004.

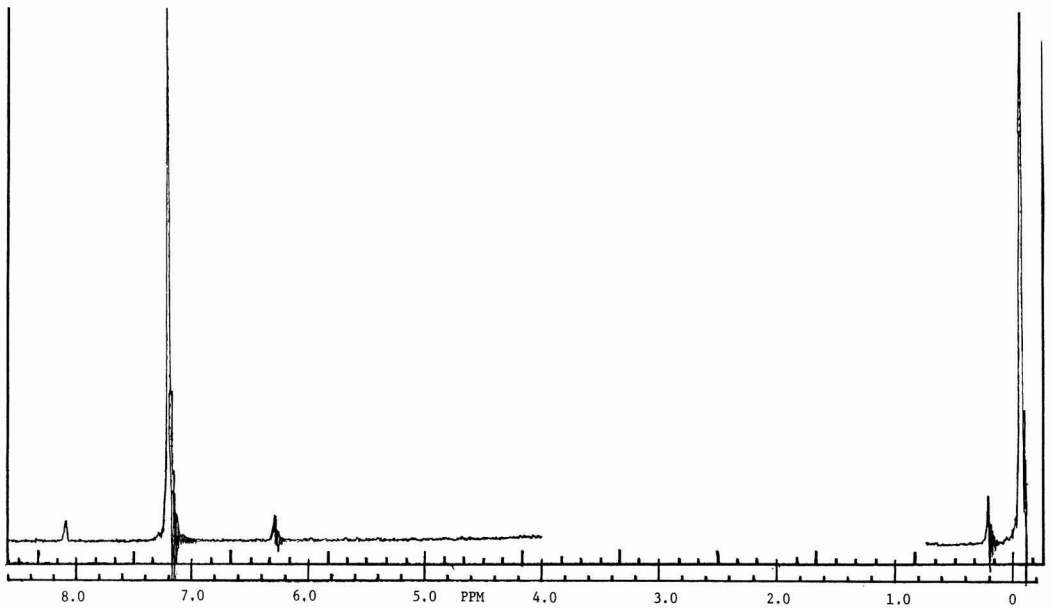


Figure 1—NMR spectra of maleic anhydride

While it is possible to produce slightly longer styrene blocks on styrene-maleic anhydride alternating copolymers by using poorer solvents than benzene or viscous solvents, it is not possible to produce copolymers with relatively large proportions of styrene-to-maleic anhydride in benzene at moderate temperatures, such as 50°C.

However, Muskat[7] has produced copolymers having much higher ratios of styrene to maleic anhydride by copolymerizing these monomers at temperatures greater than 120°C. This investigation was undertaken to determine the difference in mechanism for the copolymerization of maleic anhydride and styrenes at moderate and high temperatures with the objective of using such information for the preparation of new polymeric systems.

CHARGE-TRANSFER COMPLEXES

Prior to the preparation of block copolymers of styrene and styrene-maleic anhydride copolymers, it was recognized that an alternating copolymer of styrene and maleic anhydride was obtained regardless of the ratio of the monomers present in the reactant mixture.[8]

The rapid formation of these and other alternating copolymers has been explained by assuming the

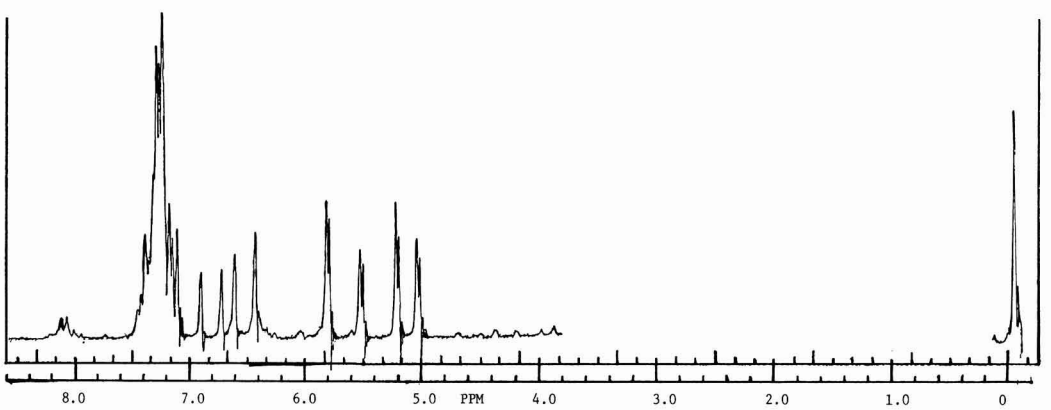


Figure 2—NMR spectra of styrene

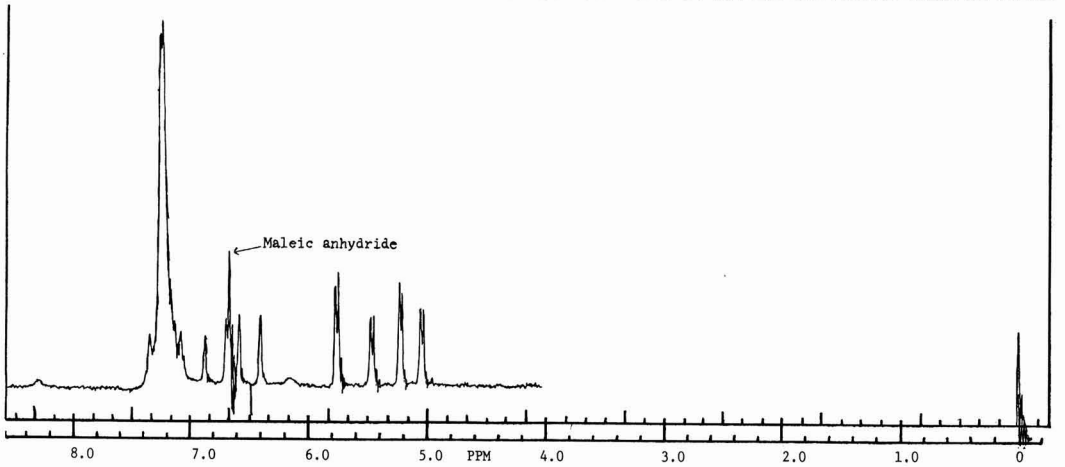
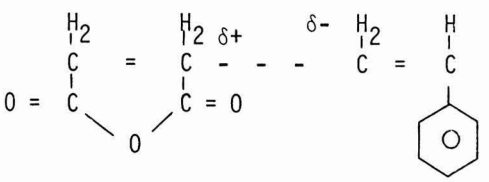


Figure 3—NMR spectra of equimolar mixture of maleic anhydride and styrene

presence of a transition state in which the electron-poor maleic anhydride accepts a charge from the electron-rich styrene donor.[9] Thus, the reacting species could be assumed to be



Absorbance bands in the UV spectra not characteristic of either donor or acceptor monomer are observed when both styrene and maleic anhydride are present in solution.[10] A change in the absorbance band at 282 nm has been assumed to be indicative of the presence of a charge-transfer complex for styrene and maleic anhydride. Evidence for this charge-transfer complex has also been shown by a shift in the maleic anhydride nuclear magnetic resonance (NMR) spectra from 7.10δ to 6.65δ in the presence of an equimolar amount of styrene.[11] This shift corresponds with the proposed donation of electrons by styrene and acceptance of these electrons by maleic anhydride in the charge-transfer complex. The NMR spectra of maleic anhydride and styrene are shown in *Figures* 1 and 2. The shifted peak for maleic anhydride in the mixture of the two monomers is shown in *Figure* 3.

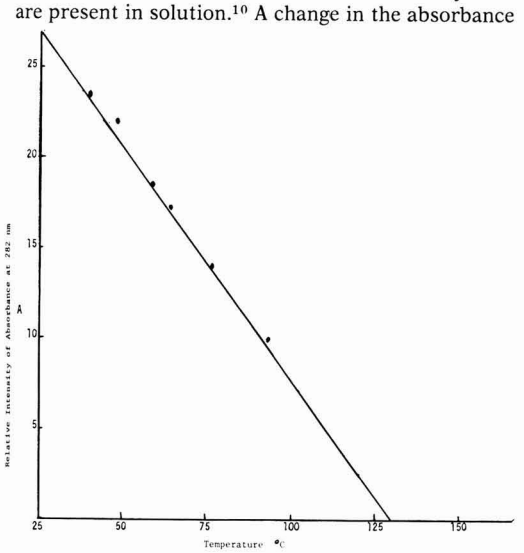


Figure 4—Effect of temperature on absorbance of maleic anhydride-styrene complex at 282 nm

Accordingly, it may be assumed that an equilibrium exists between the electron donor (ED) and the electron acceptor (EA) and the charge-transfer complex (CTC) as follows:

$$ED + EA \rightleftharpoons CTC$$

Thus, the equilibrium constant (K) for this transfer would be as follows:

$$K_{eq} = \frac{[CTC]}{[ED]\quad\quad[EA]}$$

By use of Bennessi-Hildebrand techniques,[12] the value of K for styrene and maleic anhydride at 25°C has been found to be 0.27.

EFFECT OF TEMPERATURE ON CHARGE-TRANSFER COMPLEXES

Since NMR spectra at elevated temperatures are not readily determined on the available instrument, the effects of temperature on K_{eq} were investigated by UV spectrophotometry. As shown in *Figure* 4, the intensity of the absorbance band at 282 nm decreased as the temperature increased. Extrapolation

Table 1—Effect of Temperature on Composition Of Styrene-Maleic Anhydride Copolymers Produced From Equimolar Ratios of Monomers

Temperature (°C)	Yield(%)	Ratio of S/MA In Copolymers
80	81	1:1
110	85	1:1
120	62	1:1
130	74	7:4

of these data indicated that the absorbance was zero at temperatures above 125°C.

Thus, the tendency for the formation of an alternating copolymer of styrene and maleic anhydride should decrease as the temperature is increased. Because of the absence of a charge-transfer complex, there should be little tendency for the formation of alternating copolymers at temperatures above 125°C.

COPOLYMERS OF STYRENE AND MALEIC ANHYDRIDE

As shown by the data in *Table* 1, good yields of decalin-insoluble alternating copolymers were produced when equimolar ratios of styrene and maleic anhydride were heated for five hr in decalin (δ = 8.8 H) in the presence of 0.25% azobisisobutyronitrile (AIBN) at temperatures below 120°C. However, the copolymer obtained at 130°C was shown to have a ratio of styrene to maleic anhydride of 7:4. Characterizations were by pyrolysis gas chromatography.

As shown in *Table* 2, copolymers with higher ratios of styrene to maleic anhydride were obtained when a 5:1 ratio of S/MA was used. Characterization by pyrolysis GC showed that the first copolymer produced after 20 min at 110°C was an alternating copolymer of SMA. However, the first copolymer produced at 120°C and 130°C had S/MA ratios of 9:4 and 7:2, respectively. The compositions of those copolymers obtained after five hr at 120°C and 130°C were similar to that of the feed.

As shown in *Figure* 5, scan A for differential scanning calorimetry (DSC) of an alternating copolymer of SMA, prepared in benzene at 80°C, exhibited no glass transition temperature below 175°C. However, as shown by scan C, a glass transition temperature around 100°C, which is typical of polystyrene, was observed for the copolymer prepared at 110°C. The DSC scan for polystyrene is labeled scan

Table 2—Effect of Temperature on Composition Of Styrene-Maleic Anhydride Copolymers Produced from a 5:1 Ratio of S/MA

Temperature (°C)	Ratio of S/MA in Copolymer
110	3:1
120	19:4
130	19:4

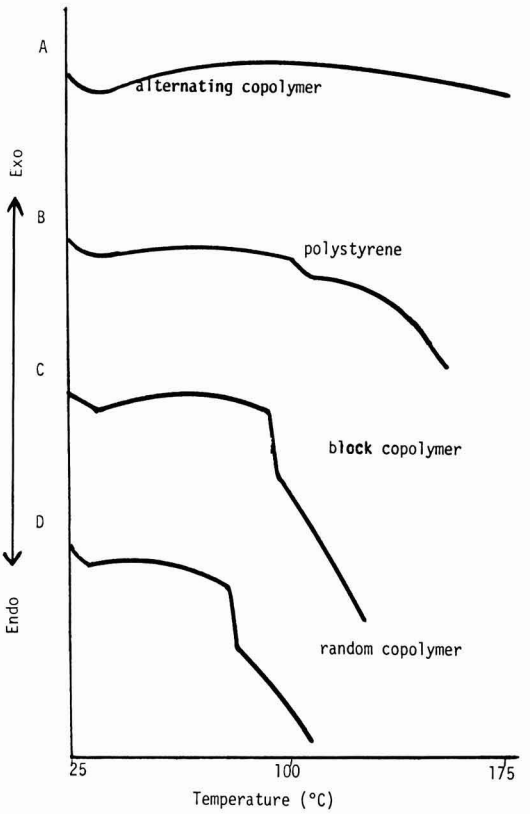


Figure 5—Differential scanning calorimetric thermograms of styrene-maleic anhydride copolymers prepared from an S/MA ratio of 5:1 at different temperatures (A = 80°C, C = 110°C, D = 130°C, and B = DSC scan for polystyrene). Scan rate of 10°/min; sample size of 50-70 mg

B. The DSC data for scan C indicate that some block copolymer or polystyrene was produced when an S/MA ratio of 5:1 was heated at 110°C. However, since the product was insoluble in decalin, it should be the block copolymer.

In contrast, as shown in scan D, the copolymer prepared from an S/MA ratio of 5:1 at 130°C had a glass transition temperature of 84°C. This decrease from a temperature of 102°C shown in scan B is indicative of a random copolymer.

Random copolymers of styrene and maleic anhydride with S/MA ratios as high as 25:1 were prepared by heating mixtures of styrene and maleic anhydride in decalin at 130°C. Both AIBN and dicumyl peroxide were used as initiators. Since the yields of these low molecular weight random copolymers were a function of the initiator concentration, it was necessary to use a relatively high concentration (10%) of AIBN or dicumyl peroxide to obtain quantitative yields of random copolymers at high temperatures.

DR. RAYMOND B. SEYMOUR, Professor and Coordinator of Polymer Research at the University of Houston, received his Ph.D. Degree from the University of Iowa. He has been the Project Leader for PRI Fellowship No. 46 for the past five years. In his 23 years in the plastics and coatings industries, he has been granted more than 40 U.S. patents, and has authored nine books and more than 400 technical publications.

DAVID P. GARNER, a predoctoral student in Polymer Chemistry at the University of Houston, received his B.S. Degree from East Texas State University in 1973. He is a PRI fellow, and is the Master Alchemist of Alpha Chi Sigma.

EXPERIMENTAL

In these investigations, 0.01 moles of maleic anhydride in 20 ml of decalin was copolymerized with 0.01 or more moles of styrene in sealed tubes under an atmosphere of nitrogen, at specified temperatures in the presence of 0.025 g or more of azobisisobutyronitrile (AIBN) or dicumyl peroxide.

The absence of low molecular weight solvent-soluble polymers was demonstrated by the absence of a precipitate when the excess solvent was decanted and poured into pentane. The polymers were purified by dissolving in acetone, precipitating in methanol, filtering, and drying in a vacuum desiccator for 48 hr at 50°C.

NMR data were obtained in 20% solutions of the monomers in carbon tetrachloride using a Varian T-60 spectrometer. UV absorbance data were obtained from 0.001M solutions of monomers in decalin using a Carey Model 14 spectrophotometer.

Pyrolysis GC data for determination of composition of polymers were obtained by decomposing films of polymers for 10 sec with a current of 9 amp using a Varian Aerograph A-25 pyrolysis unit in conjunction with a Varian Aerograph A100C gas chromatograph. Helium with a flow rate of 60 ml/min was used as the carrier gas. The accuracy of these data is ±5%. The DSC pyrograms, showing composition of copolymers, were obtained on a Perkin Elmer Differential Scanning Calorimeter-1B.

CONCLUSIONS

Alternating copolymers of maleic anhydride with styrene were obtained when equimolar mixtures of these monomers were heated in good or poor solvents in the presence of AIBN at temperatures below 100°C.

Random copolymers were obtained when either equimolar mixtures or high ratios of styrene to maleic anhydride were heated with AIBN or dicumyl peroxide in decalin at 130°C. These compositions were correlated with UV spectrophotometric data which showed the charge-transfer complex between these monomers decreased as the temperature was increased and was absent at 130°C. Since the yield of copolymer produced at high temperatures was a function of initiator concentration, it was necessary to use a high concentration of initiator in order to obtain quantitative yields of random copolymers. □

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PROCEEDINGS/NUMBER 119

Hydrosilylation Of Methyl Eleostearate

S. F. THAMES, B. G. BUFKIN, S. J. JEN, J. M. EVANS,* and J. S. LONG†
University of Southern Mississippi**

Hydrosilylation of both methyl alpha and beta eleostearate yields either mono or dihydrosilylated products depending upon the stoichiometry of the reactants. Monohydrosilylation proceeds by 1,2 addition to the conjugated triene system of the alpha isomer and apparently occurs on the 13,14 double bond with the silicon atom attached to carbon 13. Techniques employed in the elucidation of the mode of orientation which included infrared and ultraviolet spectroscopy, elemental analysis, and chemical modification of the hydrosilylated substrates do not allow differentiation between 1,2 addition to the 9,10 double bond, 1,2 addition to the 13,14 double bond and 1,6 addition to the conjugated triene in the beta isomer. However, the double bonds remaining are apparently conjugated with the silicon atom located in an allylic position. Such reactions open new routes to novel fatty acid derivatives.

KEY WORDS: Hydrosilylation; Methyl eleostearate; Fatty acid derivatives.

INTRODUCTION

The addition of silanes containing an Si-H linkage to alkenes is a well known reaction. Studies involving different catalysts,[1] silanes, and conjugated dienes,[2] have been conducted. However, only one report of the addition of such a moiety to an acyclic conjugated triene is to be found in the literature.[3]

The reports of Mironov[2] and Shiihara[4] that the major product from the reaction of a silane containing the Si-H linkage with a conjugated diene is the 1,4 addition product prompted this study of the orientation of addition to a conjugated triene system.

Since methyl alpha and beta eleostearate, I and IV respectively, (*Scheme* I), are known to have different reactivities at the triene system and have well-documented infrared and ultraviolet spectra, these compounds made ideal substrates for the determination of orientation of the Si-H moiety.

EXPERIMENTAL

Methyl Alpha-Eleostearate (I)

This material was synthesized via the method of Thames, et al.[5] It was distilled at 132°C/0.03 mm Hg, $\eta_d = 1.5012$.

Methyl 13-Dimethylchlorosilyl-9-cis-11-trans-Octadecadienoate (II)

A dry 100 ml three neck flask was equipped with a dropping funnel, condenser, calcium chloride drying tube, thermometer and magnetic stir bar. After flushing the system with dry nitrogen, I (15.35 g, 0.052 mole) was charged into the flask and 0.15 ml of 0.2 M chloroplatinic acid solution (in isopropanol) added as catalyst. Dimethylchlorosilane (5.34 g, 0.056 mole) was added dropwise with vigorous stirring. The colorless solution turned red and the temperature rose from 26 to 35°C during the addition. The solution was heated to 67°C for 20 hr, the volatile components removed via water aspirator vacuum and the product (16.62 g, 82% yield) purified by multiple distillations through a 10 in. vigreux distillation

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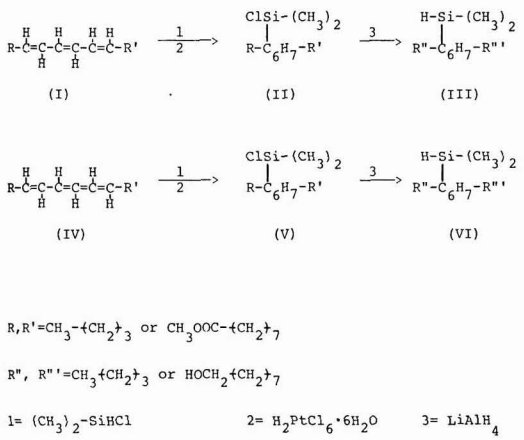


Scheme I—Preparation of silicon containing derivatives of methyl alpha and beta eleostearate

column, the purified product boiled at 128°C/0.02 mm Hg, $\eta_d = 1.4750$.

Anal: Percent calcd. for $C_{21}H_{39}SiClO_2$
C, 65.17; H, 10.16; Si, 7.26
Found: C, 65.15; H, 10.23; Si, 7.50

13-Dimethylsilyl-9-cis-11-trans-Octadecadienol (III)

Lithium aluminum hydride (2 g) was suspended in 200 ml of anhydrous ether in a one liter three neck flask equipped with a reflux condenser, calcium chloride drying tube, dropping funnel, and magnetic stirrer. II (6.32 g, 0.017 mole) in 100 ml of anhydrous ether was added dropwise, the solution refluxed for four hr after addition, and the excess lithium aluminum hydride decomposed with a water saturated ether solution. Since this decomposition is exothermic, a water-ice-salt bath was employed to cool the system during this step. The aluminum hydroxide was filtered and discarded, the filtrate washed with sodium carbonate solution and dried over $MgSO_4$. The solvent was removed *en vacuo* and the residue distilled as in preparation of II above to give a colorless liquid, bp 121°C/0.03 mm Hg, $\eta_d = 1.4757$.

Anal: Percent calcd. for $C_{20}H_{40}SiO$; Si, 8.76
Found: Si, 8.84

Methyl Beta-Eleostearate (IV)

The same procedure employed in the preparation of I was followed.

The product (48.7% yield) was a colorless liquid, bp 169°C/0.25 mm Hg, $\eta_d = 1.5004$.

Methyl 13-Dimethylchlorosilyl-9-trans-11-trans-Octadecadienoate (V)

The procedure for the preparation of II was employed. The purified product was obtained in 85% yield by vacuum distillation, bp 140.5°C/0.03 mm Hg, $\eta_d = 1.4772$.

Anal: Percent calcd. for $C_{21}H_{39}SiClO_2$
C, 65.17; H, 10.16; Si, 7.26
Found: C, 64.91; H, 10.10; Si, 7.54

13-Dimethylsilyl-9-trans-11-trans-Octadecadienol (VI)

The procedure employed for the preparation of III was utilized. The product was obtained via vacuum distillation, bp 130°C/0.03 mm Hg, in 87.5% yield. $\eta_d = 1.4808$.

Anal: Percent calcd. for $C_{20}H_{40}SiO$; Si, 8.76
Found: Si, 8.97

Dihydrosilylation Product Of Methyl Alpha-Eleostearate With Methyldichlorosilane

The reaction was carried out as in II above, except that twice as much silane was employed per mole of methyl alpha-eleostearate. The product would not distill nor recrystallize; however, infrared data indicated that the reaction had been accomplished. Thus, an elemental analysis of the residue was carried out with the following results:

Anal: Percent calcd. for $C_{23}H_{46}Si_2Cl_2O_2$; Si, 14.72
Found: Si, 14.75

RESULTS AND DISCUSSION

In order to study the orientation of hydrosilylation of I and IV, it was necessary to confirm addition of the Si-H linkage to the conjugated triene moiety. Therefore, II and V, the dimethylchlorosilane addition products with methyl alpha and beta eleostearate, were prepared via *Scheme* I. These derivatives were distilled repeatedly until a constant boiling point and refractive index were obtained after two subsequent distillations. This technique was employed to assure the purity of the derivatives and to make certain that they were not a mixture of isomers. To further demonstrate that II and V were not mixtures of isomers, III and VI were prepared and purified in the same careful manner as II and V. If a mixture of isomers had boiled at a constant temperature in II or V, derivation of II and V to III and VI, respectively, would in all probability have generated products separable by multiple distillations. Since this was not the case, and a high yield of a single isomer of both III and VI was obtained, it is the opinion of the authors that II, III, V and VI are pure products. The one type of isomeric products not taken into account is optical isomers. However, a racemic mixture of these enantiomers would surely be obtained under the symmetrical conditions of the reactions conducted herein. Moreover, they would possess identical physical properties under these reaction conditions. Infrared and ultraviolet

Table 1—Infrared Data on Hydrosilylation Products

Vibration	Wavelength of Absorption II (Microns)	III (Microns)	V (Microns)	VI (Microns)
C—H Stretch	3.33-3.4	3.3-3.4	3.3-3.4	3.3-3.4
C=O Stretch of ester	5.71	None	5.71	None
C—O Stretch	8.30 8.51	9.38	8.30	9.38
Si—$(CH_3)_2$ Stretching	7.92 11.7-12.6	7.92 11.7-12.6	7.92 11.7-12.6	7.92 11.7-12.6
C=C Conjugated double bonds	10.1 10.4	10.1 10.4	10.1	10.1
Si—H Stretch	None	4.7	None	4.7
Si—H Bending	None	11.4	None	11.4
O—H Stretch	None	2.98	None	2.98

spectral and physical property data which would not differ for the enantiomers was obtained on the derivatives and is reported in *Tables* 1, 2, and 3, respectively.

That hydrosilylation had indeed occurred was demonstrated by the appearance of Si-C vibrations in the infrared spectra of II, III, V, and VI, by Si-H vibrations in the infrared spectra of III and VI, by changed ultraviolet absorption maxima for all four compounds relative to the parent compound and by identical elemental analyses for II and V and III and VI, respectively. Moreover, the appearance of infrared absorption bands (*Table* 1) at 10.1 and 10.4 μ in II and III indicated the *cis-trans* conjugated unsaturation at bonds 9, 10 and 11, 12 respectively, was intact. The band at 10.1 μ in V and VI indicated that *trans-trans* conjugated unsaturation remained. These absorption bands are characteristic of alpha and beta eleostearic acids and their C_1 (carbonyl) derivatives and are routinely employed by the authors to follow the progress of reactions which destroy the conjugated triene and generate isolated dienes such as the Diels-Alder reaction, i.e., their disappearance and reaction progress are concomitant.

An examination of the ultraviolet spectral data in *Table* 2 showed definite differences in the ultraviolet spectra of the various products generated, with perhaps the most dramatic difference occurring in compounds III and VI. Compounds II, III, V and VI all have wavelengths of maximum absorption which are shifted in a hypsochromic fashion relative to the parent molecule. Phillips,[6] Sondheimer,[7] and Bohlmann[8] have established that the wavelength of maximum absorption of conjugated polyolefins varies with the number of double bonds in conjugation. The wavelength of maximum absorption of 1,4-dialkyl substituted conjugated dienes is usually approximately 227 mμ. Since compounds II, III, V and VI possess ultraviolet absorption maxima at a wavelength of 240-242 mμ or longer (*Table* 2), this is strong evidence that a conjugated diene exists which has greater resonance stabilization than a typical 1,4-dialkyl substituted conjugated diene. Furthermore, Pinckard,[9] in a comparative study of the three stereoisomeric 1,4-diphenylbutadienes, pointed out that *cis, cis* and *cis, trans* isomers showed singlet peaks at 299 mμ and 313 mμ respectively, while the *trans, trans* isomer showed three peaks at 315 mμ, 328 mμ and 340 mμ with the second peak being most intense. Lewis[10] has also pointed out that the conjugation of *trans*-stilbene shows an increase both in the position and intensity of its fundamental band as compared with the *cis*-isomer. Thus, the appearance of three absorption peaks in VI and of only one in III further indicates, according to Pinckard's work,[9] that the conjugated diene in VI is a *trans, trans* isomer and the diene in III is not a *trans, trans* isomer but rather is the *cis, trans* isomer since alpha methyl eleostearate is the methyl ester of 9-*cis*-11-*trans*-13-*trans*-octadecatrienoic acid. The increased peak intensity of VI compared with III is also in agreement with this premise according to Lewis.[10]

Table 2—Ultraviolet Spectral Data on Methyl Alpha And Beta Eleostearate and Their Hydrosilylation Products In Cyclohexane

Compound	Wavelength mμ	Molar Absorptivity $\times 10^{-4}$
I	269.0	4.162
	271.5	4.694
	276.5	3.411
II	242	1.05
III	242.8	1.92
IV	269.0	5.635
	271.5	4.598
	276.5	3.411
V	241 *	2.46
VI	241.5	2.78
	267.5	1.17
	279.2	0.86

* Although one would expect this molecule to have three absorption bands in the UV spectrum, it had only one in practice. However, the infrared and physical property data clearly demonstrate that the *trans, trans* conjugation still exists (10.1μ peak in the IR) and that II and V are clearly different molecules (Table 3). The absorption intensity also indicates that V is a *trans, trans* conjugated diene system.

Gilman,[11] Hague,[12] Sakurai,[13] Bellama,[14] and Abel,[15] showed that silicon is capable of (p-d) π bonding with olefinic groups through sigma bonds and/or through a quasi three membered ring. Nagy and Reify[16] have pointed out that the ultraviolet absorption maximum of trimethylallylsilane appears at a longer wavelength than that of trimethylvinylsilane. The absorption maximum for trimethylvinylsilane is in turn shifted in a bathochromic fashion relative to ethylene. In other work Nagy, Gresz and Mironov[17] observed that in the homologous series of $(CH_3)_3Si(CH_2)_nCH=CH_2$ type compounds, the chemical and physical properties are not continuous uniform functions but exhibit maxima in the case of the $-(CH_2)_n-$ group. These findings are explained by the fact that the π electron pair of the vinyl group is delocalized and interacts with the 3d orbitals of the silicon atom in some instances. In fact,

Table 3—Physical Properties of Hydrosilylation Products

Compound	Boiling Point C/mm Hg	Elemental Analysis (Percent Silicon Found)	Refractive Index
II	128/0.02	7.50	1.4750
III	121/0.03	8.84	1.4757
V	140.5/0.03	7.54	1.4772
VI	130/0.03	8.97	1.4804

Nagy, et al[18] have further shown that the silicon atom has a significant effect upon the nature of a vinyl double bond when either attached to the olefin or to a position allylic to the olefin. When the silicon atom is removed from the olefin by two methylene functions however, the olefin behaves similarly to propylene.

Thus the bathochromic shift in ultraviolet absorption relative to that of a typical 1,4-dialkyl substituted diene strongly indicates increased resonance stabilization through (p-d) π bonding with the silicon atom. This in turn requires that the silicon atom be in an allylic position to the conjugated diene since its attachment directly to the vinyl group is extremely unlikely and its attachment to the carbon beta to the olefin would practically eliminate resonance effects.

The data in *Table* 3 clearly demonstrates that II and V and III and VI are definitely different products.

Thus the following conclusions may be drawn from the experimental data and literature survey:

(a) II, III, V and VI are pure isomers with the exception of possible enantiomer formation.

(b) II, III, V and VI contain a conjugated diene which is resonance stabilized by (p-d) π bonding with the silicon atom.

(c) The silicon atom is in a position allylic to the conjugated diene.

(d) The conjugated diene in II and III is the *cis, trans* isomer and that in V and VI is the *trans, trans* isomer.

(e) II, III, V and VI are different products. Specifically II and III are not the same isomer as V and VI.

These conclusions certainly tempt one to elucidate the position of hydrosilylation. The possible modes of addition are discussed below.

1,4 addition to either I or IV would result in a loss of conjugation and the production of two isolated double bonds. Since the infrared spectra demonstrated bands at 10.1 and 10.4 μ in II and III and at 10.1 μ in V and VI which are characteristic of the *cis, trans* and *trans, trans* conjugated unsaturation in alpha and beta eleostearic acid and their C_1 derivatives respectively, these products appear very unlikely. Moreover, the ultraviolet absorption of II, III, V and VI at 240-242 mμ strongly supports the existence of a conjugated diene. Thus, the products formed by this mode of addition violate conclusion (b) and (d) above and may be considered very highly unlikely.

1,6 addition to I or IV would, in all likelihood, yield the same product as a result of isomerization during addition. Since this violates conclusion (e) above, these products may also be considered very unlikely. However, 1,6 addition to IV cannot be ruled out as it would yield a *trans, trans* conjugated diene, place the silicon atom in an allylic position and generate a product different than that obtained by 1,2 addition to I, which agrees with all conclusions drawn from the available data.

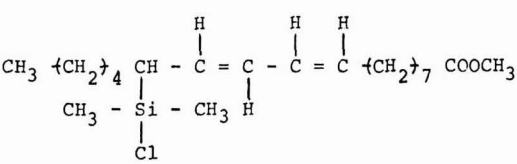
There are three possible sites for 1,2 addition in both I and IV. Since addition to the internal[11,12] bond in both would destroy the conjugation and generate isolated double bonds, this product may be eliminated.

Addition at the 9,10 position in I would generate a *trans, trans* conjugated diene in II and III and this may be ruled out according to conclusion (d). However, 1,2 addition at the 9,10 double bond in IV cannot be eliminated with the data obtained in this research effort.

Addition at the 13,14 double bond in I and IV would generate a conjugated diene which could participate in (p-d) π bonding with the silicon atom provided that the silicon atom is positioned on carbon. 13. This would then satisfy conclusions (b) and (c). Moreover, the conjugated diene would be *cis, trans* in II and III and *trans, trans* in V and VI as indicated in conclusion (d). II and III would also be different isomers than V and VI as required by the conclusion (e).

Thus, based upon the evidence collected during this research effort and from supporting materials in the literature, it is the conclusion of the authors that the hydrosilylation of I proceeds by 1,2 addition at the 13,14 double bond and that while this same mode of addition would seem logical for IV, neither 1,6 addition nor 1,2 addition on the 9,10 double bond can be eliminated by the experimental data obtained at this point.

Thus, the most likely product of monohydrosilylation of I with dimethylchlorosilane is:



Mironov[2] has reported that both of the double bonds of an isolated diene may be hydrosilylated. We have found dihydrosilylation of the conjugated triene may also be achieved by employing a ratio of silane to I or IV greater than one. Thus, high yields

of monohydrosilylated product can only be attained when a 1/1 ratio of reactants is used.

We have employed hydrosilylation for the production of water reducible coatings which possess properties superior to similar non-silicon containing polyesters.[3] Moreover, this process is presently being utilized to generate some novel electrodepositable polymers.[19]

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Are Conventional Trade Sales Formulating Practices Wasteful?

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Vehicle nonvolatile generally is the most expensive of the basic components of a paint system, so it is axiomatic that economy in paint formulation requires that pigmentation levels be as high as is consistent with quality demands. It is the burden of this discussion that conventional formulating practices have been unnecessarily wasteful of vehicle nonvolatile both by formulating at lower-than necessary PVC levels, and by the use of materials that unnecessarily lower the critical PVC.

KEY WORDS: Vehicle nonvolatile; Formulating; Trade sales paints; PVC; CPVC.

INTRODUCTION

Paint-film characteristics are recognized by most paint formulators today as being closely related to the balance that exists between the binder demand of any given pigmentation and the amount of binder actually supplied by the paint formula in which it is used.

The pivotal point of this balance is the pigmentation CPVC, which was first identified by the fact that a considerable number of dry film properties seemed to pass through a transition point at just about the same "rung" of a PVC ladder.[1,2,3]

The CPVC is a basic characteristic of any pigmentation that is related to how tightly the various particle sizes represented will pack together in a dry paint film — and consequently, to how much void space will remain to be filled with vehicle nonvolatile. The volume of these voids is also determined, however, by how much binder is absorbed on pigment surfaces, since this has the effect of increasing void size as well as apparent particle size. To form an impervious dry film, vehicle nonvolatile must be supplied in sufficient amount to both coat the pigment particles and to fill in the larger voids that are created by such a coating.[4]

Since vehicle nonvolatile generally is the most expensive of the basic components of a paint system, it is axiomatic that economy — *or the avoidance of waste* — in paint formulation requires that pigmentation levels be as high as is consistent with quality demands.

It will be the burden of this discussion that conventional formulating practices have been unnecessarily wasteful of vehicle nonvolatile both by formulating at lower-than-necessary PVC levels, and by the use of materials that unnecessarily lower the CPVC.

There is certainly no novelty in the concept that higher PVC's result in lower costs, but the availability of this route to economy has been limited in the minds of many formulators by the belief that quality would inevitably suffer if PVC levels were raised. All too often such beliefs are based upon rules of thumb that were established many years ago when neither pigments nor vehicles were the same as they are today.

EXTERIOR HOUSE PAINTS

The fact is that quality may also suffer when excessive amounts of nonvolatile vehicle are employed, particularly in exterior finishes — producing the highly undesirable combination of high cost and low quality.

One of the earliest attempts at a systematic study of exterior house paints, for example, was exposed on the test fences of the University of North Dakota in 1915. A variety of pigmentations over a wide range of PVC levels were incorporated in the typical unbodied linseed oil vehicle of the day. A statistical analysis by Calbeck[5] of the results of this study resulted in the discovery of what was described as a transitional area of performance between 26 and 30% pigment by volume — and as a consequence, several generations of conservative formulators pigmented all exterior house paints at 28 PVC.

A careful reexamination of Calbeck's data discloses, however, that all of the panels rated as "good" after exposure had PVC's of 28 *or above*. As a matter of fact, the distribution of "good" ratings centered about 30 PVC, while the distribution of "poor" ratings centered about 24 PVC.

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Calbeck defined *durability* as "the time of exterior exposure during which the paint film will retain its good appearance, protect the surface painted, and continually be in good condition for repainting."

CHALKING

It will be noted that such a definition is far more all-inclusive of the properties for which a paint film is applied in the first place than is the often-heard judgment of durability based on "chalk resistance" alone. It is felt that the emphasis placed upon chalk resistance by many pigment manufacturers may have been responsible for the interpretation of Calbeck's data on the low side.

Chalk is nothing more than the pigment left behind when the nonvolatile vehicle which originally bound it in the film has been decomposed and eroded away by the forces of weathering. It should be apparent that the decomposition of the same quantity of organic binder will release more chalk from a high-PVC finish — but it does not necessarily follow that as much organic binder *will* be decomposed, or that the film will be any less durable than that of a lower PVC finish. Chalk is only one of several forms of film failure — and quite possibly the least objectionable.

It is felt to be significant that none of the panels rated as "good" in the North Dakota study failed to show some chalking (some even heavy chalk) at the end of the very first year, while almost 50% of those ultimately rated as "bad" were chalk-free. Certainly the early inception of chalking would appear to bear little relationship to ultimate durability.

REACTIVE PIGMENTS

The cracking and checking failures that were responsible for poor durability ratings at still higher PVC's in the North Dakota study may be largely ascribed to another formulating convention that has doubtless affected the results obtained by many other investigators. It was the habit to include reactive pigments, such as zinc oxide, in all pigmentations at the level of 30-40% of the total pigmentation, by weight. Thus, as the PVC was raised, the amount of reactive pigment increased at the same time that the linseed oil vehicle with which it reacted decreased. Had the reactive pigment content been held at a fixed ratio to the linseed oil content, cracking and checking failures would not have been noted at PVC's above 40%.

This claim can be substantiated by the results of our own exposure experience with the familiar primer of the so-called "two-coat house paint system." This primer, which contained white lead but no zinc oxide, was our preferred recommendation — prior to the development of flat alkyd and latex systems — for the painting of asbestos shingles. A two-coat application was in good condition after 11 yr of exposure on our test fences — yet it was pigmented, as were most similar primers, at 40 PVC!

FILM PERMEABILITY

There have been, as might be expected, technical explanations for the superior durability of higher PVC films. Moisture as well as ultraviolet radiation is required to produce the decomposition of organic binders, and it has been demonstrated that pigmentation decreases the moisture permeability of most paint vehicles. As a matter of fact, Mattiello Lecturer A. C. Elm[6] stated categorically that moisture permeability is decreased as pigmentation is increased *all the way up to the CPVC*, and then increases very rapidly above the CPVC as porosity is developed.

As recently as last year, Svoboda (et al)[7] showed that the pigmentation of paint films decreases the penetration of industrial fumes such as SO_2. Protection of the substrate is thus improved by higher PVC's, not only through the longer service life of the coating, but also because of the exclusion of moisture and corrosive fumes.

These observations should not be too surprising because pigment particles, after all, are not permeable to either moisture or SO_2 fumes. Also, as pigmentation is increased, the void channels through which penetration must take place become smaller and more constricted.

On the other hand, there has been a body of evidence suggesting that the moisture permeability of latex films *increases* with pigmentation. The difference in mechanism would seem attributable to the presence of water-soluble surfactants in latex paints. By concentrating at the pigment/binder interface, these provide water-soluble pathways through the film.

It has also been proposed that the pigment/binder interface may be a route for moisture penetration for any poor-wetting vehicle system. Since the pigment surface is hydrophylic for most inorganic pigments and extenders, water will spontaneously spread over that surface if it has not been previously occupied by an adsorbed layer of organic binder.

Despite these possible limitations, the concept of reducing film permeability through higher pigmentation obviously deserves consideration.

TiO_2-TO-BINDER RATIO

It should also be remembered that the protective effect provided by the ultraviolet absorption of rutile titanium dioxide may be increased in more highly pigmented films simply because there is less organic vehicle to be protected. Assuming that two exterior house paints at 28 and 40 PVC's contained

the same amount of rutile TiO_2 per gallon, the pigment in the 28 PVC formulation would be called upon to protect 20% more organic binder.

The same mathematics also apply to the *chalk-producing* effect of anatase titanium dioxide, and some anatase should be replaced with rutile when raising the PVC of an exterior house paint.

This last statement should not be considered as an explanation for the so-called faster chalking rate of higher PVC formulations. As was previously pointed out, the practice of rating durability in terms of the visibility of chalk can be very misleading. Weight loss measurements have repeatedly proved that less film thickness may be lost by erosion, despite the higher visibility of a highly pigmented chalk-face.

PVC LEVELS

At the present time, of course, oil-base exterior house paints are more commonly pigmented at 33 PVC than at the 28 PVC referred to above, but this apparent move in the right direction must be attributed primarily to serendipity. During the Second World War, shortages in linseed and other paint oils were combatted with conservation measures that called for a restriction in the nonvolatile content of house paint vehicles to 65% — the common pre-war level had been around 90%. For a formulation pigmented at 28 PVC, this resulted in an increase to approximately 35 PVC when "replacement linseed oil" was substituted for pure oil, if no other changes were made.

To their credit, it must be admitted that the majority of the industry experts who were consulted prior to the application of such restrictions had no personal doubts whatsoever about the potential durability of these higher-PVC coatings — one can only wonder, however, why a war was needed to persuade them to change their habits!

Strangely enough, subsequent comments as to why these higher-PVC formulations out-performed the originals most often attributed their improved durability to the use of varying percentages of bodied oils, which were blended with unbodied oil to retain brushing consistency at the lower solids. Whatever the explanation, the indisputable fact that higher-PVC formulations were proving more durable was not followed to its logical conclusion, and typically — pigmentation levels fell back to "safer" compromise PVC's of 30-33% when oil restrictions were removed.

EXTENDER OIL ABSORPTION

Vannoy[8] however, was bold enough in his 1949 paper "Current House Paints" to include a tint-base formulation at 45.6 PVC. The formulating device that he used to arrive at this pigmentation level is one that calls attention to the second wasteful practice in conventional formulating — the use of raw materials (specifically extenders) that unnecessarily increase the demand for vehicle nonvolatile. The principal change required to produce equal or better tint retention at this higher PVC level was simply the replacement of a high-oil-absorption magnesium silicate with a low-oil-absorption calcium carbonate.

Over the years there have been many test fence operators who have reported that coarse calcium carbonate, coarse calcium sulphate, coarse barytes, or coarse talc, produced better tint retention or better chalk resistance than their fine-particle-size counterparts. Very few recognized that it was the relationship of particle size to pigment oil-demand, rather than particle size itself, that influenced exterior durability. The excess of oil above the amount required to coat pigment surfaces and fill in the voids between pigment particles was referred to as *free binder* and was considered to be directly related to the exterior durability of the paint film.[9-10]

FREE-BINDER CONCEPT

In today's terminology, the percent of free binder present in any oil-base formulation may be expressed by the equation:

$$\% \text{ free binder} = \frac{\text{CPVC} - \text{PVC}}{\text{PVC}}$$

The architects of the free-binder concept were never very explicit as to the optimum percentage of free binder for exterior house paints — for a very good reason. Free binder is required to maintain the flexibility of a paint film in the face of the embrittling influences of oxidation, ultraviolet radiation, and reactive pigments such as zinc oxide. The amount of free binder required for optimum performance is therefore a variable, dependent upon the type of vehicle used, the presence or absence of U-V absorbing pigments, the geographic area of exposure (as related to U-V intensity), and the concentration of reactive pigment.

For any given set of conditions, however, the equation tells us that the higher the CPVC of the pigmentation, the higher the PVC may be for a given percentage of free binder.

It is unfortunate that the word *free* was ever associated with anything as wasteful as the use of excessive amounts of nonvolatile vehicle. The replacement of high-oil-absorption pigments and extenders with low-oil-absorption types will permit the replacement of expensive vehicle solids with additional extender, raising the PVC without affecting the percent of free binder. This, furthermore, results in a reduction in the amount of organic binder that must be protected from fungus attack with reactive pigment. If the reactive pigment is reduced in proportion to the amount of oil remaining, a source of embrittlement is also reduced — permitting a fur-

ther reduction in free binder without adversely affecting durability. And finally, if this removed reactive pigment is replaced with a low-oil-absorption extender, the binder requirements of the pigmentation are again reduced.

GLOSS AS A LIMITING FACTOR

The replacement of pigments and extenders that are wasteful in their binder requirements thus has a snow-balling effect, permitting cost savings from the replacement of both vehicle nonvolatile and reactive pigment with low-cost extender. The desire for gloss may be considered a natural limiting factor in this process, but there is no good reason why gloss should be too greatly affected before major cost reductions have been made.

It is true that low gloss is commonly associated with large-particle-size extenders. It is also true, however, that low oil absorption may be derived just as much from an intermixture of particle sizes — which reduces interparticulate void volume — as from the low surface area of coarse particles. It will sometimes be possible, therefore, to reduce the oil absorption of some not-particularly-coarse extender by adding a small quantity of a still-finer extender to complete the distribution required for maximum packing and minimum binder demand. This is illustrated in *Figure* 1 for a blend of Lorite® with ASP-100® clay. While Lorite alone has an oil absorption calculating to approximately 50 CPVC, the addition of 30% by volume of fine-particle-size clay produces maximum packing at 55 PVC.

Furthermore, several of the higher-oil absorption extenders commonly used in exterior house paints are flatting types, so that their replacement with larger volumes of nonflatting types will not necessarily reduce gloss.

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ASP is a registered trademark of Engelhard Minerals & Chemicals Corp.

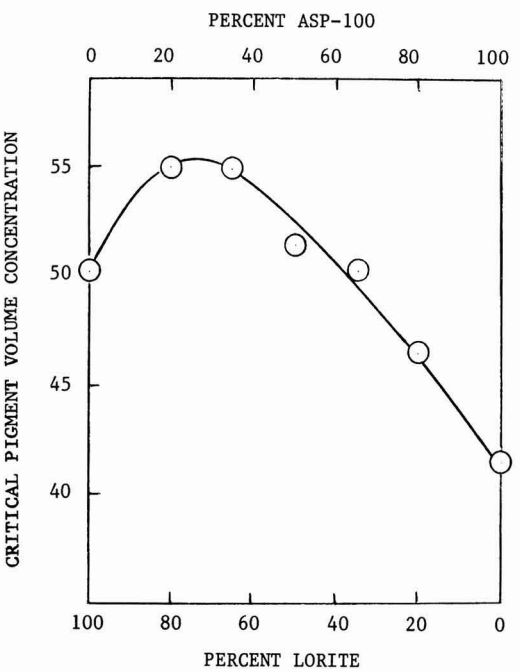

Figure 1

Table 1—Typical Pigmentation Levels

Formula Type	PVC Range
Enamels	15—30
Gloss paints	30—40
Semi-gloss paints	40—50
Undercoats	50—60
Flat wall paints	60—70
Ceiling paints	70—80

INTERIOR ARCHITECTURAL FINISHES

The same general opportunities to save nonvolatile vehicle also exist in the formulation of interior architectural finishes — although reactive pigments are of course not involved. The PVC ranges in *Table* 1 were established many years ago[11] when neither the pigments nor the vehicles used were capable of today's level of performance.

These PVC ranges actually represent skewed distributions, with the greatest number of formulations in each category falling somewhat on the low side of the numerical average because of the conservative formulating habits of the industry. It was generally believed, and often quoted, that "oil is the life of the paint;" quality was associated with lower PVC's.

It is possible, however, to formulate at substantially higher PVC's using modern pigments and vehicles without sacrificing performance characteristics. *Figure* 2 shows hiding power curves for pigmentations containing various ratios of rutile TiO_2 and extender over a pigmentation range of approximate 10-50 PVC in a typical alkyd vehicle.

As indicated by the dotted line, the same hiding power (350 sq ft per gallon) may be obtained by any one of five different formulations. The PVC's and relative costs of these five formulas are shown in *Table* 2.

When these enamels were compared for gloss and hiding power by means of drawdowns over

Table 2—Comparative Data for 350 Sq Ft Hiding

% TiO_2	PVC	Cost per Gallon
100	11.7	$3.24
75	16.2	3.18
60	20.9	3.12
50	26.4	3.06
40	37.2	2.96

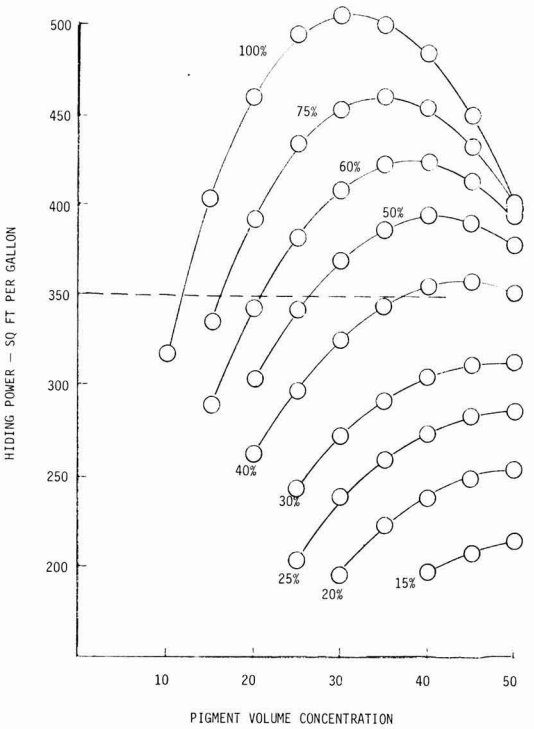

Figure 2—TiO_2/extender hiding power curves

black-and-white hiding power charts, the data of *Table* 3 were obtained.

It is apparent from these data that the PVC may be increased enough to produce a saving of 12¢ a gallon in raw-material cost without any detectable effect on gloss. At the higher PVC ranges the reduced level of gloss would still be completely acceptable for most trade sales coatings. As a matter of fact, these gloss readings would have been substantially higher had a better extender been used.

While the given examples were alkyd enamels, similar opportunities to replace expensive vehicle solids with extenders exist in almost all other types of trade sales finishes.

PIGMENT OIL ABSORPTION

The use of high oil absorption titanium pigments is wasteful because of the relationship that exists between the oil absorption of the pigment and its titanium dioxide content. High oil absorption is developed through the addition of relatively high levels of surface treatment — there is no other way. Consequently, the titanium dioxide content of some latex-grade pigments may run as low as 80% (85% is about average), while enamel-grade or multi-purpose types usually contain closer to 95%.

Table 3—Comparative Gloss and Hiding Data

PVC	Contrast Ratio	60° Gloss
11.7	0.973	92.5
16.2	0.972	92.5
20.9	0.972	92.5
26.4	0.973	90.6
37.2	0.970	86.0

Since titanium dioxide is the only part of the pigment possessing the high refractive index essential for the development of hiding power, the titanium dioxide content is directly related to the total amount of pigment required to produce a desired level of hiding.

High oil absorption contributes to the development of dry hiding power in paints by increasing the binder demand of the pigmentation until its CPVC (which may be determined from oil absorption) is lower than the formula PVC. The degree of porosity may be expressed by the following formula:[12]

$$\text{P.I.} = 1 - \frac{\text{CPVC}(1 - \text{PVC})}{\text{PVC}(1 - \text{CPVC})}$$

where P.I. = porosity index
CPVC = pigmentation CPVC from oil absorption
PVC = formula pigment volume concentration

The porosity index is numerically equal to the volume of air in a porous paint film, expressed as a percentage of the pigmentation's total binder demand. Dry hiding power is produced when pigment/air interfaces replace some of the pigment/binder interfaces that would be present in a nonporous film. The relative volumes of air and binder in a porous paint film may be expressed by the ratio P.I./(1 — P.I.). Based upon the relative Fresnel reflectivity of rutile titanium dioxide in air as compared to its reflectivity in an organic binder with an assumed refractive index of 1.50, the effect of film porosity on hiding power may be expressed as follows:

$$\text{HP}_\text{R} = \frac{(5.14 + 2.11\ \text{P.I.})^2}{(5.14 - 0.61\ \text{P.I.})^2}$$

where HP_R = relative dry hiding power

HP_R is the factor by which the basic hiding power of a given amount of rutile titanium dioxide will be multiplied due to film porosity.

It should be apparent that the same increase in film porosity, and therefore in dry hiding power, may be produced by either a decrease in CPVC or an increase in PVC. It is therefore unnecessary to use high-oil-absorption titanium pigments to develop increased dry hiding power—the same effect may be produced by the use of high-oil-absorption extender and/or by an increase in PVC, provided that the effective PVC of the titanium dioxide is not increased.

When modifying an existing formula to reduce cost, the use of a fine-particle-size, high-oil-absorp-

tion extender offers the opportunity to replace vehicle solids without reducing the efficiency of the titanium dioxide content. This is because its fine particle size permits it to act as a diluent, and the effective PVC of the titanium dioxide is not affected by such a substitution:

$$\text{Effective PVC} = \frac{\text{Pigment}}{\text{Pigment} + \text{Fine Extender} + \text{Binder}}$$

At the same time, the high oil absorption of the fine-particle-size extender acts to reduce the CPVC of the total pigmentation. Since the substitution results in a simultaneous increase in PVC and decrease in CPVC, it has a pronounced effect on film porosity and dry hiding power.

Formula PVC may of course also be increased by the use of large-particle-size extenders, but while these are generally less expensive, they also tend to reduce the effectiveness of the titanium dioxide content when used to replace vehicle solids. In some instances, however, it may prove economical to use the coarser extender and to substitute a higher-titanium-dioxide content pigment to compensate for the loss in efficiency.

ALKYD FLAT WALL PAINTS

Table 4 illustrates several approaches that might be taken to replace a high-oil-absorption latex-grade titanium pigment in a porous alkyd flat wall paint without changing film porosity as calculated by the method outlined above.

Only the pigmentations are shown, but in all cases the total solids were held constant at 50% by volume. When the PVC was raised, an equal volume of extender replaced the vehicle solids removed. In this series, no effort was made to reduce the total amount of pigment used to compensate for titanium dioxide content.

To produce formula B, the PVC was held constant, an enamel-grade titanium pigment replaced the high-oil-absorption latex-grade, and the ratio of calcined clay to calcium carbonate was increased to bring the CPVC back to the original level. This method of modification results in a slight increase in raw-material cost (because the clay is more expensive than the carbonate), but a significant increase in hiding power because of the increased titanium dioxide content of the pigment and because of the increased efficiency provided by increased dilution with the fine-particle-size clay (lower effective PVC). Reduced to equal hiding with mineral spirits, formula B is 27¢ cheaper than formula A.

To produce formula C, the PVC was raised to 69.0, keeping the effective PVC constant by replacing removed vehicle solids with calcined clay, and replacing the difference in bulking between the enamel-grade pigment and the latex-grade with additional calcium carbonate. Since the formula PVC had been raised, the pigmentation CPVC also had to be increased to keep the porosity constant. This modification results in a slight increase in hiding power over formula A because of the difference in titanium dioxide content alone—effective PVC and porosity were identical. Cost, however, is 7¢ lower than formula A because of the replacement of expensive vehicle solids. At equal hiding, the saving increases to 23¢ a gallon.

To produce formula D, advantage was taken of the higher titanium dioxide content of the enamel-grade pigment. The calcined clay was held constant, while the calcium carbonate was increased at the expense of vehicle solids until the resulting CPVC/PVC ratio provided a match for the original film porosity. This resulted in a PVC of 71.0. Formula D still has slightly more hiding power than formula A, but less than formula C because the effective PVC of the titanium pigment has been increased by the replacement of vehicle solids with coarse extender. In this particular example, this latter method of modification produced the greatest saving—27¢ before thinning to equal hiding, and 40¢ when adjusted—but potential savings are roughly proportional to the amount of titanium pigment available for replacement.

In preparing these examples, the CPVC/PVC ratios were calculated from existing CPVC curves for the pigments and extenders involved. However, laboratory procedures may be used for matching formula A without resorting to this somewhat complex approach.

Formula B, for example, might have been arrived at by formulating two test grinds using the enamel-grade titanium pigment at the original 65 PVC level, one with the original clay/carbonate ratio and the other with half-again as much clay. Cross-blending on a volume basis could then have been used to arrive at a combination yielding equal film porosity, as indicated by stain-removal tests.

Similar cross-blending procedures might have been used to derive formulas C and D. In the case of formula C, the two test grinds would involve one

Table 4—Enamel-Grade vs Latex-Grade Pigmentation

	A	B	C	D
Titanium dioxide*	250	250	250	250
Calcium carbonate	339	232	348	420
Calcined clay	214	327	258	214
Formula PVC	65.0	65.0	69.0	71.0
Pigmentation CPVC	52.4	52.4	56.7	59.1
Porosity index (P.I.)	0.41	0.41	0.41	0.41
Hiding power (sq ft/gal)	440	522	480	452
Cost per gallon	$2.37	$2.42	$2.30	$2.10
Cost at equal hiding	$2.37	$2.10	$2.14	$1.97

*Latex-grade for formula A; all others standard enamel-grade pigment.

at 65 PVC with only the calcium carbonate addition required to compensate for the change in titanium pigment, and the other at 75 PVC with the same amount of calcium carbonate, and clay replacing the removed vehicle solids.

Formula D would differ from the above only in that the clay would be kept constant in both test grinds, while calcium carbonate would be used to replace vehicle solids.

FLAT LATEX PAINTS

As indicated by the name given to high-oil-absorption titanium pigments, they find their major use in latex flat wall paints. Ever since it was first demonstrated that a bag-for-bag replacement of one of these latex-grade titanium pigments for a multipurpose type would help to overcome the characteristic wet-to-dry hiding power loss of latex paints, their use has skyrocketed.

The increased hiding power was of course due to increased film porosity—a fact that was generally minimized by their manufacturers. However, the increased porosity has obviously been acceptable to paint customers—had this not been so, changes would have been made.

Historically, flat latex paints have been formulated at lower PVC's than alkyd flats—initially to obtain better washability characteristics, and later, as it became apparent that latex vehicles were not as efficient binders as the alkyds. Consequently, many flat latex formulations represent the wasteful attempt to obtain high dry hiding power at relatively low PVC's.

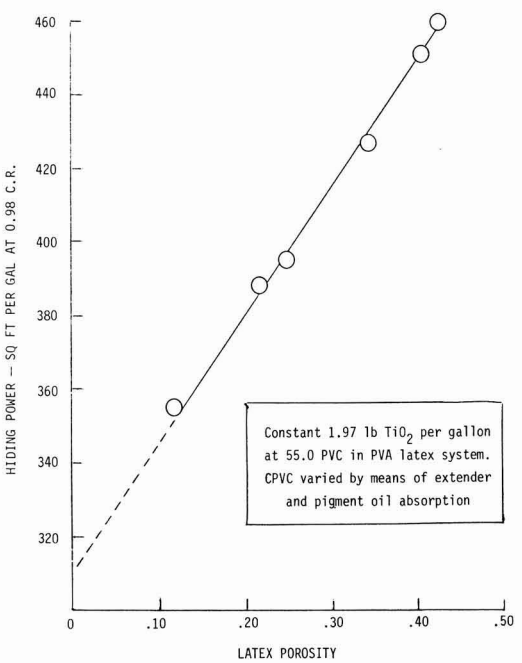

Figure 3—Variation of hiding power with film porosity

Table 5—Flat Latex Paint Formulations

	A	B	C
Water	453.5	453.5	468.0
Ethylene glycol	9.3	9.3	9.3
Defoamer	1.0	1.0	1.0
Cellulosic thickener	5.0	5.0	5.0
KTPP	0.4	0.4	0.4
Dispersing agent	3.4	3.4	3.4
Titanium dioxide[a]	175.0	175.0	160.0
Calcined clay	75.0	75.0	114.0
Calcium carbonate	166.0	166.0	183.0
Wetting agent	4.3	4.3	4.3
Defoamer	1.0	1.0	1.0
PVA latex (55% solids)	241.5	241.5	209.3
TOTALS	100 gal	100 gal	100 gal

(a) Latex-grade in formula B; all others enamel-grade.

When matching latex paints for porosity it is necessary to utilize a slightly different equation:[4]

$$\text{L.P.} = 1 - \frac{\text{CPVC}\ (1-\text{PVC})}{\text{PVC}\ (1-\text{CPVC})}^{-\chi}$$

where L.P. = latex porosity
CPVC = pigmentation CPVC
PVC = formula PVC
χ = binding power index

The effect of latex porosity on hiding power is shown in *Figure* 3.

The binding power index is used to compensate for the relative binding ability of latex vehicles as compared to solution resins. The fact that different latex vehicles vary in binding power offers an additional opportunity for savings in latex systems—a procedure that will be discussed at a later point.

For the replacement of latex-grade titanium pigment with an enamel-grade type, using the same latex vehicle, the procedure is no different from that outlined for alkyd flat wall paints, since equal film porosity will result so long as the following relationship applies:

$$\frac{\text{CPVC}_A\ (1-\text{PVC}_A)}{\text{PVC}_A\ (1-\text{CPVC}_A)} = \frac{\text{CPVC}_B\ (1-\text{PVC}_B)}{\text{PVC}_B\ (1-\text{CPVC}_B)}$$

Since the common procedure leading to the presence of latex-grade titanium pigments in most latex paints has been their replacement of a lower-oil-absorption type, the examples given in *Table* 5 have been chosen to represent what has happened to film porosity when the original substitution of a latex-grade pigment was made in formula A to produce formula B. Formula C is an example of what can be done to reduce costs using the original lower-oil-absorption titanium pigment.

Table 6 shows the relative hiding power, porosity, and cost of all three formulations.

Table 6—Comparative Data for Latex Paints

	PVC	Relative[a] Hiding	L.P.	Cost/Gal
Formula A	55	100	0.20	88.5¢
Formula B	55	111	0.43	88.5¢
Formula C	61	112	0.43	80.1¢

(a) Based upon tinctorial strength.

As will be noted, the original introduction of the latex-grade pigment produced an 11% increase in dry hiding power, with no increase in cost but a much more porous film. Assuming that this porosity was acceptable, formula C was produced by reducing the titanium pigment to produce a titanium dioxide content equal to that of the 175 lbs of latex-grade pigment, adding enough calcium carbonate to compensate for the volume of titanium pigment removed, and then replacing latex solids with calcined clay until the porosity was matched.

In this instance, since the amount of titanium dioxide, effective PVC and porosity are unchanged (from formula B), the laboratory cross-blending process can involve an optical match produced by adding exactly the same amount of colorant to each formulation. This was actually done to obtain the relative hiding power figures of *Table* 6, calculating the relative Kubelka-Munk scattering coefficients from dry reflectance measurements by assigning the value of 100 to formula A as the standard of comparison.[13,14]

The binding power index of the latex used was also determined in order to be able to provide the latex porosity values given in *Table* 6, but as previously mentioned, this is necessary only when vehicle substitutions are to be made.

LATEX VEHICLE SUBSTITUTIONS

Obviously if a latex with a higher binding power index were available, it would be possible to combine a latex and a pigment change in a single operation to minimize cost.

It is quite easy to evaluate the latex vehicles that are available to us in terms of their binding power.[4] It is only necessary to produce a PVC ladder with each, using some common extender as the only pigment, but making sure that all of the additives normally used are present. This PVC ladder is most easily produced by making two test grinds at 30 and 70 PVC (with the same total solids), and cross-blending to provide PVC "steps" of 5%. Drawdowns are then made on black-and-white hiding power charts and the determined contrast ratios plotted against PVC. Two straight-line segments will normally result, as in *Figure* 4, and the PVC of zero porosity (PVC_0) may be picked off at the point of intersection.

To calculate the binding power index (χ), it would normally be necessary to first determine the

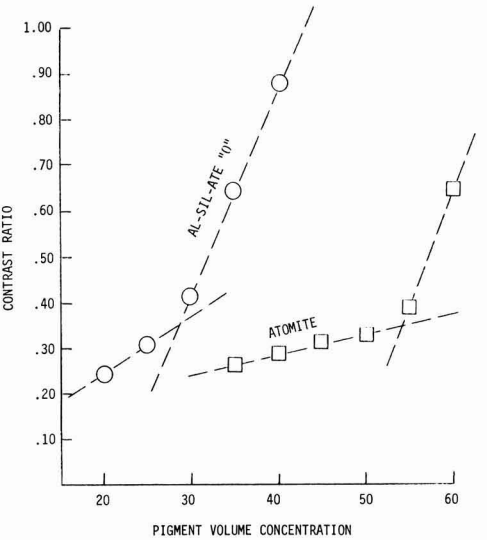

Figure 4—Identification of PVC for zero porosity

CPVC of the extender used from its spatula rub-out oil absorption.

This CPVC value would then be used to calculate the binding power index:

$$\chi = \frac{PVC_0}{(1-PVC_0)} \times \frac{(1-CPVC)}{CPVC}$$

where χ = binding power index
PVC_0 = PVC of zero porosity
CPVC = CPVC of extender (from oil absorption)

RELATIVE BINDING POWER INDEX (χ_R)

If, however, the same extender is used for all of the latex vehicles evaluated, relative binding powers, represented by the symbol χ_R, suitable for vehicle substitution work, may be obtained directly from the PVC's of zero porosity, and the oil absorption determination may be eliminated:

$$\chi_R = \frac{PVC_{01}}{(1-PVC_{01})} \times \frac{(1-PVC_{02})}{PVC_{02}}$$

χ_R = relative binding power
PVC_{01} = PVC of zero porosity for latex #1
PVC_{02} = PVC of zero porosity for latex #2

Table 7 contains data obtained for four commercial latex vehicles using this method.

Table 7—Relative Binding Power Data

	PVC_0[a]	χ_R[b]
Latex #1	54.5	1.20
Latex #2 (st'd)	50.0	1.00
Latex #3	56.5	1.30
Latex #4	50.2	1.02

(a) PVC of zero porosity.
(b) χ relative to chosen standard (2).

In this example, the latex producing the lowest PVC of zero porosity (PVC_0) was arbitrarily selected as the "standard" to make all other values of χ_R greater than unity. In general, however, it will be most convenient to establish the latex to be replaced as the standard, regardless of its relative binding power index.

If for example, latex #2 were to be replaced with latex #1 so as to maintain equal film porosity in some standard formula, the following equation would apply:

$$\frac{CPVC_1}{(1-CPVC_1)} \times \frac{(1-PVC_1)}{PVC_1} \chi_R = \frac{CPVC_2}{(1-CPVC_2)} \times \frac{(1-PVC_2)}{PVC_2}$$

Replacing the latex #2 of *Table* 7 with latex #1 at the same time that the pigmentation is modified simply introduces one extra term into the calculation:

$$\frac{CPVC}{(1-CPVC)} \times \frac{(1-PVC)}{PVC} \times \frac{1.20}{1.00} = \frac{0.516^*}{0.484} \times \frac{0.45}{0.55}$$

$$PVC = 0.64 \qquad CPVC = 0.57$$

The result of this combination is shown as Formula D in *Table* 8.

The saving of 10.1¢ per gallon created by the differences between formula B and formula D may appear small compared to the 40¢ per gallon saving illustrated for the alkyd flat wall paint, but this is due to the relatively small amount of titanium dioxide available for replacement. If compared on the basis of their relationship to total formula cost, the savings appear much closer—11.4% and 16.9% for the latex and alkyd, respectively.

When making latex-vehicle substitutions to obtain a more favorable binding power index, one precaution should be observed. It is possible for a higher binding power index to be accompanied by poorer freeze-thaw and mechanical stability—although this is not necessarily a characteristic of such vehicles. Tests should be made, however, to be sure that no such disadvantages are involved.

The important fact to be aware of is simply that these differences in binding capability do exist and they should be considered—in addition to price—when selecting a latex vehicle. A more efficient binder may prove to be worth a small premium in price.

* CPVC of formula B pigmentation.

Table 8—Comparative Data for Latex Paints

	PVC	Relative[a] Hiding	LP	Cost/Gal
Formula B	55	111	0.43	88.5¢
Formula C	61	112	0.43	80.1¢
Formula D	64	110	0.43	78.4¢

(a) Based upon tinctorial strength.

CONCLUSION

Many paint formulations have been developed at a time when either the performance characteristics of pigments and vehicles were not what they are today, or—as is the case in many flat wall paints, both alkyd and latex—when the "easy" path to desired hiding power levels could be followed without regard to cost considerations.

Today, product costs have soared until they are actually meeting sales resistance from the ultimate consumer. Those products that contain the least "fat" (no pun intended) will inevitably have a better chance to capture the available market. Today is the time to reformulate those wasteful products for maximum efficiency and minimum cost.

It is also worth remembering that the replacement of unnecessary vehicle solids—whether they be linseed oil, alkyd resin, or synthetic latex polymers—is a process that conserves energy as well as our employers' dollars.

Much more energy has been consumed in the production of one solid gallon of almost any organic binder than in the mining and grinding of an equal volume of extender. Market price is closely related to either energy consumption or to scarcity created by the depletion of valuable natural resources. When we raise pigmentation levels by replacing vehicle solids with extender we can therefore be assured that we are saving energy as well as dollars.

The avoidance of waste—no matter how it is accomplished—is an activity that brings its own rewards. When profits are squeezed by high raw-material costs, and both raw-materials and energy are in short supply, the wise paint formulator should become a dedicated conservationist. □

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Minimum Film Forming Temperatures of Emulsion Vehicles And Latex Paints

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The determination of the minimum film forming temperatures (MFFT) of emulsion vehicles and latex paints is essential for the successful development of commercial products. To market saleable products, it is necessary to know at what temperature the polymer or paint film will coalesce to form a continuous film.

The method described herein makes it possible to simultaneously determine the minimum film forming temperatures of multiple latex vehicles and latex paints. This method thereby significantly reduces the time and effort required for determining the MFFT of polymers and paints as described in ASTM D-2354-68. Reproducibility of this method has been determined to be ± 2°F. In addition, this method is not limited to temperatures below 77°F (25°C).

KEY WORDS: Minimum film forming temperature; Accelerated method; Simultaneous evaluations; Reproducibility.

INTRODUCTION

The determination of the minimum film forming temperatures of a latex vehicle is of utmost importance in the development of an efficient protective coating. The ability of a resin emulsion to form a film at relatively low temperatures without recourse to excessive quantities of coalescing solvent is important to its effective performance. As the particles in a resin emulsion are softened by plasticization, the minimum film forming temperature is reduced. In a very real sense, the effect of a plasticizing monomer on the minimum film forming temperature is an excellent index of its plasticizing efficiency.

The present accepted method, ASTM D-2354-68, offers some direction toward the determination of film forming temperatures but is somewhat limited in that it is time consuming, not especially reproducible, and limits the testing to one sample at a time. As outlined in the present method, approximately one to 1½ hr are needed for the temperature gradient to reach equilibrium once the bar (film substrate) is placed in operation. After the test film is cast, approximately one to two hr are required for the film to dry. Therefore we now have a total of approximately 3½ hr consumed solely for test results, excluding the time required to set up the entire apparatus and to constantly monitor the cooling bath. The greatest drawback lies in the fact that only *one* film is evaluated at one time unless duplicate testing apparatus is set up to obtain multiple evaluations. This, of course, would require considerable testing space and additional testing equipment. In addition, some conjecture is required in the examination of the film to determine a definitive result.

The use of an environmental test chamber* with accurate temperature controls has widened the scope of experimentation. It is now possible to accurately determine the minimum film forming temperatures of several latex vehicles simultaneously in a relatively shorter period of time with a greater degree of reproducibility with objective data. The minimum film forming temperature values of the nine experimental copolymers evaluated for this article were obtained in four hr.

TEST PROCEDURE

Films of nine experimental vinyl-acrylic copolymers containing varying amounts of hard and moderately hard comonomers were simultaneously drawn down on a glass plate (6½″ × 17″) using a 6.0 mil Bird application measuring 10½ in. in length with a film width of 9 in. The films were allowed to dry at room temperature (73°F (23°C)) and later examined for film continuity in order to visually determine the degree of film formation. Two latex vehicles did not coalesce at room temperature and were set aside to be subsequently tested at higher temperatures.

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* Environmental chamber used in our testing was manufactured by Associated Testing Labs, Wayne, N.J.

Now that some direction has been indicated, the glass panel is positioned on a black plastic scrub panel (6½" × 17") obtainable from the Leneta Co. and placed in the environmental chamber with the temperature set at 65°F (18°C). While waiting 10 minutes for the test chamber to equilibriate, the samples to be tested are lined up on a nearby workbench and adequately stirred to ensure uniformity. The lids should be left slightly ajar to allow easy access to the contents without excessive evaporation. A spatula should be provided for each sample.

When testing is ready to begin, remove the glass plate from the chamber and place it on the workbench. Position the film applicator at the top of the glass plate and with reasonable speed, dip the spatula into the latex sample and place a sufficient amount of polymer (or paint) to cover an area approximately ¾ in. wide on the plate. The same procedure is followed for all the samples. When all the globules have been placed on the plates, immediately draw down the films simultaneously and quickly place the glass plates in the chamber. (The films take approximately seven min to dry). If the films are continuous, repeat casting procedures and reduce the chamber temperature in 5°F increments until film(s) fail to coalesce. At this point, increase the chamber temperature by 2° to 3°F to obtain final film forming temperature.

Should films fail to form at room temperature, the same procedures should be followed except that the temperature should be increased until film formation occurs.

TEST RESULTS

Monomer Composition	MFFT °F	MFFT °C
Vinyl acetate/butyl acrylate, 85/15 (control)	60	15.5
Vinyl acetate/butyl acrylate, 85/15 + 4% pentaerythritol triacrylate	68	20
Vinyl acetate/butyl acrylate, 85/15 + 8% pentaerythritol triacrylate	92	33.3
Vinyl acetate/butyl acrylate, 85/15 + 4% hexanediol diacrylate	65	18.3
Vinyl acetate/butyl acrylate, 85/15 + 8% hexanediol diacrylate	73	22.7
Vinyl acetate/butyl acrylate, 85/15 + 4% hexanediol diacrylate/pentaerythritol triacrylate, 50/50	68	20
Vinyl acetate/butyl acrylate, 85/15 + 8% hexanediol diacrylate/pentaerythritol triacrylate, 50/50	78	25.5
Vinyl acetate/butyl acrylate, 70/30 + 8% pentaerythritol triacrylate	69	20.5
Vinyl acetate/butyl acrylate, 70/30 + 8% hexanediol diacrylate	58	14.4

In order to demonstrate the reproducibility of the described method, a laboratory colleague evaluated three of the above-mentioned emulsion polymers using the technique evolved to determine minimum film forming temperatures. It should be pointed out that this co-worker has been preparing and evaluating emulsion polymers for almost one yr, having recently been hired as an effective member of the laboratory staff. The following MFFT results are an indication of the reproducibility of this method.

	°F	°C
Vinyl acetate/butyl acrylate, 85/15 (control)	58	14.4
Vinyl acetate/butyl acrylate, 85/15 + 4% pentaerythritol triacrylate	67	19.4
Vinyl acetate/butyl acrylate, 85/15 + 4% hexanediol diacrylate	63	17.2

The minimum film forming temperature of latex paint films can also be determined with the following two additional inspections on final results.

(1) Dried paint films may be examined by placing the panel in front of a light to show film forming irregularities.

(2) Place the glass panel with dried paint film under running water. If the paint flakes off, it has not coalesced. If the paint film removes itself in a continuous film, coalescence has occurred.

SUMMARY

This method of determining minimum film forming temperatures of latex and paint films permits fast and accurate results in addition to greatly increasing the number of determinations which can be evaluated simultaneously when compared to the present method described in ASTM D-2354-68 and is not limited to temperatures below 77°F.

The method described allows the simultaneous testing of multiple films in the same amount of time as described in the presently accepted method to evaluate one film.

No cumbersome equipment is necessary to obtain excellent reproducibility with elimination of conjecture concerning end results.

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Regulations Regarding Paint Products

Their Classification and Labeling Requirements

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Title 49, Code of Federal Regulations, places on all shippers of hazardous materials certain regulations concerning classification, description, packing, marking, and labeling requirements for many formulations of paint, enamel, lacquer, stain, shellac, varnish, and their removing, reducing, or thinning compounds, when these materials are offered for transportation. Also regulated are aerosol products when vapor pressure in the container exceeds 40 PSIA at 70° F, or exceeds 104 PSIA at 130°F, or for a flammable material with vapor pressure exceeding 40 PSIA at 100°F. The regulations apply with force of Federal law to shippers by all modes of transportation, and are administered by the Department of Transportation.

This paper discusses the Department of Transportation regulations relating to the transportation of hazardous materials, with particular emphasis on the shipper's requirements for paint, lacquer, stain, varnish, liquids, their removing, reducing, and thinning compounds, and those paint-related aerosol products which meet the definitions of hazardous materials included in the regulations. The stated purpose of the regulations is to minimize the danger to life and property incident to transportation of hazardous materials. It is the duty of the shipper to make the regulations effective and to instruct his employees in the requirements of the regulations.

Introduction

When a shipper offers a shipment of hazardous material for transportation by common carrier, his bill of lading tendered to the carrier must carry a signed "Shipper's Certificate," which reads, "This is to certify that the above named articles are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation." In the balance of this paper, the emphasis will be on the classification, description, packaging, marking, and labeling requirements of the regulations.

Source Documents

Before further discussion of the provisions of the regulations, we should review what they are and where copies may be obtained for future use. The Department of Transportation's designation of the regulations is "Code of Federal Regulations, Title 49, Transportation, Parts 100—199." This document is available from the Government Printing Office at a cost of $7.20 per copy, and it is revised and reissued annually. The regulations are also available as "Mr. R. M. Graziano's Tariff #29," which is published periodically by the Bureau of Explosives, 1920 "L" Street NW, Washington, D.C. 20036. The tariff costs $15.00 in either the bound or looseleaf version, and is supplemented as the regulations change. This provides the advantage that subscribers always have the correct and current regulations on hand. Long-run cost for each document is about equal, as the tariff is reissued only after a considerable volume of changes have been made. For the balance of this paper, section references will be given—these references apply to both documents.

Commodity List

One of the basic parts of the regulations is Section 172.5, the "Commodity List," an alphabetical list of those items regulated as hazardous materials by name. If a commodity is not described by name in the list, but does meet the classification criterion for a hazardous material, it must be described by its generic name, such as "Flammable Liquid n.o.s.," and offered for shipment as required by the regulations applicable to the appropriate hazard classification.

There are four entries in the commodity list that could cover coatings-related items: Paint driers, liquid; Paint, enamel, lacquer, stain, shellac, varnish, aluminum, bronze, gold, wood filler, liquid, and lacquer base liquid; Compounds, lacquer, paint, or varnish, etc., removing, reducing, or thinning, liquid; Aerosol products which are described as "Compressed gases n.o.s." All of these items are classed as flammable liquid, except that the "Compounds . . . removing, reducing, or thinning" may be classed as corrosive material. The "compressed gases" are classed as either flammable compressed gas, or nonflammable compressed gas.

In addition to the name and classification shown in Section 172.5, there are included the "Exemptions and Packaging" sections applicable to each item, the "label required if not exempt," and the "maximum quantity in one outside container by rail express." The importance of the maximum quantity entry is that this is also the maximum quantity in one outside package for shipment by air. The abbreviations and other signs used in Section 172.5 are detailed in Section 172.4.

Classification

To ascertain if a material is regulated, we must know the test method and classification criterion, both of which are given for each classification of hazardous material at the beginning of each subpart of Part 173 of the regulations. Section 173.115 covers flammable liquid; Section

Presented at the Golden Gate Society's Management Seminar held in San Francisco, Calif., June 16, 1975.

* American Railroads Building, Washington, D.C. 20036.

173.240 covers corrosive material; and Section 173.300 covers the compressed gases.

Since the bulk of coating products are classed as flammable liquid, let us explore Section 173.115 in more detail. This section defines flammable liquid as a liquid which gives off flammable vapors at or below 80°F when tested by Tagiabue's open cup tester. The test may be run by the Bureau Laboratory in Edison, N.J., or by any other capable laboratory. Classification of materials is strictly the shipper's responsibility and should be done any time that a formulation may meet the definition of a hazardous material.

Docket HM-102

Docket HM-102, at the time of this writing scheduled to become effective January 1, 1976, proposes to change the definition of flammable liquid by increasing the flash point to 100°F when tested by Tagiabue's closed cup tester. The additional material thus regulated will be exempted from specification packaging requirements when packaged in containers of 110 gal or less, if an indication that the flash point is 73°F or higher is marked on the outside of the package. This docket also proposes to establish a new class of hazardous material, "combustible liquid," which is defined as having a flash point of 101°F through 200°F, TCC. This material will be exempt from all provisions of the regulations when it is packaged in containers of 110 gal or less. When it is packaged in larger containers, it will be subject to the description requirements on shipping papers, marking of portable tanks, placarding of rail cars and motor vehicles, and incident reporting requirements only.

Exemptions and Packaging

The commodity list gave two section numbers covering "Exemptions and Packaging" for paint and related products, Sections 173.118 and 173.128. Section 173.118 is the exemption from specification packing, marking, and labeling requirements and applies when the material is packaged in inner containers not over 1 pint, or in metal containers not over 1 qt, overpacked in a strong outside container. Section 173.128 (c) further exempts paint and related articles from the specification packing, marking, and labeling requirements when packaged in glass or earthenware inner containers not over 1 gal, or in metal inner containers not over 5 gal; when these inner containers are packed in a strong outside container. The exemption allows the use of nonspecification containers. The label must not be applied to exempt packages, except that if such package is to be shipped by air and has an inner container of more than 1 qt capacity, then the package must be marked with the name of contents and the flammable liquid label must be applied. The name of the commodity need not be shown on "exempt" packages, except when offered for shipment by water, in which case the name must be marked on the package. It is important to remember that the exemption does not waive the classification and description requirements of the regulations.

Section 173.128(a) gives the authorized containers for paints and related articles. Its major provisions refer to Section 173.119, the standard flammable liquid packages, which vary with flash point and viscosity. Section 173.128(a) also authorizes use of 5-gal 37A and 37B drums irrespective of flash point and viscosity. These two packages are very widely used for coating products for which they are authorized. It is the shipper's duty to use the required packages and to know that they are built as required by package specifications. The shipper may rely on the manufacturer's specification marking to assure construction to specification, but I also recommend that the shipper compare the packages with the specification from time to time to assure, to the best of his ability, that the package does meet the requirements specified.

The packaging specified in the regulations is designed to withstand normal transportation without release of contents. There is a provision that the carrier must report to the DOT any instances in which a hazardous material escapes from a package. The March 1975 issue of *OHM Newsletter*, a publication of the DOT, reports that, in 1974, 8,500 such reports were received, and that the greatest number of incidents, 1,794, involved paint and related compounds. This "scare statistic" is explained by two factors: first, the large number of shipments of paint and related compounds; second, the relatively large exemption contained in Section 173.128(c) and the blanket authorization for 5-gal 37A and 37B drums. Only the cement and related compounds classed as flammable liquid enjoy such liberal packaging requirements.

Exemptions

The regulations may be changed by petition submitted by any person, especially if justification can be shown. Any person may also petition for an exemption, which is authority to do something not authorized in the regulations. Exemptions are often used to gain service experience with new packaging and may lead to permanent changes in the regulations. Another common use of the exemption is to allow use of foreign-made containers in the United States. See Part 107 for further details on exemptions.

Filling and Loading

When filling any liquid container, outage must be left for possible expansion of the lading in transit; for flammable liquids, at least 2% outage must be left in the container. Package closures must be tight; drum bungs, pail caps, 17H bolt ring nuts, for example, must be more than hand-tight. The outlet cap on a tank car must be applied with a 36-in.-long wrench. Closures must not leak, and use of a good gasket is vital in this regard. Cars must be loaded so as to prevent damage in transit; Bureau of Explosives Pamphlet 6 details proven loading plans for box-type cars, and Pamphlet 6C shows proven plans for TOFCCOFC van-containers. Cars which require placards—tank cars of material classed as flammable liquid, liquid corrosive material, flammable compressed gas, and nonflammable compressed gas, or any type of car carrying one or more packages labeled flammable liquid, corrosive (liquid only), or flammable gas—must be placarded "Dangerous" on both ends and both sides by the shipper. The name of the article must be shown on the placards for car load shipments. Cars containing packages exempt from labeling must not be placarded.

Marking and Labeling

The marking and labeling requirements for the outside of packages not specifically exempted from these requirements are detailed below. The legal name of the commodity, as shown in Section 172.5, must be shown. The specification marking as required by the container specification must be displayed. The label, of the type shown in either Section 172.5 or in Section 173.402 of the regulations, must be applied. The name, specification, and label must appear on all packages except those specifically exempted.

Other marks which may be required include "This Side Up," which must be shown on the top of the outer container when it contains corrosive liquids in inner containers of any size, or flammable liquids in inner containers over 1 qt, except when the inner containers are nonrefillable metal cans with spun-in head and base with no replaceable cap. The name and address of the consignee must be shown on the packages, except for carload or truckload shipments, and less-than-truckload ship-

ments which do not require interlining to another carrier. The exemption notation "DOT E ****" must appear when shipment is made under the provisions of an exemption. Also, no marks are allowed which could be confused with a standard DOT hazard label.

Tank car marks include the car specification and tank and valve (if applicable) test dates. Test intervals vary with the specification and the age of the car and are detailed in Section 173.31. These marks are stenciled on the right end of the tank and must be legible and the car must be within test date, or the car must not be loaded. The commodity name goes on the placards which must be applied by the shipper. If an exemption is involved, the stencil "DOT E ****" must appear near the car specification stencil.

Shipping Papers

Section 173.427 of the regulations requires that the quantity of hazardous material by weight volume or as otherwise appropriate, the legal name from Section 172.5, and the hazard classification must be shown on all bills of lading covering shipments of hazardous material, when such bills are tendered to a carrier. In addition, if an exemption is involved, this information must be shown by the notation "DOT E-****."

If the package is exempt from the labeling requirements, and thus has no label applied, this must be shown by the notation "No Label Required." If a label is applied, no notation is required, except for shipments by water in which case the color and kind of label applied must be shown. In addition to these required items, the shipping papers may show any additional information not inconsistent with the requirements of the regulations. Trade names and rate tariff names are commonly shown on bills of lading following the legally required entries. The bill of lading must also carry a signed "Shipper's Certificate," as shown in Section 173.430(a), "This is to certify that the above named articles are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation." For shipments on passenger aircraft, the shipper must add the words, "This shipment is within the limitations prescribed for passenger-carrying aircraft."

Summary

The Department of Transportation regulations place certain duties on shippers of coatings and related compounds which meet certain criterion specified in the regulations. The regulations covering these "Hazardous Materials" place certain requirements relating to the classification, description, packaging, marking, and labeling of these articles on the shipper, so that these articles may be handled in transportation with a reasonable degree of safety. The intention of the regulations is to identify those articles which represent extraordinary hazards in transportation, require that the carrier be advised of the hazard, that the carrier take certain precautions with these materials, and that containers be constructed and contents limited so that unintentional releases of these materials in transportation will be minimized. □

Society Meetings

Chicago
November 10

Dr. Gordon P. Bierwagen, of the Sherwin-Williams Co., gave a presentation concerning the use of PVC/CPVC ratio from some recent work on particle size distribution and pigment packing for predicting the physical properties of coatings.

Robert J. Burger, of du Pont Co., spoke on "CONSUMERS' VIEW OF PAINT." He related the results of a consumer survey conducted by the NPCA on 19 paint attributes.

RUDOLPH C. ALBRECHT, *Secretary*

Officers of the Cleveland Society for Coatings Technology for 1975-76. Seated (left to right): Council Representative — Michael W. Malaga, of Glidden-Durkee Div., SCM Corp.; President-Elect — Fred G. Schwab, of Coatings Research, Inc.; President — Tom H. Keene, of Harshaw Chemical Co.; Secretary — Helen Skowronska, of Sherwin-Williams Co.; and Treasurer — Charles K. Beck, of Addressograph Multigraph Corp. Standing: Membership Chairman — Paul J. Houck, of Morgan Adhesives Co.; Technical Coordinator — Charles Kumins, of Tremco Mfg. Co.; Immediate Past-President — Donald H. Fordyce, of Body Bros., Inc.; Assistant Treasurer — James Austin, of Mobil Chemical Co.; and Education Chairman — Carl J. Knauss, of Kent State University

Cleveland
November 19

Larry Kay, of Day-Glo Corp., spoke on "WHAT'S NEW IN FLUORESCENT PIGMENTS."

With the aid of flip charts, slides, and various light sources, Mr. Kay demonstrated how daylight fluorescent pigments absorb radiation and convert it into visible light. Daylight fluorescent pigments, which actually are dyed resin particles, were developed about 29 years ago and were used first in safety applications. The early pigments had poor lightfastness — faded out in a relatively short time in direct sunlight. However, Mr. Kay reported that the pigments available today can be incorporated into coatings which, when properly formulated and properly applied, retain color and brightness for some time. New end-uses for daylight fluorescent pigments exist in such areas as decorative paints, wall coverings, floor coverings, textiles, etc.

HELEN SKOWRONSKA, *Secretary*

C-D-I-C
November 10

Sam Militello, of Spencer Kellogg Div., Textron, Inc., spoke on "URETHANE MODIFICATION TO UPGRADE PERFORMANCE COATINGS."

Urethanes are reaction products of diisocyanates. The diisocyanates are usually reacted with polyols, polyethers, polyesters, glycol triols or castor oil derivatives, all of which contain at least two hydroxyl groups. In coatings the prepolymer types are based on the first three, while the castor oil types are used in adhesives.

Polyurethanes are categorized by six different designations:

Type I — one-package prereacted oil modified.

Type II — one-package moisture cure.

Type III — one-package heat cure or blocked urethane.

Type IV — two-package catalyzed.

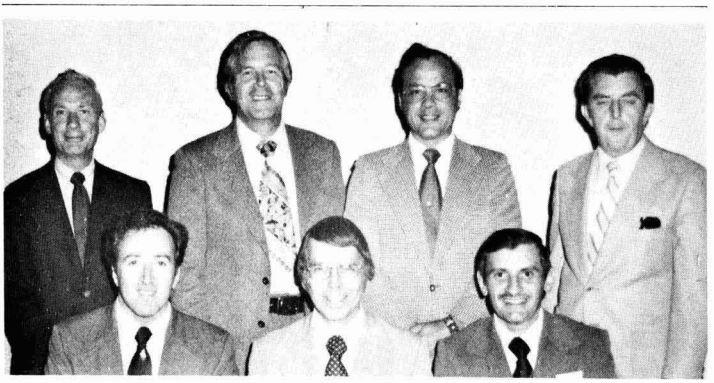
Type V — two-package polyol two-component system.

Type VI — urethane lacquer nonreactive.

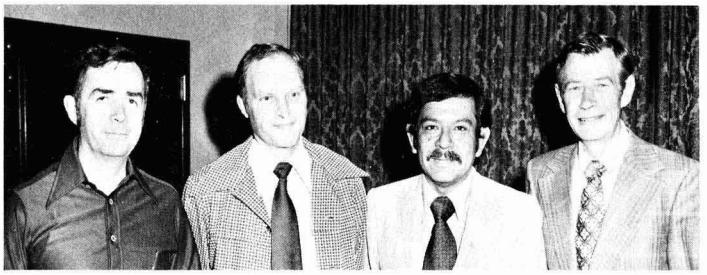
Of the six types, Type I and Type VI are stable systems which are quite capable of modification with other systems. They are considered stable since they do not contain any free NCO groups.

Types II, III, IV and V are referred to as prepolymers, since they have free NCO groups present. Of these four types, only III and V offer the possibility of resin modification.

Type IV is designed to cure with just a catalyst, if it is cured with something more than a catalyst it should be considered as a Type V resin.



Officers of the Chicago Society for Coatings Technology for 1975-76. Seated (left to right): Vice-President — Harvey L. Beeferman, of DeSoto, Inc.; President — Gus W. Leep, of Illinois Bronze Paint Co.; and Secretary — Rudolph C. Albrecht, of Standard T. Chemicals, Inc. Standing: Council Representative — Victor M. Willis, of Sherwin-Williams Co.; Immediate Past-President — Thomas E. Nevins, of U. S. Gypsum Co.; Membership Chairman — W. B. Bartelt, of Rust-Oleum Corp.; and Treasurer — Walter J. Krason, of Enterprise Paint Mfg. Co.



Officers of the Kansas City Society for Coatings Technology for 1975-76. Left to right: President — James N. Edwards, of Conchemco, Inc.; Secretary — Ray D. Lawson, of Southwest Grease & Oil Co., Inc.; Treasurer — Hugo R. Manco, of Farmland Industries, Inc.; and Council Representative — Terryl F. Johnson, of Cook Paint & Varnish Co.

The Type I urethanes are the best known and most widely used since they are similar to alkyds. This type is dried by using driers and the properties obtained are readily known to the formulator. Nitrocellulose and cellulose acetate butyrate can be added to the oil modified urethanes to get lacquer type of finishes. Also, hydrocarbon resins can be added to gain cost advantages, but create other problems and detract from film properties.

The largest area for resin modification is the two-component urethane, because there are so many commercially available resins which contain hydroxy functionality. Primarily, however, the polyols are most widely used.

At this point, many specific examples of urethane formulations were presented, based on the two-component prepolymers.

The Type VI urethane or urethane lacquer is a linear polymer which can be supplied at 100% solids. This type is compatible or can be modified with nitrocellulose, CAB, vinyl, phenoxy and acrylics.

Q. What is tapetime?

A. In automobile refinishing, areas need to be masked to permit a second color to be applied to a portion of the car. Tapetime is the time needed for a finish to dry sufficiently so that the fresh paint will not be taken off with the masking tape.

Q. In your acrylic formula there is a silicone additive; who supplied this silicone additive?

A. Dow Corning; about 1/4% was added on solid.

After the business meeting, Walter Jandel, of Precision Colors Co., spoke on "ELECTROCURE." He described electrocure as the high energy beam type cure, where electrons are passed through an accelerator and impinged on the surface to be cured. Cures can be effected at speeds of 4000 ft/min.

Mr. Jandel said that laboratory type of curing systems are available for $50,000. Production size units which can handle 36-38 in. size pieces are available for approximately $300,000.

Q. Why are the units so expensive?

A. The insulation and the tubes along with the special design of the units contribute to the cost.

Q. What thickness film have you been able to cure?

A. Up to 10 mils.

RAY SCHOMAKER, *Secretary*

Golden Gate November 17

William Korrell, of Nalco Chemical Co., spoke on "FOAM IN COATINGS — ITS PREVENTION AND DESTRUCTION."

Properties affecting formation and stability, antifoam composition, characteristics, requirements and selection, and evaluation techniques for proper antifoams were discussed. Slides were used to emphasize the subjects. A short movie was used to show experiments on the production and dissipation of foam by additives. Analysis of foam with the Gibbs function for free energy was developed. The Marangoni effect was illustrated. Defoamer evaluation for trade sales and industrial paints completed the talk.

Q. In the industrial test, can 150 g of coating be put into a half-pint can also?

A. No. 70 g is put into a ¼-pt. can and given a five-min shake.

Q. Then much less volume is used in an industrial coating test than in a latex?

A. Yes. They are somewhat higher in viscosity in most instances. One has to allow for more foam build-up in the can in a five-min shake. This gives somewhat consistent results.

Q. Is it a rule to use one-half of the defoamer in the grind and one-half in the letdown?

A. Typically this is the way defoamers are used. However, we find in trade sales and also industrials, silicone can be used in the grind and a nonsilicone defoamer can be used in the letdown. The ratios can be equal, but usually vary with less defoamer in the letdown.

Q. Will bubble coalescence in a batch aid in defoaming?

A. In bubble coalescence, a higher pressure of the large bubbles will cause the smaller bubbles to collapse and lead to dissipation of foam.

KEN PROBST, *Secretary*

Los Angeles November 12

A moment of silence was observed in memory of Hugh McClanahan, of E. T. Horn Co., who died recently.

Wayne B. Wright, of Nalco Co., spoke on "FOAM IN COATINGS — ITS PREVENTION AND DESTRUCTION." Mr. Wright explained the technical properties affecting foam formation and stability. He then explained what the composition and antifoam characteristics are of antifoam agents, and how to select the proper antifoam agent through suitable evaluation techniques.

FRED CROAD, *Secretary*

New York November 11

Frank Bolway presented the Nuodex Gavel to incoming President Al Sarnotsky, and Evelyn Romer, of Jesse S. Young Co., presented him with Robert's Rules of Order. Mr. Sarnotsky in turn presented a Past-President pin to Dick Schmidt and a check toward the purchase of a camera.

Fred Daniel, of Daniel Products Co., spoke on "ECONOMIC AND TECHNICAL PARAMETERS OF PIGMENT DISPERSIONS." His presentation was structured around a series of slides, covering the following topics:

(1) Grinding at present consists of wetting and deagglomeration of pigment particles and not actually

breaking or fracturing those particles.

(2) The effects of particle size of fine pigments and extenders on paint manufacturing procedures and equipment. Changes occurred in the period between 1945 and 1950 on the following: Particle conditions; Equipment needed; Pigment cost; Output rate; Manpower demand/gal; Operator skill; Equipment cost; Maintenance cost; Space requirements; Power consumption.

(3) Altered approaches to utilizing hard-to-grind pigments in modern plants: Sand milling; Supplemental roller mills; Attritors, etc.; Jet-milled pigments; Surface-treated pigments; Flushed colors; Dispersions (advantages).

(4) Economic and noneconomic considerations on whether to buy or make pigment dispersions oneself.

(5) Effects of milling on color development. 100% is obtained in 48 hr on an attritor (untreated pigments). Using a sand mill, best grinds are obtained with surface-treated phthalo blue. Increasing grinding time helps develop the color. With a pebble mill, increasing time does not help. Therefore, the choice is: (a) to use treated pigments on a sand mill; (b) a pebble mill; or (c) an attritor for 24 hr or 48 hr. Ultimate strength is obtained on the attritor.

(6) Strength and hue shifts of carbazole violet. 96-hr pebble mills vs. 48 hr on the attritor under high and low energy incorporation methods.

(7) Pigment vehicle interaction: Phthalo blue "A" vs. "B" dispersed in alkyd and universal tint vehicle; White alkyd semi-gloss, white latex flat, and white alkyd semigloss.

(8) Effects of co-grinding phthalo greens: 100% green "B": 100% green "A": 90% "A" to 10% of "B."

(9) Mutual interference of "universal" tinting colors. Universal phthalo blue and ferrite yellow incorporated into latex semigloss white at low and high energy.

(10) The same point as in (9), using universal hansa yellow and quinacridone red.

(11) Tangible and intangible economic benefits of ready-made dispersions.

(12) Technical advantages of ready-made dispersions: (a) Wider compatibility range with fewer tinting lines; (b) Minimum adverse side effects; (c) Standardization; (d) Optimum rheological properties; and (e) Better color development.

Constituent Society Meetings and Secretaries

BALTIMORE (Third Thursday—Eudowood Gardens, Towson). C. HERBERT PUND, III, Conchemco, Inc., 1401 Severn St., Baltimore, Md. 21230.

BIRMINGHAM (First Thursday—Imperial Hotel). GEORGE H. TENNANT, Carr's Paints Ltd., Alvechurch Rd., Birmingham B31 3PG, England.

CHICAGO (First Monday—meeting sites in various suburban locations). RUDOLPH C. ALBRECHT, Standard T Chemicals, Inc., 10th & Washington Sts., Chicago, Ill. 60616.

C-D-I-C (Second Monday—Sept., Jan., Mar. in Columbus; Oct., Dec., Apr. in Cincinnati; Nov., Feb., May in Dayton). RAY SCHOMAKER, Foy-Johnston, Inc., 1176 Mentor Ave., Cincinnati, Ohio 45212.

CLEVELAND (Third Friday—meeting sites vary). Ms. HELEN SKOWRONSKA, Sherwin-Williams Co., P. O. Box 6027, Cleveland, Ohio 44101.

DALLAS (Thursday following second Tuesday—Vic's Gallery Restaurant). DONALD J. WEBB, Jones-Blair Co., P. O. Box 35286, Dallas, Tex. 75235.

DETROIT (Fourth Tuesday—Rackham Memorial Bldg.). MACKENZIE ENDO, Argo Paint & Chemical Co., 550 S. Edwin, Westland, Mich. 48185.

GOLDEN GATE (Monday before Third Wednesday—varies between Sabella's in San Francisco and His Lordship's Restaurant in Berkeley). KEN G. PROBST, San Jose Regional Vocational Center, 760 Hillsdale Ave., San Jose, Calif. 95123.

HOUSTON (Second Tuesday—Sonny Look's Sir-Loin Inn). GERRY J. GOLDBERG, San Jacinto Paint Co., P. O. Box 14312, Houston, Tex. 77021.

KANSAS CITY (Second Thursday—Fireside Inn). RAY LAWSON, Southwest Grease & Oil Co. (Kansas City), Inc., 1400 S. Harrison, Olathe, Kan. 66061.

LOS ANGELES (Second Wednesday—Home Furnishings Mart). FRED CROAD, Engard Coatings Corp., 15541 Commerce Ln., Huntington Beach, Calif. 92647.

LOUISVILLE (Third Wednesday—Essex House).

MONTREAL (First Wednesday—Bill Wong's Restaurant). J. W. A. MELSBACH, Sico, Inc., 2505 de la Metropole, Longueuil, Que., Canada.

NEW ENGLAND (Third Thursday—Fantasia Restaurant, Cambridge). MARTIN L. DAVIS, Sterling-Clark-Lurton Corp., P. O. Box J, Malden, Mass. 02148.

NEW YORK (Second Tuesday—varies between New York and New Jersey locations). GEORGE J. DIPPOLD, Whittaker, Clark & Daniels, Inc., 1000 Coolidge St., South Plainfield, N. J. 07080.

NORTHWESTERN (Tuesday after first Monday—Jax Cafe). JAMES E. FANSLOW, Farwell, Ozmun, Kirk & Co., 1200 Mendelssohn Ave. N., Golden Valley, Minn. 55427.

PACIFIC NORTHWEST (Portland Section—Tuesday following second Wednesday; Seattle Section—the day after Portland; British Columbia Section—the day after Seattle). WILLIAM SHACKELFORD, Gaco-Western, Inc., P. O. Box 88698, Seattle, Wash. 98188.

PHILADELPHIA (Second Thursday—Williamson's Restaurant, Presidential Apartments). WAYNE N. WOOD, Allentown Paint Mfg. Co., P. O. Box 597, Allentown, Pa. 18105.

PIEDMONT (Third Wednesday—Howard Johnson's, Greensboro, N. C.). JAMES A. MARTZ, The Lilly Co., P. O. Box 1821, High Point, N. C. 27261.

PITTSBURGH (First Monday—Skibo Hall, Carnegie-Mellon University Campus). GASPER CAJKA, Chase Chemical Corp., 3527 Smallman St., Pittsburgh, Pa. 15201.

ROCKY MOUNTAIN (Monday prior to second Wednesday—Gasthaus Ridgeview, Wheatridge, Colo.).

ST. LOUIS (Third Tuesday—Salad Bowl Restaurant). BERNARD M. BRILL, P. D. George Co., 5200 N. Second St., St. Louis, Mo. 63147.

SOUTHERN (Gulf Coast Section—Second Tuesday; Central Florida Section—Thursday after third Monday; Atlanta Section—Third Thursday). A ROY NEAL, Superior Lacquer Co., P. O. Box 849, Toccoa, Ga. 30577.

TORONTO (Second Monday—Town and Country Restaurant). PAUL D. F. COOPER, Chemetron of Canada Ltd., 137 Horner Ave., Toronto M82 4Y1, Ont., Canada.

WESTERN NEW YORK (Second Tuesday—Buffalo Trap and Field Club, Cheektowaga, N. Y.). PAUL R. GUEVIN, JR., Hughson Chemical Co., 2000 W. Grandview Blvd., Erie, Pa. 16512.

Q. Does one get graying on the attritor if one uses steel balls?

A. In the work done, it is not necessary to use steel balls.

Q. How does the use of press cake compare to the use of dispersions?

A. Press cake will very often give optimum properties since the pigment is present in ultimate unagglomerated paint.

WILLIAM SINGER, *Secretary*

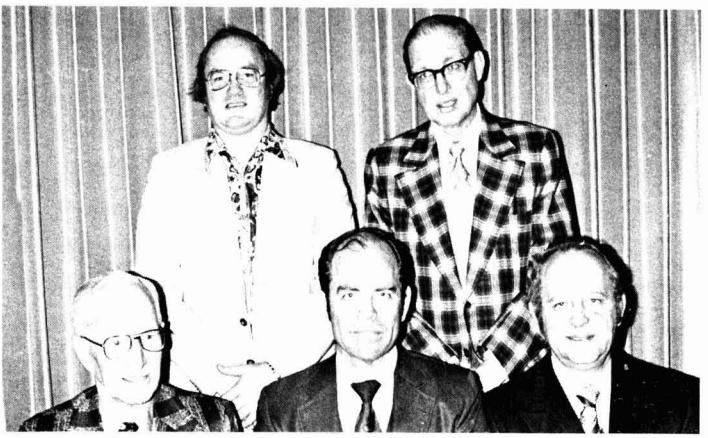
Northwestern November 4

Doug Kesatie was appointed Parliamentarian.

Glenn Wellman, of Welco Chemical Co., spoke on "ELIMINATION OF CLEANING SOLVENTS AND WASTE POLLUTION BY THE USE OF CAUSTIC SPRAY TANK CLEANING SYSTEMS."

The presentation covered the mechanized cleaning of paint tanks and other coating-processing equipment using high-pressure spray and water-soluble cleaning and stripping compounds. The advantages of this method are the elimination of large volumes of cleaning solvents, elimination of sewage disposal problems, and lower cleaning costs.

JAMES FANSLOW, *Secretary*



Officers of the Rocky Mountain Society for Coatings Technology for 1975-76. Seated (left to right): Council Representative — Edmund Peterson, of Peterson Paint Co.; President — J. D. Mullen, of J. D. Mullen Co.; and Vice-President — Edward G. Trousil, of Kohler-McWhirter Paint Co. Standing: Treasurer — James E. Peterson, of Peterson Paint Co.; and Secretary — John S. Baker, of Johns-Manville Corp.

Rocky Mountain November 10

Wayne B. Wright, of Nalco Chemical Co., spoke on "FOAM IN COATINGS — ITS PREVENTION AND DESTRUCTION."

He began his presentation, which included slides and a motion picture, with a description of the importance of antifoams. He stated that antifoams at a level of 0.1-2% of formulations can make the difference between the success or failure of a coating.

He then discussed the importance of the Gibbs Function for surface free energy. Through equations and narrative, he illustrated the principle that the free energy must become more positive or less negative for foam to be stable.

Mr. Wright proceeded to describe the Marangoni Effect wherein a liquid area of lower suface tension goes to areas of higher surface tension. He also discussed viscosity effects and the gelatinous layer which forms on standing.

A defoamer was defined as a surface-active agent that will prevent foam development and/or destabilize foam which has formed. The components of defoamers were listed as active compounds, spreading agents, and carriers. Carriers tie the system together and lower the cost.

The entering and spreading coefficients were discussed and treated mathematically. In order for defoaming to occur, both must be greater than zero. It was also explained that spherical bubbles were more, and polyhedral ones less, stable.

Mr. Wright mentioned the importance of pH conditions and stated that most antifoams perform best under basic conditions.

JOHN S. BAKER, *Secretary*

Technical Articles in Other Publications

DOUBLE LIAISON — CHIMIE DES PEINTURES (in French)

Published by: Les Presses Continentales, Rue du Cherche-Midi, F-75006, Paris, France

Vol. 22 No. 241 September 1975

Poison, R., and Toussaint, A.—"Polymer Absorption Measurements on Solid Substrates by Means of Labelled Molecules. Pt. I;" 389-395.
Mertens, R., and Lerberghe, van K.—"Influence of Baking Temperature and Time on Some Mechanical Properties of an Epoxy-Alkyd Based Varnish;" 397-406.
Layec, R.—"About Drying and U-V. Pt. I;" 407-415.

DEUTSCHE FARBEN-ZEITSCHRIFT (in German)

Published by: Wissenschaftliche Verlagsgesellschaft MBH, 7000 Stuttgart 1, Postfach 40, Germany

Vol. 29 No. 11 November 1975

Weigel, K.—"Weather Resistant Airgalvanik Powder Coatings;" 474-478.

FARBE und LACK (in German)

Published by: Curt R. Vincentz Verlag, 3 Hannover, Postfach 6247, Shiffgraben 43, Germany

Vol. 81 No. 11 November 1975

Hauser, P., and Honigmann, B.—"Optimizing Colouristic Properties of Organic Pigments with the Kubelka-Munk and Mie Theories;" 1005-1011.
Weissmann, G.—"Esters of Resin Acids from Indonesian Colophony;" 1012-1014.
Gall, L.—"Testing Errors and Significance and Tolerance Limits in Quality Control;" 1015-1023.
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Vol. 45 No. 8 October 1975

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Galjaard, D.—"Properties of Powder Coatings on Various Metal Surfaces with Different Pretreatments;" 325-326.
Sakamoto, S.—"Painting in Ship-Yards in Japan;" 327-330.

Elections

C-D-I-C

Active

FISHER, C. EDWARD — Moran Div., Carboline Co., Xenia, Ohio.
JOHNSON, KENNETH G. — Moran Div., Carboline Co., Xenia.
NIEMEYER, ALFRED C. — Moran Div., Carboline Co., Xenia.
ROBINSON, GLENN N. — Commercial Solvents Corp., Terre Haute, Ind.
WREN, HENRY K. — Perfection Paint & Color Co., Indianapolis, Ind.

Associate

KARAU, RAIPH E., SR. — Central Can Co., Chicago, Ill.
KELLY, MICHAEL C. — Aluminum Co. of America, Cincinnati, Ohio.
MCFARLAND, JAMES E. — Abbott Labs., Stow, Ohio.

CHICAGO

Active

BAKANEC, KENNETH M. — Midland Div., Dexter Corp., Waukegan, Ill.
BECKER, FRED, JR. — Rust-Oleum Corp., Evanston, Ill.
BRANDT, KENNETH E. — Valspar Corp., Rockford, Ill.
BUDZIEN, BRIAN L. — Midland Div., Dexter Corp., Waukegan.
CZICZO, RAYMOND J. —Illinois Bronze Paint Co., Lake Zurich, Ill.
GEORGAS, NICK T. — Whittaker Coatings Corp., Chicago, Ill.
JEWELL, DAVID G. — Midland Div., Dexter Corp., Waukegan.
KRAJEWSKI, JOHN J. — DeSoto, Inc., Des Plaines, Ill.
MCCARTHY, EDWARD A. — Midland Division, Dexter Corp., Waukegan.
MOHAMMAD, SYED PEER — United Coatings, Inc., Chicago.
MOIT, DAN D. — Sherwin-Williams Co., Chicago.
MORRILL, GARRETH W. — Midland Div., Dexter Corp., Waukegan.
OESTREICH, KARL L. — Rust-Oleum Corp., Evanston.
OLSON, STEVEN A. — Valspar Corp., Rockford, Ill.
PACKER, EUGENE S. — DeSoto, Inc., Des Plaines.
PETTY, JOHN L. — Sherwin-Williams Co., Chicago.
POMERANTZ, HERBERT V. — Celanese Coating & Specialties Co., Bridgeview, Ill.
RICHARDS, RONALD L. — Continental Can Co., Chicago.
SIRENO, ROBERT C. — Enterprise Chemical Coatings, Chicago.
STEVENSON, JAMES D. — Rust-Oleum Corp., Evanston.
VOLIVA, BENJAMIN H. — R. R. Donnelley and Sons Co., Chicago.
VYLASEK, STEPHAN S. — Midland Div., Dexter Corp., Waukegan.
WALKER, CARL W. — DeSoto, Inc., Des Plaines.
WEREKENTHIEN, CHARLES C. — Ashland Chemical Co./IC&S Div., Willow Springs, Ill.
WHITFORD, JOSEPH C. — General Paint and Chemical Co., Chicago.
WILLIARD, JAMES M. — Superior Graphite Co., Chicago.

Associate

BYKERK, LARRY D. — Chemetron Pigments, Chicago.
EGGERS, WARREN J. — Mineral Pigments Corp., Aurora, Ill.
MAPES, LESTER R. — Paul Uhlich & Co., Hastings, N.Y.
MCGINNESS, GEORGE T. — Cargill, Inc., Carpentersville, Ill.
PIGROM, HERBERT A., JR. — Rohm and Haas Co., Niles, Ill.
STILLS, JAMES W. R. — Chemetron Pigments, Chicago.
WINANDY, GEORGE J. — Chemetron Pigments, Chicago.

DALLAS

Active

MARETT, RAY O. — Western Specialty Coatings, Dallas, Tex.
RICHARDSON, JOHN A. — Roach Paint Co., Inc., Dallas.

DETROIT

Active

CRAIGIE, ROBERT E., JR. — Craigie Paint Co., Detroit, Mich.
DHAKE, BHIMASHANKAR G. — M & T Chemicals, Inc., Southfield, Mich.
KERNSTOCK, JOHN M. — Dow Chemical, U.S.A., Midland, Mich.
METEVIER, DAVID F. — Grow Chemical Co., Detroit.
THORNTON, DAVID C. — Dow Chemical U.S.A., Midland.

Associate

FINN, RICHARD J. — Shell Chemical Co., Southfield.

GOLDEN GATE

Associate

LEWIS, JAMES H. — Celanese Resin Systems Div., Union City, Calif.

LOS ANGELES

Active

ADDINGTON, W. A. — Universal Paint Co., Industry, Calif.
ARCEBAL, BILL G. — PPG Industries, Inc., Torrance, Calif.
BACKLEY, DONALD A. — Synres Chemical Corp., Anaheim, Calif.
BIGGAR, CALVIN H. — Electrofilm Inc., N. Hollywood, Calif.
COLEGROVE, GEORGE T. — Kelco Co., San Diego, Calif.
DE JESUS, ARTURO G. — PPG Industries, Inc., Torrance.
HANLON, KENNETH C. — M.C.A. Disco Vision, Torrance.
JOHNSON, H. KENT — Synres Chemical Corp., Anaheim.
LINDROTH, THOMAS A. — Kelco Co., San Diego, Calif.
LOWE, ALEX E. — PFI, Inc., Santa Fe Springs, Calif.
PERALTA, DIONISIO L. — Reliance Universal, Inc., Brea, Calif.
SIMPSON, JAMES U. — Synres Chemical Corp., Anaheim.

Associate

FAULL, J. M. — Calsol, Inc., Pomona, Calif.
GALBRAITH, IAN T. — Wilson & George Meyer & Co., Los Angeles.
KING, JOSEPH E. — Reichhold Chemicals Co., Azusa, Calif.
LESTER, STEPHEN L. — E. T. Horn Co., La Mirada, Calif.
MCCORMICK, WILLIAM K. — Tenneco Chemicals, Inc., Monterey Park, Calif.
MCLELLAN, MICHAEL F. — Dow Chemical Co., Pasadena, Calif.
MOREHOUSE, DALE H. — DHM Co., Glendale, Calif.
QUINTY, JOSEPH E. — Emery Industries, Inc., Downey, Calif.
ROMERO, FRANK L. — Synres Chemical Corp., Anaheim.
ROSS, LAURA D. — Allo Chemical Co., Ontario, Calif.
RUPPRECHT, HENRY J. — Titanium Pigment Div., N L Industries, Inc., Los Angeles.

LOUISVILLE

Active

BRATCHER, DANIEL N. — Guardsman Chemical Coatings, Louisville, Ky.
DE MARCUS, FRANK E. — Progress Paint Co., Louisville.
LANNING, NICK J. — Reliance Universal, Inc., Louisville.

Associate

FISH, RICHARD A. — Ciba-Geigy Corp., Prospect, Ky.

MONTREAL

Associate

BELANGER, MICHEL — Union Carbide Canada Ltd., Pointe Aux Trembles, Que.
CONDIE, MALCOLM A. — The Sherwin-Williams Co. of Canada Ltd., Montreal, Que.
FEGAN, GERALD F. — The Sherwin-Williams Co. of Canada Ltd., Montreal, Que.
ROBBERS, GERARD S. — Schnectady Chemicals Canada Ltd., Scarborough, Ont.
TAYLOR, PETER F. — Ciba-Geigy Canada Ltd., Pointe-Claire, Que.

NEW ENGLAND

Active

BROWN, ROBERT A. — Trancoa Chemical Corp., Reading, Mass.
FARIA, EARL T. — Spectrum Coatings Labs., Inc., Providence, R.I.
GAYNES, NORMAN I. — Burgess-Fobes Paint, Portland, Me.
SARTORELLI, VINCENT J. — Danvers Chemical Industries Inc., Danvers, Mass.

Associate

AVENI, JOSEPH F. — Engelhard Minerals & Chemicals Corp., Belmont, Mass.
SCHMIDT, EDWIN H., JR. — E. I. DuPont de Nemours & Co., Inc., New York.
SULLIVAN, GILBERT C., JR. — Independent Packaging Inc., South Boston, Mass.

NEW YORK

Active

CLEMENTS, WILLIAM R. — Pfizer, Inc., Easton, Pa.
FONCELLINO, MICHAEL D. — Atlas Paint & Varnish Co. Irvington, N.J.
MILLER, DUANE H. — Technical Coatings Co., Inc., Newark, N.J.
RICHON, GEORGE L. — John C. Dolph Co., Monmouth Junction, N.J.

NORTHWESTERN

Active

GRAVEN, PATRICK J. — Valspar Corp., Minneapolis, Minn.
MEHRER, ROGER L. — Valspar Corp., Minneapolis.

PHILADELPHIA

Active

CAPRIOTTI, DANTE R. — McCloskey Varnish Co., Philadelphia, Pa.
COOK, WAYNE W. — M. A. Bruder & Sons, Inc., Philadelphia.

Associate

FAULKNER, STALEY — Hercules Incorporated, Wilmington, Del.

Retired

KUNSTMANN, CHARLES W. — Whiting, N.J.

PIEDMONT

Associate

MANSALILLO, M. C. — Celanese Chemical Coatings Co., Charlotte, N.C.

PITTSBURGH

Active

BAKER, R. DALE — Mobay Chemical Co., Pittsburgh, Pa.
JOHNSON, JESSE R. — Johnson Paint Co., McKees Rocks, Pa.
SCHOFF, CLIFFORD K. — PPG Industries, Inc., Allison Park, Pa.

Associate

HEALEY, JOSEPH S. — Eastman Chemical Products, Inc., Kingsport, Tenn.
HOY, KENNETH — Koppers Co., Inc., Pittsburgh, Pa.
MARKS, JOHN A., JR. — Neville Chemical Co., Pittsburgh.
STEEN, JAMES B. — Durr Marketing Associates, Pittsburgh.
THOMPSON, ROBERT J. — Mobay Chemical Corp., Pittsburgh.

ROCKY MOUNTAIN

Active

HENSHAW, LAUREN S. — USDI, Bureau of Reclamation — Engineering & Res. Ctr., Denver, Colo.
MOULTON, HARRY D. — Dow Chemical Co., Denver.

ST. LOUIS

Active

FITZGERALD, THOMAS W., JR. — Vane-Calvert Paint Co., St. Louis, Mo.
LANSON, ELLIOTT W. — Poly-Chem Resin Corp., St. Louis.
LANSON, HERMAN J. — Poly-Chem Resin Corp., St. Louis.
WALSH, JOHN C. — Brod-Dugan Paint Co., St. Louis.

Associate

CALDWELL, DOUG — Ivan T. Bauman Co., St. Louis.
HECK, PETER H. — Lanson Chemical Co., E. St. Louis.
HUGHES, DANIEL W. — Mooney Chemicals, Inc., Cleveland, Ohio.

WESTERN NEW YORK

Active

MARTIN, PAUL F. — Spencer Kellogg Div. of Textron, Inc., Buffalo, N.Y.

AFFILIATE

MEKRUNGRUANGKAEI, ARERAT — Thailand Paints & Chemical Co. Ltd., Bangkok, Thailand.
TAPANAPAHA, CHINGCHAI — Thailand Paints & Chemical Co. Ltd., Bangkok.

Education

Societies Report on Their Educational Programs

The following reports have been submitted by the respective Societies and are published here as part of the Federation's ongoing efforts to keep members informed of eductional programs underway or planned, and to stimulate interest in the formulation of new programs at both the local and national level.

Baltimore

One-day seminar will be held February 25 on "An Update on Emerging Technologies." Speakers will cover topics on powder coating, radiation-cured coatings, electrodeposition, and pigment slurry technologies.

Work is underway on the establishment of a technical library for the use of the membership.

Cleveland

A one-day symposium was presented last May on "Protection of Ferrous Metals with Coatings — A State of the Art Review." Topics discussed were coatings from the applicator's viewpoint, in-process pretreatment, and zinc-rich and nontoxic pigments for corrosion resistance.

Close cooperation is maintained with Kent State University in publicizing and promoting courses. A 10-session Saturday morning course on organic coating technology presented at KSU during 1974-75 had 20 students enrolled. Currently, a 9-session Saturday morning course is being presented at KSU on advanced organic coating technology; 34 students are registered, 25 of whom are taking the course for graduate or undergraduate credit.

Slide/tape presentations on "Stormer Viscometer" and "Weight Per Gallon" were produced for Federation's Training Series on Test Methods.

One-day symposium will be held February 20 on "Latex Paints: Principles and Practice" at the Cleveland Engineering and Scientific Center. Basic principles of latex performance and resultant practices in the field of latex coatings will be covered.

In the planning stages are a symposium for September 1976, an intensive course on the business activities of the coatings industry, and cooperative efforts with Kent State on an introductory credit course in organic coatings, to be presented in the fall.

C-D-I-C

Educational Committee sponsors presentation at each Society monthly meeting. Topics covered in the past year were the oil crisis, water-soluble industrial coatings, NIOSH investigation of raw materials for the paint industry, and color selection and development in the auto industry.

Society programming also included a plant tour and a round-table type discussion on "Paint Manufacturing from the Treasurer's Point of View."

Dallas

For the last two seasons, pre-dinner lectures were presented at three monthly meetings. Guest speakers discussed surfactants, latex manufacture, and latex paint manufacturing. The format has proved quite successful, and this year the program has been expanded to five lectures. They are being presented by Dr. Margaret Willoughby, Professor of Chemistry at the University of Texas at Arlington; 33 people are currently attending.

In addition, Society cooperated with University of Texas at Arlington in series of polymer chemistry lectures presented by Dr. Willoughby in the spring of 1975.

Detroit

Efforts are centered on lecture and laboratory courses given at the Polymer Institute of the University of Detroit. These non-credit courses are not part of the university curriculum; so far, they have been financially self-sustaining, with all expenses including the instructors' salaries being covered by the registration fees.

The lecture course (two evenings per week) runs 15 weeks; registration fee is $150. Academic level of the course is geared to the average of the class, which has varied from average technician level to a partial college level. The Federation Series booklets are used as teaching guides, with the instructors lecturing from their own notes.

The laboratory course concept was changed last year and was very successful. The class met once a week for 12 weeks (fee was $75), at either the Polymer Institute or at a supplier company laboratory. Each week featured a demonstration of a modern analytical technique or industrial process. Previously, emphasis was on fundamentals of miscellaneous lab tests; however, most technicians are already familiar with these, but are in need of information on newer techniques.

The Society has also been involved with two courses being taught at the University of Detroit by Dr. Taki Anagnostou, of Chrysler Corp. One is a lecture course on the Chemistry of Protective Coatings, the other is a laboratory course on the Synthesis of Organic Coating Polymers. Both are accredited courses that carry graduate and undergraduate credit. Through this program, and other science courses presented at the University of Detroit, a student may obtain a master's degree in polymer science with up to half the required 30 hours of credits in coatings-oriented subjects — the culmination of an effort begun six years ago to establish a center for coatings studies which would be available to industry employed individuals seeking advanced degrees.

Meanwhile, in conjunction with the Detroit Paint and Coatings Association, the Society is engaged in an effort to raise funds from local industry to establish a modern coatings laboratory and resin cooking facilities at the Polymer Institute. Sufficient funds have already been raised to install a substanial amount of equipment.

A continuation of the above efforts will continue in the coming year to expand on the solid educational base that has been established. Plans are also underway for a technical seminar in 1977.

Golden Gate

A lecture course was initiated on "Protective and Decorative Coatings Technology." Instructor was William Sawyer, of Dymo Industries, Inc. Classes were held at the John Adams

Adult Center in San Francisco one night a week (three hours), and were directed toward upgrading knowledge of those in the industry, as well as those interested in basic coatings technology.

Two other night courses were presented: one on Elementary Coatings Technology I, and another on Fundamentals of Color Matching.

The coatings technology program for high school students at the San Jose Regional Vocational Center was continued, although enrollment was small.

Two slide/tape presentations ("Stormer Viscometer with Stroboscope" and "Flash Point — TCC") were produced for the Federation's Training Series on Test Methods.

This year Elementary Coatings Technology I is being repeated. Classes are held at the John Adams Center (one night a week for 2½ hours), under direction of William Sawyer. The lecture course is for one semester. Fundamentals of Color Matching is also being repeated. Ken Probst is the instructor for this practical laboratory course which meets once a week for 2½ hours at the San Jose Regional Vocational Center. Students are color matching architectural, industrial, and automotive colors; currently, 28 are enrolled.

The high school technician training course at San Jose is being maintained, with other industrial chemistry interested students.

The Society, meanwhile, continues its search for a library to house a section on coatings literature.

Houston

Committee sponsored annual symposium in January 1975 on "New Innovations in Coatings," and presented a seminar at the University of Houston on "The Optimization of the Composition of Latex Emulsions."

A slide/tape presentation on "Sward Hardness Rocker" was completed for the Federation's Training Series on Test Methods.

The 1976 annual symposium will be held January 13. Topic will be 'New Coatings Concepts," and will focus on use of water-borne acrylics for factory prefinishing of interior and exterior board coatings, color measurement in iron oxide pigment industry, and water and solvent evaporation from latex and latex paint films.

Review of Federation Unit booklets Nos. 10, 11, 12, and 21 are underway for suggestions as to possible updating and/or revision.

Los Angeles

Financial support continues for North Dakota State University, Los Angeles Trade Technical College, and the Coatings Section of the City of Commerce Public Library.

A total of $8100 was awarded to 11 students under the Scholarship Program.

Six students were graduated the past year from the two-year course sponsored at LA Trade Tech, and were awarded certificates by the Society.

A slide/tape presentation on "Specular Gloss" was completed for the Federation Training Series.

Louisville

Final course in University of Louisville's Coatings Technology Series, "Formulation Principles," was offered during the spring semester. A certificate was awarded to Larry Lewis of Celanese Coatings in recognition of his successful completion of the four-course series; he is the first to complete the newly established series.

Slide/tape presentation on "Non-Volatile Content of Resin Solution" was completed for Federation's Training Series.

A series of monthly evening lectures was initiated at the Speed Scientific School of the University of Louisville on the chemistry and technology of coatings; there is no registration fee for the non-credit series.

A follow-up lecture series is planned for the spring, also to be held at the University of Louisville. And a resumption of the four-course coatings technology series is again planned at the University of Louisville.

Meanwhile, work continues on a slide/tape production of "Preparation of a Test Panel Using an Industrial Coating."

Montreal

Successful organic coatings technology course was held last year.

Associate educational program on coatings with local community college will begin in January 1976, in the French language. Subsequent additional educational courses will be planned jointly, and will depend on local industry and provincial government support.

New England

An evening course on "Coatings Science and Technology" is being sponsored in conjunction with the Lowell Technological Institute. Classes for the two-semester evening course meet weekly for 2½ hours. The course is offered either for professional enrichment or for credit toward an undergraduate or graduate degree — three credits per semester.

New York

A 30-week course on "Fundamentals of Organic Coatings Technology, Parts I and II" was presented at the New York Community College, the third consecutive year this course has been held.

A 14-week training course for laboratory technicians was held at Newark College of Engineering in the spring of 1975.

In conjunction with the New York Community College, application was submitted to the federal government for a grant for a Vocational Educational Project to train personnel and/or factory technicians in the coatings industry. If granted, this program would begin sometime in 1976.

An advanced course on "New Developments in Coatings Technology" is being held at New York Community College. It consists of 12 guest lectures by prominent coatings people.

A repeat of "Fundamentals of Organic Coatings Technology" is planned for the fall of 1976.

Also planned for the Bicentennial Year are sponsorship of a seminar on "Governmental Ecology, Safety, and Health Regulations and How We Can Meet Them," presentation of a course on "Chemical Specialties for the Construction Industry," and preparation and circulation of a questionnaire to determine the needs of the coatings industry in regard to education and training of professional people and technicians.

Northwestern

Consideration is being given to reviving special meetings which were held prior to monthly meeting during 1972-74, at which speakers presented discussions based on the Federation Unit series.

Joint symposium is being sponsored with North Dakota State University in March which will feature papers by NDSU students.

Pacific Northwest

British Columbia Section recently completed presentation of advanced coatings course, and currently has a

basic course being presented at B. C. Institute. Presentation on "Porosity of Paint Films" was completed for Federation's slide/tape Training Series.

Seattle Section is preparing a short course on basic coatings technology for possible presentation at Pacific Lutheran University, and is also considering a course for technicians at a local trade school.. In final stages of productions is a slide/tape presentation on "Fineness of Grind" for Federation's Training Series.

Portland Section is exploring possibilities of establishing a coatings course at a community college. Production of "Acid Number" was completed for Federation's slide/tape Training Series.

Philadelphia

New course on modern coatings technology being sponsored at Drexel University. Instructor is Joseph W. Prane, consultant. The course is designed to explore coatings technology and to introduce students to new materials, methods, processes, and applications. Classes are held two hours per week for 15 weeks.

Continuation of the course at Drexel is planned for 1976-77, as well as a short course for semi-trained technical personnel.

Under discussion is feasibility of presenting an "update of technology" series of lectures prior to monthly meetings.

Piedmont

Polymer and coatings course which had been offered at High Point College was dropped due to lack of student interest.

Negotiations were conducted with Guilford Technical Institute, in Jamestown, N. C., to initiate a coatings-related course. As a result, a basic course will begin in January 1976. Initial response to announcement of the course brought applications from 50 people, necessitating the scheduling of two evening classes weekly to accommodate them.

Initially, this will be a non-credit course. However, GTI has expressed interest in offering a two-year polymer coatings course that would lead to a certificate in applied science.

Rocky Mountain

Special Environmental Symposium, featured presentations on EPA, fire prevention, and control of air and water emissions.

Two slide/tape presentations were completed for the Federation Training Series: "Sag Resistance" and "Leveling."

Southern

Emphasis in recent years has been on supporting the coatings program at University of Southern Mississippi. Through the 1974-75 school year, a total of $12,858 had been contributed to the USM scholarship fund; donations of an additional $4679 are planned for the 1975-76 school year.

In addition to the academic program, the Society jointly sponsored with USM a symposium on "Water-Borne and High Solids Coatings"" in February in New Orleans. A second symposium is slated for February 1976. Papers presented will be bound and offered for sale.

One-day symposium is under consideration for presentation prior to Southern Society Annual Meeting. Topic for initial effort would be "Design and Experiment," and would include laboratory procedures and related material.

Toronto

Comprehensive coatings program is still being pursued in cooperation with George Brown College.

The program includes a Basic Coatings Technology Course (25 evening sessions, three hours each), an Advanced Resin Technology course (two 15-week modules), given in both morning and evening sessions, which is intended for experienced technicians and professionals, and a Coatings Technician course (a part-time program given in late afternoon and evening sessions), offered as technical training in conjunction with work experience.

Golden Gate Society Slates Basic Coatings Course

Continuation of "Elementary Coatings Technology I," night course presented at the John Adams Center in San Francisco, has been announced by the Golden Gate Society, which co-sponsors the course with the local Coatings Association.

Classes will meet each Thursday evening, beginning February 5, under the direction of William Sawyer, Supervising Chemist, Dymo Industries, Inc., Berkeley, California.

Topics to be discussed include all types of pigments, color systems, elementary paint formulating and paint calculations. There are no prerequisites, and new students are welcome.

A Certificate of Completion will be awarded to all those compiling 70% attendance and completing the examination for this course.

Cleveland Society Schedules Symposium for February 20

The Cleveland Society for Coatings Technology will present its 19th symposium, titled "Latex Paints: Principles and Practice," on February 20 at the Cleveland Engineering and Scientific Center.

The all-day symposium will cover the basic principles of latex performance and resultant practices in the field of latex coatings.

The morning session will be chaired by Jean S. Mehaffey, of The Sherwin-Williams Co., and will feature the following topics:

"Chemistry and Technology of Latex Polymers in Coatings" — Stephen T. Bowell, of Glidden-Durkee Div., SCM Corp.

"Latex Rheology" — Dr. Irvin M. Krieger, of Case Western Reserve University.

"Particle Size Analysis by Disc Centrifuge Photosedimentometry" — Dr. Theodore Provder and Richard M. Holsworth, of Glidden-Durkee Div., SCM Corp.

"Role Played by Water-Soluble Polymers in Paint Performance — Chemical Modeling Studies and Examination of Techniques" — Dr. J. Edward Glass, of Union Carbide Corp.

The afternoon session will be chaired by Sidney Lauren, of the Coatings Research Group, Inc., and will feature the following:

"Rate of Drying of Latex Films" — Dr. John W. Vanderhoff, of Lehigh University.

"Practical Problems in Water-Borne Coatings Systems" — Werner J. Blank, of American Cyanamid Co.

"Interaction of Water and Hydrophilic Polymers" — Dr. Anne Hiltner, of Case Western Reserve University.

"Guidelines for Exposure Testing of Exterior Paints" — Dr. Lewis R. Freimiller, of Rohm and Haas Co.

The entire program will be concluded by a summation by the panel of speakers, which will be conducted by Dr. John C. Weaver, retired from The Sherwin-Williams Co., and former Technical Editor of JPT.

For additional information, contact Carl J. Knauss, Symposium Chairman, Chemistry Dept., Kent State University, Kent, Ohio 44242.

Committee Activities

ENVIRONMENTAL CONTROL

Subchapter to N. J. Air Pollution Control Regs Promulgated

On December 18, Commissioner David J. Bardin promulgated Subchapter 16 of New Jersey Air Pollution Control Regulations, entitled "Control and Prohibition of Air Pollution by Volatile Organic Substances," to become effective on March 1, 1976.

The provisions of Subchapter 16 affect the coatings industry in the following:

(1) Exterior storage tanks of solvents commonly used in the paint industry, having a capacity over 2000 gallons, shall be painted and maintained white.

(2) The exterior of each of these tanks shall be painted white by March 1, 1977.

(3) Transfer of solvents into a tank having a capacity greater than 2000 gallons must be done through a submerged pipe.

The regulation as promulgated does not include any rules relating to source operations (industrial coatings operations). Regulations for source operations are still under consideration, and Section 4 of the Subchapter is being reserved for possible future promulgation.

The text of the sections applicable to the coatings industry are as follows:

"7:27—16.2 Storage of Volatile Organic Substances

(a) 1. No person shall cause, suffer, allow or permit the storage of a volatile organic substance having a vapor pressure of 0.02 pounds per square inch absolute or greater at standard conditions in any tank having a capacity greater than 2000 gallons exposed to the rays of the sun unless the external surface of the tank is painted and maintained white.

2. Any tank subject to the provisions of subsection (a) 1 of this Section whose external surface is non-white shall be painted white within one year of the effective date of subsection (a) 1 of this Section.

3. The provisions of subsection (a) 1 of this Section shall not apply to words and logograms applied to the external surface of a storage tank for purposes of identification provided such symbols do not cover more than 20% of the external surface area of the tank's sides and top or more than 200 square feet, whichever is less.

7:27—16.3 Transfer Operations

(a) No person shall transfer any volatile organic substance having a vapor pressure of 0.02 pounds per square inch absolute or greater at standard conditions into any receiving vessel of greater than 2000 gallon capacity unless such transfer is made

1. through a submerged fill pipe or by other means approved by the Departments as being equally or more effective in preventing the emission of organic substances into the outdoor atmosphere during transfer. . .

(b) No person shall transfer into or transport in a mobile vessel of greater than 2000 gallon capacity any volatile organic substance having a vapor pressure of 0.02 pounds per square inch absolute or greater at standard conditions unless such vessel is vapor-tight except for pressure relief during transfer and under emergency conditions."

Gabriel Malkin

Water-Borne and High Solids Coatings Symposium to be Held Feb. 9-11 in New Orleans

The chemistry, formulation, and marketing of water-borne and high-solids coatings will be discussed in a symposium to be held February 9-11 at the International Hotel, New Orleans, La. The three-day event will be co-sponsored by the Southern Society for Coatings Technology and the University of Southern Mississippi's Department of Polymer Science.

The following papers will be presented:

"High-Solids Low Energy Curable Coatings" — Thomas J. Miranda, of Whirlpool Corp.

"Solventless Silicone Resins for Coatings Applications" — Gary LeGrow, of Dow Corning Co.

"Viscosity of Oligomeric Solutions for High-Solids Coatings" — J. Erickson, of Glidden-Durkee Div. of SCM Corp.

"Environmental Protection" — David Patrick, of U. S. Environmental Protection Agency.

"Experimental Epoxy Curing Agent XD-7080 and Its Use in Novel Water-Borne Acrylic-Epoxy Coatings" — Greg Young, of Dow Chemical Co.

"Aqueous and High-Solids Acrylic Industrial Coatings" — Donald Lunde, of Rohm and Haas Co.

"Microbiology of Water-Borne Coatings" — Milton Goll, of Cosan Chemical Co.

"Air Drying Water-Soluble Polymers" — Mike Lerman, of Amoco Chemicals Corp.

"Water-Borne Coating Systems" — John Trebellas, of Celanese Chemical Co.

"New Thoughts in Water-Borne Coatings Systems" — George Wilhelm, of Ashland Chemical Co.

"Foaming Phenomena in Water-Borne Coatings" — Paul Berger, of Witco Chemical Co.

"High-Solids Urethane Coatings" — Dale Baker, of Mobay Chemical Co.

"High-Solids Epoxy Coatings" — David Taft, R. Roesler, and R. Lovald, of General Mills Chemicals, Inc.

"Behavior of Rutile Titanium Dioxide Pigments in Water-Borne Industrial Coatings" — Ted Kolski, of E. I. du Pont de Nemours & Co., Inc.

"Low Energy Cure and Air Dry Water-Thinned Industrial Finishes" — Al Heitkamp, of Cargill, Inc.

"'Core-Shell' Morphology in Emulsion Polymerization" — John W. Vanderhoff, of Lehigh University.

"Review of Emulsion Technology" — Don Owen and George Bufkin, of University of Southern Mississippi.

People

William C. Fine, formerly Executive Vice-President, has been elected President and Chief Operating Officer of the Sherwin-Williams Co. He succeeds **Walter O. Spencer**, who has been named Chairman of the Board and will continue to serve as Chief Executive Officer. Mr. Fine joined Sherwin-Williams in 1941, and has been a Director since 1967. Mr. Spencer had been President of the firm since 1969, and Chief Executive Officer since 1971. He joined Sherwin-Williams in 1949, and was elected to the Board in 1968, at which time he was also named Executive Vice-President. **William P. Inman** has been elected Vice-President and Assistant Treasurer, and he will also continue to serve as Secretary. **James E. Wallace** has been elected Vice-President — Administration, and he will also serve as Chief Accounting Officer. **Thomas R. Miklich** has been re-elected Assistant Secretary and assigned the duties of Corporate Director of Taxes.

Eastman Kodak Co. has announced a series of personnel changes in three of its subsidiary companies — Eastman Chemical Products, Inc. (ECPI), Eastman Chemical International Ltd. (ECIL), and Eastman Chemical International Co. (ECIC).

John H. Sanders has been elected President of all three of the subsidiaries, succeeding **Dr. James E. Magoffin,** who retired on January 1 after 34 years of service with Eastman. Mr. Sanders most recently served as a Senior Vice-President of the three organizations. He joined Eastman as a Chemical Engineer in 1946, later serving in the following positions: Sales Manager for the Chemicals Div., Export Sales Manager, Director of Sales for the Fibers Div., and Director of Marketing for the Floorcovering Div. He became a Vice-President of ECPI in 1972, and was named Senior Vice-President in 1973. **Decatur B. Campbell, Jr.** has been elected a Senior Vice-President of ECPI, a Vice-President of ECIL, and a Vice-President of ECIC. He had been a Vice-President of ECPI, with responsibility for the Industrial Chemicals, Coatings Chemicals, and DPI divisions. **R. H. Cannon, Jr.** has been elected a Vice-President of ECPI, succeeding Mr. Campbell. Other appointments announced for ECPI are: **R. Clay Dubberly,** Director of Marketing for the Industrial Chemicals Div.; **Norman M. Atkins,** Director of Marketing for the Coatings Chemicals Div.; **Dr. John C. Gilmer,** Director of Marketing for the New Products Div.; and **Jack T. Mahaffey**, Assistant Director of Marketing for the New Products Div.

W. C. Fine

W. O. Spencer

J. H. Sanders

D. Campbell, Jr.

Donald F. Stauffer has been appointed Manager of Marketing Services for the Organics Department of Hercules Incorporated. He will be responsible for department marketing services, including product safety and technical literature. He joined the firm in 1948 as a Sales Representative, and most recently served as International Product Director for the Resins Division of the Organics Dept.

Gunther F. Florstedt has been named General Manager, International Operations for M&T Chemicals Inc. Working out of the firm's headquarters in Greenwich, Conn., he will direct the operations of 11 subsidiaries and affiliates in Europe, South Africa, Mexico, Japan, Australia, and New Zealand.

Joseph Caldera has been named to the sales force of Woolsey Marine Industries, Inc. He will be responsible for sales and service in the New York metropolitan area and selected markets nationally. He joined the firm eight years ago, and has served as Vice-President, Sales for Woolsey's sister company, Kimberly Chemicals, Inc., and as a Divisional Sales Manager for the parent corporation, Sapolin Paints Inc.

John Geyer, Jr. has been appointed Vice-President in charge of production for Geyer Filler Machine Co. Since joining the firm in 1966, he has served in the Production Dept.

Edward M. Wanderman has resigned as General Sales Manager for Troy Chemical Corp. and its divisions, Guard Chemical Co. and Wood Ridge Chemical Co. He had served with Troy for the past 13 years, directing its worldwide marketing activities. He began his coatings career 40 years ago, and he plans to remain active in the industry.

Benjamin Moore & Co. has announced the appointments of: **Edmund K. Chaffey** as Assistant to the Vice-President, Marketing; **Howard E. Lester** as Corporation Sales Administrator; and **Robert P. Lomas** as Corporation Transportation Manager. Mr. Chaffey began his career in 1948 with Thompson and Co., a chemical coatings manufacturer later acquired by Benjamin Moore. He most recently served as Benjamin Moore's Corporation Sales Administrator. Mr. Lester joined the firm in 1950, and most recently served as Eastern Division Metropolitan Sales Manager. Mr. Lomas, who joined the company in 1952, most recently served as a District Sales Manager.

Edwin Albright has been promoted to Branch Manager of Thompson-Hayward Chemical Co.'s distribution center in Tampa, Fla. His responsibilities will include the administration and sales of the firm's line of industrial chemicals and textile maintenance supplies.

Deborah A. Armstrong has been appointed a District Sales Manager by Bennett Industries, Peotone, Ill. She will be responsible for a sales territory consisting of the state of Wisconsin and a portion of Illinois. At the same time, **Richard C. Henderson** was named a Sales Representative in the Midwest region, and will service Ohio and Michigan.

Daniel B. Robertson has been promoted to the new position of Business Director, Industrial Colorants for Inmont Corp.'s Color Systems Group. In this position, he will be responsible for all manufacturing, research, and marketing operations related to industrial colorants, widely marketed under the Inmont "RBH" label. He joined the firm in 1966, and most recently served as Director of Marketing for the RBH product line.

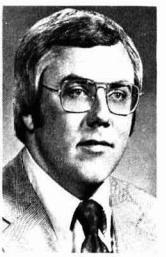
Thomas C. Keeling III has been named Market Manager of Coil Coatings for the Coatings & Resins Division of PPG Industries, Inc. Mr. Keeling, formerly West Coast Sales Manager for industrial finishes, will be responsible for product development, marketing, and national sales of PPG's coil coatings. He will be based at the firm's Delaware, Ohio facility. He joined PPG in 1967 as a Sales Representative, and later served as a Commercial Analyst in the Planning and Development Dept. of the Coatings & Resins Div., and as Manager of Market Development for radiation coatings.

The Pigments Division of American Cyanamid Co. has announced the following personnel appointments: **David M. McGarrity** as Manager of Market Development for color pigments; **Gordon M. Ruhf** as Manager of the Mid-Central Sales Region; **S. George Manolakis** as Sales Manager of the Titanium Dioxide Dept.; and **George W. Goodell** as Assistant Sales Manager for Unitane® titanium dioxide. Mr. McGarrity joined the Pigments Division in 1968, most recently serving as a Sales Representative for accounts in New York and New Jersey. Mr. Ruhf joined the firm in 1965, most recently serving as Manager of Market Development in the Color Pigments Dept. Mr. Manolakis, who most recently served as Manager of Manufacturing for the Color Pigments Dept., joined the company in 1957. Mr. Goodell has been associated with American Cyanamid for 43 years, and most recently served as Manager of the Mid-Central Sales Region.

David E. George has been appointed Manager, Field Sales for the Clay Division of J. M. Huber Corp. He will be responsible for direct sales of clay to all types of industries in the U.S. and Canada. He

D. B. Robertson

T. C. Keeling III



D. M. McGarrity

D. E. George

joined the Huber Clay Division 13 years ago, and most recently served as Regional Sales Manager.

Ashland Chemical Co. has announced the reorganization of its senior management structure. **Anton Dorfmueller, Jr.** has become Group Vice-President for the Foundry Products and International divisions; **Harvey T. Skaggs** has been named Group Vice-President for the Industrial Chemicals & Solvents, Petrochemicals, and Carbon Black & Synthetic Rubber divisions; and **James H. Davis** is now Group Vice-President with responsibility for the direction of the Resins & Plastics, Chemical Products, and Fabricated Products divisions, as well as the company's interest in Melamine Chemicals, Inc. **J. A. Brothers** has been named Administrative Vice-President for Technical Affairs. **Scotty B. Patrick** has been promoted to Vice-President and General Manager of the Resins & Plastics Div., and also is responsible for operation of the company's maleic anhydride plant, now being built in Wayne County, W. Va. **Don L. Coticchia** has been named Vice-President and General Manager of the Industrial Chemicals & Solvents Div.

Dr. Herbert L. Fenburr, Chief Engineer of Hanna Chemical Coatings Co., and a Past-President of the Federation of Societies for Coatings Technology (1967-68), retired January 1 after more than 38 years of service with Hanna. He will continue to be active in the industry as a Consultant, and will maintain an office at 2700 E. Main St., Columbus, Ohio. A Past-President and Council Representative of the C-D-I-C Society, he is also a Past-President of the Paint Research Institute, and currently serves as a Trustee of PRI. He is also a Past-Chairman of the Federation's Program and Meetings Committees, and recently concluded 11 consecutive years of service on the Federation Board of Directors.

Edward P. Daly has been elected a Vice-President of The O'Brien Corp., and named General Manager of Operations for the company's Fuller-O'Brien Div. He succeeds **Jerome J. Crowley,** who was recently elected President of O'Brien.

Gerald H. Bullock has been promoted to the position of Industry Manager—Coatings for Glidden Pigments & Color Group, SCM Corp. He succeeds **Jerry Goldstein,** who was recently appointed Sales Manager. Mr. Bullock had been a Sales Representative for Glidden since 1961, serving the southwestern region. **David Tygett** has been named to succeed Mr. Bullock as Sales Representative for the southwestern region.

Dr. Louis R. LeBras has been appointed Technical Director of Industrial Products for PPG Industries' Coatings & Resins Div., succeeding **Dr. Stewart W. Gloyer,** who has retired. Dr. LeBras joined the firm in 1955, and most recently was on assignment to Peintures Corona, PPG's French subsidiary, as Assistant to the President.

Obituary

George F. Simak, Product Manager of Paint Additives for the Ferro Chemical Div., Ferro Corp., died recently. He had served with the firm for more than 30 years.

Gary A. Leet, 29, a Chemist for Lilly Industrial Coatings, Inc., died November 15. He was a member of the C-D-I-C Society for Coatings Technology.

Literature

Styrene-Acrylic Latex

An eight-page booklet is now available describing a new styrene-acrylic latex developed primarily for maintenance paints and metal product finishes. According to the manufacturer, UCAR Vehicle 4341 may be used to formulate water-borne coatings that have the ability to control flash rusting when applied to clean steel substrates. The booklet details procedures for preparing coatings, and gives characteristics of typical formulations based on the new vehicle. Information is also provided on flash rusting, salt, and humidity tests, as well as aging, mechanical, and freeze-thaw stability tests. Performance characteristics of both primers and topcoats are tabulated, and storage and handling procedures are discussed. For a copy of Booklet F-44846, write Union Carbide Corp., Coatings Materials, Dept. JLS, 270 Park Ave., New York, N. Y. 10017.

New Polymer Resistant To Enzymatic Degradation

A new 16-page technical bulletin describes the unique capability for a high degree of resistance to enzymatic degradation available in latex paints formulated with Natrosol® B. Natrosol, a nonionic water-soluble polymer derived from cellulose, is said to be a leading thickener in water-based paints, which not only imparts mechanical and chemical stability, but also plays a significant role in controlling rheology before, during, and after application. According to the manufacturer, Natrosol B was developed as the result of a research program conducted to improve the resistance of Natrosol to enzymatic attack. For a copy of the new bulletin, write Coatings & Specialty Products Dept., Hercules Incorporated, 910 Market St., Wilmington, Del. 19899.

100% Solids Acrylic Resin

A new 100% solids acrylic resin, called Experimental Resin 22D-54, is now commercially available. The new resin has been developed for use as a pigment-dispersing vehicle in industrial coatings, including powder coatings, employed in the finishing of automobiles, appliances, pipe and metal furniture, UV-cured systems, and printing inks for flexographic and gravure printing. According to the manufacturer, Resin 22D-54 is soluble in exempt solvents, particularly aliphatic hydrocarbons that have solubility parameters in the 8.5 to 11.5 range. It is said to have excellent pigment-dispersing properties, even with difficult-to-disperse pigments, and has the ability to produce high-gloss finishes. The new resin is compatible with a wide range of film-formers, such as alkyds, acrylics, cellulosics, polyesters, vinyls, and chlorinated rubber, and it can be used as a universal dispersant for all solvent-based colorant lines. For additional information, write Coatings Dept., Rohm and Haas Co., Independence Mall West, Philadelphia, Pa. 19105.

Surface-Active Agents

A new brochure is now available describing fluorochemical surface-active agents which are the result of the recent discovery of a new fluorochemical intermediate. Monflor® surfactants are said to be a unique development in that they contain the first highly branched perfluoro group available. They are entirely new agents, and because they do differ from conventional surfactants, they present many new applications. Monflor surfactants are thermally and chemically very stable, and can improve wetting, emulsifying, spreading, and leveling properties. In paints, Monflor reportedly combats pigment flotation problems, makes overcoating easy to achieve, and improves leveling and wetting in emulsion paints. The new brochure describes typical uses of Monflor, as well as its characteristics, physical properties, and other technical details. For a copy of "Monflor Fluorochemical Surface-Active Agents," write Specialty Chemicals Div., ICI United States Inc., Wilmington, Del. 19897.

NFPA Materials

The National Fire Protection Association has announced the availability of two 35-mm slide presentations on fighting fires in storage tanks and in tank vehicles containing flammable liquids, and three pamphlets regarding NFPA standards for the safe operation of industrial heating equipment. "Horizontal Tanks" (No. SL-16) features 40 slides on fire problems involving flammable and combustible liquids in horizontal tanks and loading racks. Priced at $35, the training package includes a lesson plan outline, suggestions for classroom demonstrations, and topics for group discussion. "Tank Vehicle Fire Fighting" features 34 slides showing how to extinguish tank vehicle fires and how to minimize the dangers accompanying such incidents. It is priced at $25. Three standards relating to the safe operation of industrial heating equipment are available in individual pamphlet editions: NFPA 86A, "Standard for Ovens and Furnaces – Design, Location, and Equipment" ($2.50); NFPA 86B, "Standard for Industrial Furnaces – Design, Location, and Equipment" ($3.75); and NFPA 86C, "Standard for Industrial Furnaces Using a Special Processing Atmosphere" ($4). Write NFPA, Publication Sales Dept., 470 Atlantic Ave., Boston, Mass. 02210.

Color Control System

A new color formulation and control system has been introduced which combines modern measurement and computing with the latest in color-matching software. The Match-Mate® System features, for the first time, the ability to accurately formulate and control such difficult processes as metallic paints, fluorescent colorants, and transparent and translucent plastics. The system is said to be applicable to all industries where the color of the product is important and controllable. It incorporates mini-computers plus the advantages of dual disc storage for programs and data files. The system is available directly interfaced to Diano/Hardy Recording Spectrophotometers, the chromaSCAN® Filter Spectrophotometer, and most other color spectrophotometers. Software includes automatic calibration and operation of the spectrophotometer, automatic combinatorial colorant selection, colorant formulation, reformulations, production corrections, cost information, and quality control computations for both incoming raw materials and outgoing finished products. The Match-Mate is said to feature a software package designed to provide the user with maximum flexibility. Write Diano Corp., Optical Systems Div., 75 Forbes Blvd., Mansfield, Mass. 02048.

Xanthan Gum

The second edition of a comprehensive, 36-page technical publication on the structure, basic properties, and applications of xanthan gum is now being offered. The entire publication has been revised from the original edition issued in 1972. A chapter on the interaction between xanthan gum and galactomannans has been added to chapters on general properties, toxicology and regulatory status, food and industrial applications, rheology, analytical methods, and preparation of xanthan gum solutions. Complete references are also listed. Illustrated with 40 charts and diagrams, the booklet is designed to acquaint research and development chemists with the ability of xanthan gum to solve problems in aqueous systems involving suspensions, thickening, emulsion stabilization, and rheology modifications. Xanthan gum, a high molecular weight natural carbohydrate, or polysaccharide, is manufactured as Keltrol, the food-grade product, and Kelzan, for industrial uses. Write Kelco Co., 8355 Aero Drive, San Diego, Calif. 92123.

Flowmeter/Metering Pump System

A combination flowmeter/metering pump which installs directly in-line is now available. Integration of flowmeter, solid state pump, and chemical injection point makes the system a complete proportional treatment package. The pump receives digital signals from the meter contactor; pump stroking frequency is proportional to flow rate, and precisely accurate chemical treatment takes place right at the point of control. This unique design concept is said to be ideal for waste treatment, pH control, chlorination, and fluoridation. Write Stranco, 567 Hilltop, Bradley, Ill. 60915.

Acrylic Emulsion

A new flash-rust-resistant acrylic emulsion is now available which is designed for use in latex paints to protect metal surfaces. Coatings made with the new Rhoplex® MV-9 acrylic emulsion are said to be harder and to have better solvent and chemical resistance than coatings which incorporate Rhoplex MV-1 emulsions. Other advantages of paints based on the new emulsion are: fast dry and recoat time, exterior durability, good reactive-pigment stability, elimination of solvents, excellent adhesion to repainted surfaces, and ease of clean-up. Rhoplex MV-9 can be employed: as a vehicle for self-priming paint systems for metal; for solvent-resistant topcoats; and in durable glossy finishes. Write Coatings Dept., Rohm and Haas Co., Independence Mall West, Philadelphia, Pa. 19105.

Lightfast Yellow Pigment

A new lightfast yellow pigment, Luna LF YT-8371, has been introduced for use in a broad range of coating applications, both industrial and trade sales. An improvement over conventional Luna and Hansa type yellow pigments, this new, stable, organic yellow is said to offer a significant cost advantage in systems where lightfastness is a necessary component of coatings performance. Currently available only as a dry powder, YT-8371 offers high tinting strength. Samples and technical information are available from Fronse Smith, Pigments Div., Chemetron Corp., 491 Columbia Ave., Holland, Mich. 42493.

Viscometer and Timer

Literature is now available describing the Laray Viscometer, TMI 92-15, which is said to be an inexpensive instrument designed for precise and rapid determination of viscosity of all types of liquid and viscous materials, particularly printing inks, paints, varnishes, and similar products. In principle an extrusion instrument, this viscometer measures the relative velocity of two essentially parallel surfaces separated by a thin film of material being examined when a constant force is applied to a movable member. Also described is the Laray Timer, TMI 87-7, which is an optional unit designed for use in conjunction with the viscometer to provide an electronic time measurement and readout. Its operation is reported to be simple, and it yields maximum precision without continuous operator attention. The timer may be added as an accessory to most old-style Laray Viscometers. Write Testing Machines Inc., 400 Bayview Ave., Amityville, N.Y. 11701.

Antifoams

Literature is now available describing gem-like paint and coatings antifoams for all phases and types of coatings. Advantages of Foamkill defoamers are discussed for adhesives, inks, resins, vehicles, and paper coatings, especially the new water-reducibles. Along with this brochure will be provided an eight-page bulletin titled "Who is and Why Crucible for Foam Control," which outlines recommended defoamers and specific advantages for all coatings areas. This bulletin is a summary of a 30-page report, "Twelve-Year Technical Service Summary," which is also available upon request. Write Crucible Chemical Co., P.O. Box 6786, Donaldson Center, Greenville, S. C. 29606.

Epoxy Accelerators And Leveling Agents

A new series of epoxy accelerators and hardening agents, as well as a new series of leveling agents, are now available. Actiron® NX epoxy accelerators and hardening agents are dimethylamino-methylphenol compounds and their salts, which are said to increase formulation flexibility in many types of epoxy systems. Acrylron® MFP acrylic copolymers are leveling agents for nonaqueous coatings, both liquid and powder systems. For additional information, write Synthron, Inc., Dept. ND, 44 East Ave., Pawtucket, R.I. 02860.

Fluorescent Colorants

A technical bulletin now available describes a new series of fluorescent colorants which are said to offer the plastics formulator a broad compatibility in most plastics, brilliantly clean fluorescence, and easy mixing over a wide temperature range. This combination of advantages, coupled with good low-temperature dispersion properties, suggests that the new series be used as fluorescent colorants for plastic safety equipment, toys, sheeting for graphic arts, display packaging, and vacuum-formed products. Colors available include red, pink, orange, orange-red, and green. The bulletin also provides information on colorant specifications, colorant level, color incorporation, process temperature, and other data. Write Coatings & Specialty Products Dept., Hercules Incorporated, 910 Market St., Wilmington, Del. 19899.

Fatty Acids and Methyl Esters

A new 12-page brochure describes a line of fatty acids in the C_8-C_{14} range. The brochure covers the special features, current specifications, and typical compositions of each of the line's short-chain and coconut fatty acids, plus current specifications and typical characteristics of methyl esters of many of these acids. For a copy of "Emery Short-Chain Acids and Methyl Esters," write Fatty & Dibasic Acids Group, Emery Industries, Inc., 1300 Carew Tower, Cincinnati, Ohio 45202.

Letters to the Editor

Author Responds to Comments On CPVC and Latex Paints

TO THE EDITOR:

Mr. Boatwright makes several comments in his letter which appears in the October JPT [*See page 29—Ed.*] that I wish to address.

I certainly am not questioning the existence of his supporting evidence. I simply state that I have not seen it. Consequently, I cannot respond to his evidence which supports his case. Therefore, I suggested in my August letter that he not be hasty in discarding a well documented concept that has survived years of testing by many coatings scientists.

In Mr. Boatwright's letter, third paragraph, he discusses the CPVC concept. I suggest that it appears as if he has misinterpreted the literature. The concept is based on several observations of paint film properties as a function of pigment volume content. As such, there are no restrictions on the state of polymer in paint compositions. Furthermore, I take exception to the statement "The pigment particles are never completely encapsulated by the resin, since the resin exists as discrete particles itself". This statement holds for the liquid paint but does not generally hold for dry paint films cast from properly formulated latex paints. I can demonstrate by electron microscopy that pigment in latex paint films is encapsulated in much the same manner as pigments in solvent base paint films. Indirect evidence is given in the paper by H. A. Wildt (JPT, *41*, No. 539, 654 (1969)) and the paper by J. W. Herr and R. A. Withers (JPT, *42*, No. 551, 711 (1970)). Furthermore, the review article by Vanderhoff (*Paint and Varnish Production*, December 1970, Page 25) presents evidence which suggests that latex particles do not always remain discrete subsequent to film formulation. Here then, is strong evidence suggesting that pigment particles are encapsulated and that latex particles do not necessarily remain discrete. Next, Mr. Boatwright suggests that all latex paint films are permeable. This is, of course, true. However, the same holds for solution cast paints films. Therefore, I guess that he means to imply that latex paint films are more permeable. To this, I reply that all latex binders are not created equal. I can show examples of latex films which are less permeable than solution cast films. Also, I wonder if Mr. Boatwright would believe it possible that some of the very impermeable grades of poly (vinylidenechloride) are prepared from emulsion polymers.

Next, Mr. Boatwright questions the wisdom of applying the CPVC concept to latex paint product development. Again I must repeat that I am without any direct evidence to respond to. However, I can assure Mr. Boatwright that there are those who find the concept useful and leave it to Mr. Boatwright to explain why some find it not useful.

Finally, Mr. Boatwright comments on variability between test methods used for determination of CPVC. I refer Mr. Boatwright to the article by Pierce and Holsworth [*Official* DIGEST, 37, No. 482, 272 (1965)]. Four different test methods are discussed and agreement is quite acceptable.

In summary, my letter makes the number by Mr. Boatwright and myself even. Of course, we could go on ad nauseum. However, I invite Mr. Boatwright to forward to me a copy of his manuscript. I would be most happy to review it and offer my comments in private.

ALEXANDER RAMIG, JR.
Brunswick, Ohio

[*For additional commentary on the positions of Dr. Ramig and Mr. Boatwright, see December JPT, pages 36 and 37.*]

Book Review

APPLIED POLYMER SCIENCE

Edited by J. Kenneth Craver
And Roy W. Tess
Division of Organic Coatings
And Plastics Chemistry
American Chemical Society
Washington, D. C.
1975 (921 pp, 6½" x 9¾", $25.00)

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

This book is a compilation of papers from a special Symposium on Chemistry and Technology, presented at the 50th Anniversary Meeting of the ACS Division of Organic Coatings and Plastics Chemistry in Atlantic City, N. J., September 8-13, 1974.

The volume covers a number of review papers, including the history of the Division, a survey on the half century of creative coating science, a review of 75 years of polymer science, as well as multi-component polymer systems, structural properties, transport phenomenon, polymer characterization, spectroscopic methods, microscopy, physical testing mechanisms of polymerization through emulsion and free radical, as well as cationic polymerization. There is also a section on color science pigment technology.

Other sections deal with methods on the application of coatings, physical chemistry of film formation, electrodeposition, coating curing methods and the chemistry and technology of rubbers and plastics, as well as the economics of the coatings and plastics industry, and adhesives and printing inks. Also included are discussions on the chemistry and technology of drying oils, alkyds, latex polymers, plasticizers, solvents, bituminous coatings, amino resins, and urethane coatings.

The papers published are by recognized authorities in each subject area and are well written.

The book should be a valued addition to the chemist's library and is highly recommended, as it puts into perspective the historical and recent progress in the plastics, coatings and printing ink industry, and is an excellent record of the contributions made by chemists through the Organic Coatings and Plastics Chemistry section of the ACS. An added virtue is a good index.

Copies may be ordered through R. H. Lalk, Dow Chemical Co. USA, 2040 Dow Center, Midland, Mich. 48640. Enclose check payable to ACS Div. of Organic Coatings and Plastics Chemistry. (Add $7.50 additional for air shipment to Europe; $9.50 additional for air shipment to Asia.)

Calendar of Coming Events

FEDERATION MEETINGS

(May 14)—Spring Council Meeting. Sheraton Four Season Hotel, Toronto, Canada.

(Oct. 27-29)—54th Annual Meeting and 41st Paint Industries' Show. Sheraton Park Hotel, Washington, D. C. (FSCT, Suite 830, 1315 Walnut St., Philadelphia, Pa. 19107).

SPECIAL SOCIETY MEETINGS

(Feb. 20)—Cleveland Society Symposium on "Latex Paints—Principles and Practice." Cleveland Engineering Society Auditorium, Cleveland, Ohio. (Carl J. Knaus, Dept. of Chemistry, Kent State University, Kent, Ohio 44242).

(Feb. 25)—Baltimore Society Seminar on "An Update on Emerging Technologies." (Robert M. Hopkins, Glidden-Durkee Div., SCM Corp., 3901 Hawkins Point Rd., Baltimore, Md. 21226).

(Mar. 9-10)—Chicago Society. SYMCO '76. Sheraton Oakbrook Hotel, Oakbrook, Ill. "Coatings — Past, Present, and Future — 1776-2176." (Miss Delores Thomas, Chicago Paint and Coatings Association, 33 N. Dearborn St., Chicago, Ill. 60602).

(Mar. 17-19)—Southern Society Annual Meeting. Fairmont Hotel, Atlanta, Ga. (Bobby D. Moore, Interstate Paint Corp., P. O. Box 1038, Brunswick, Ga. 31520).

(Apr. 8-10)—Dallas and Houston Societies. Southwestern Paint Convention, Dallas, Texas. (Donald D. Wilson, Dal-Worth Paint Mfg. Co., P. O. Box 173, Mesquite, Texas 75149).

(Apr. 26)—Philadelphia Society Seminar on "Thermoplastic and Thermosetting Anti-Corrosive Water-Reducible Coatings." Cities Service Research Center, Cranbury, N. J. (Donald Romanofsky, Harad Paint Co., 5525 Grays Ave., Philadelphia, Pa. 19143).

(May 6-8)—Pacific Northwest Society. Spring Symposium. Vancouver, B. C., Canada. (Deryk Pawsey, Rohm and Haas Co., 2205 Fir St. #201, Vancouver 9, B. C., Canada).

OTHER ORGANIZATIONS

(Feb. 2-Feb. 13)—Paint Short Courses at University of Missouri — Rolla. For Paint Inspectors and Quality Controllers — Feb. 2-6; Advanced Chemical Coatings Workshop — Feb. 9-13. (Norma Fleming, Extension Div., University of Missouri — Rolla, 501 W. 11th St., Rolla, Mo. 65401).

(Feb. 8-11)—Symposium on "Water Borne and High Solids Coatings" co-sponsored by Southern Society and University of Southern Mississippi. International Hotel, New Orleans, La. (Dr. Gary C. Wildman, Dept. of Polymer Science, University of Southern Mississippi, Hattiesburg, Miss. 39401).

(Mar. 1-5)—World Conference on Oilseed and Vegetable Oil Processing Technology. RAI Centre, Amsterdam, Netherlands. (American Oil Chemists' Society, 508 S. Sixth St., Champaign, Ill. 61820).

(Mar. 2-4)—Plastics Institute of America course on "Polymers for Decorative and Durable Coatings." University of Louisville, Louisville, Ky. (PIA, Castle Point Station, Hoboken, N. J. 07030).

(Mar. 8-9)—Regional Technical Conference on "Plastics Coatings for Electrical Applications." Hotel Toronto, Toronto, Canada. Co-sponsored by Ontario Section and Electrical and Electronics Div. of Society of Plastics Engineers. (Walter Ambriki, Honeywell Ltd., 740 Ellesmere Rd., Toronto, Ontario MIP 2V9, Canada).

(Mar. 10-12)—Annual Marine Coatings Conference. Sea Pines Plantation, Hilton Head Island, S. C. (John Montgomery, National Paint and Coatings Association, 1500 Rhode Island Ave. N. W., Washington, D. C. 20005).

(Mar. 16-17)—Association for Finishing Processes of SME Seminar on "Modern Finishing Processes for Flat Line Board Products." Thunderbird Jantzen Beach Motor Inn, Portland, Ore. (Flat Line Seminar, AFP/SME, 20501 Ford Road, P. O. Box 930, Dearborn, Mich. 48128).

(Mar. 22-24)—Fifth Annual Gas Chromatography Short Course. Occidental College, Los Angeles, Calif. (Dr. R. L. Amey, Department of Chemistry, Occidental College, Los Angeles, Calif. 90041).

(Mar. 22-26)—National Association of Corrosion Engineers. Materials Performance and Corrosion Show. Hyatt-Regency Hotel, Houston. (NACE, P. O. Box 1499, Houston, Tex. 77001).

(Mar. 23-26)—OCCA — XXVIII. Oil and Colour Chemists' Association Annual Technical Exhibition. Alexandra Palace, London, England. (Director and Secretary, OCCA, Priory House, 967 Harrow Road, Wembley, Middlesex HAO 2SF, England).

(Mar. 29-31)—Fourth North American Conference on Powder Coating. Inn-on-the-Park, Toronto, Canada. (M. J. Palmer, **Canadian Paint and Finishing**, 481 University Ave., Toronto, Ontario, Canada M5W 1A7).

(Apr. 4-9)—100th Anniversary Meeting of American Chemical Society. New York, N. Y. (ACS, 1155 16th St. N. W., Washington, D. C. 20036).

(Apr. 5-9)—Scanning Electron Microscopy Symposium and Workshops. Four Seasons Sheraton Hotel, Toronto, Canada. (Dr. Om Johari, IIT Research Institute, 10 West 35th St., Chicago, Ill. 60616).

(Apr. 12-13)—Washington Paint Technical Group's 16th Annual Symposium. Marriott Twin Bridges Hotel. (Mildred A. Post, c/o U. S. Dept. of Commerce, National Bureau of Standards, Washington, D. C., 20234).

(Apr. 7-8)—Air Pollution Control Association's 4th Annual Government Affairs Seminar. International Inn, Washington, D. C. (APCA, 4400 Fifth Ave., Pittsburgh, Pa. 15213).

(Apr. 26-29)—Society of Plastics Engineers 34th Annual Technical Conference. Chalfonte-Haddon Hall, Atlantic City, N. J. (Eugene E. Wilson, Society of Plastics Engineers, 656 W. Putnam Ave., Greenwich, Conn. 06830).

(May 2-5)—Color Marketing Group. Copley Plaza, Boston, Mass. (Color Marketing Group, 1000 Vermont Ave., N.W., Washington, D.C. 20005).

(May 2-7)—XIIIth FATIPEC Congress. Cannes, France.

(May 6-7)—International Symposium on Flammability and Fire Retardants. Four Seasons Sheraton Hotel, Toronto, Canada. (V. M. Bhatnagar, 209 Dover Rd., Cornwall, Ontario, Canada K6J 1T7).

(May 9-12)—National Coil Coaters Association Annual Meeting. Marco Island Hotel, Marco Island, Fla. (NCCA, 1900 Arch St., Philadelphia, Pa. 19103).

(May 10-13)—International Meeting on Radiation Processing. Cerromar Beach Hotel, Dorado Beach, Puerto Rico.

(June 6-10)—The Chemical Institute of Canada's 59th Canadian Chemical Conference. London, Ontario, Canada. (Don Emmerson, CIC, Suite 906, 151 Slater St., Ottawa, Ont. K1P 5H3, Canada).

(June 8-11)—International "Conference on Colour Studies," sponsored by Hungarian Naitonal Color Committee. Budapest, Hungary. (Dr. Fred W. Billmeyer, Jr., Dept. of Chemistry, Rensselaer Polytechnic Institute, Troy, N. Y. 12181).

(June 27-30)—American Society for Testing and Materials Annual Meeting. Chicago, Ill. (ASTM, 1916 Race St., Philadelphia, Pa. 19103).

(June 27-July 1)—Air Pollution Control Association's 69th Annual Conference & Exhibition. Memorial Coliseum, Portland, Ore. (APCA, 4400 Fifth Ave., Pittsburgh, Pa. 15213).

(July 19-24)—International Conference in Organic Coatings Technology. Athens, Greece. (Dr. Angelos Patsis, State University College, CSB 209, New Paltz, N.Y. 12561).

(Aug. 30-Sept. 4)—Thirteenth World Congress for Fat Research. Marseilles, France. (A. Uzzan, International Society for Fat Research, c/o Laboratoire National des Matieres Grasses, Universite de Provence, Place Victor-Hugo, F 13331 Marseilles Cedex 3, France).

Coming Events
(Continued)

(Sept. 14-16)—"Powder Coating 4." Cincinnati, Ohio. (Society of Manufacturing Engineers, 20501 Ford Rd., Dearborn, Mich. 48128).

(Sept. 29-Oct. 1)—Convention of Scandinavian Federation of Paint Technologists. Congress Hotel Kalastajatorppa, Helsinki, Finland. (Federation of Paint and Varnish Technologists, Boks 828—2100, Copenhagen, Denmark).

(Sept. 30-Oct. 1)—National Coil Coaters Association Fall Technical Meeting. Hyatt Regency O'Hare, Chicago, Ill. (NCCA, 1900 Arch St., Philadelphia, Pa. 19103).

(Oct. 7-9)—South African Section of OCCA and Council for Scientific and Industrial Research Symposium on "Nonconventional Coatings." Port Elizabeth, South Africa. (Council for Scientific and Industrial Research, Symposium Secretariat — S.125, P. O. Box 395, Pretoria 0001, South Africa).

(Oct. 17-19)—"Adhesion of Polymers at Interfaces." Symposium jointly sponsored by Protective Coatings Div. and Macromolecular Science Div. of Chemical Institute of Canada. Montreal, Canada. (Professor H. P. Schreiber, Dept. of Chemical Engineering, Ecole Polytechnique, Montreal, Quebec, Canada H3C 3A7).

(Oct. 25-27)—National Paint and Coatings Association Annual Meeting. Washington Hilton Hotel. (Alan N. Darrow, NPCA, 1500 Rhode Island Ave., N.W., Washington, D. C. 20005).

(Oct. 26-29)—World Congress Interfinish. International Union for Electrodeposition and Surface Finishing. RAI Congress Centre, Amsterdam, Netherlands (Organisatie Bureau Amsterdam B.V., P. O. Box 7205, Europaplein 14, Amsterdam, Netherlands).

(Nov. 2-4)—ASTM Symposium on Adhesion Measurement of Thin Films, Thick Films, and Bulk Coatings. ASTM headquarters, Philadelphia, Pa. (American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103).

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(July 10-15)—Third Congress of the International Colour Association, "Color 77." Rensselaer Polytechnic Institute, Troy, N.Y. (Dr. Fred W. Billmeyer, Jr., Dept. of Chemistry, Rensselaer Polytechnic Institute, Troy, N.Y. 12181).

(Sept. 25-28)—First International Convention of Oil & Colour Chemists' Association of Australia. Canberra, Australia. (Oil & Colour Chemists' Association of Australia, P. O. Box 93 Punchbowl, 2196, Australia).

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