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JOURNAL OF COATINGS TECHNOLOGY

Volume 48

Number 618

JULY 1976



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and Non-Metal Substrates**

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Volume 48 Number 618

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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) 507-5070. Second class postage paid at Philadelphia, Pa. and at additional mailing offices. Subscriptions U. S. and Canada — 1 \$16, 2 years, \$29; 3 years, \$40. Other countries — 1 year, \$22; 2 years, \$40; 3 years, \$56.

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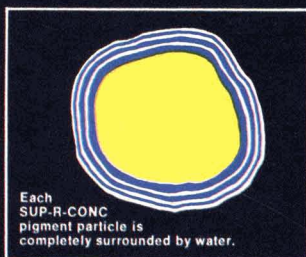
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The annual dues for members of the Federation of Societies for Coatings Technology, \$10.00, includes a subscription to this publication. Membership in the Federation is attained through prior affiliation with and payment of dues to one of its 25 Constituent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

	U. S. and Canada	Other Countries
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.

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A Guide for Authors is published in each January issue.

The JOURNAL OF COATINGS TECHNOLOGY is available on microfilm from University Microfilms, a Xerox Co., Ann Arbor, Mich. 48106.

The Federation of Societies for Coatings Technology assumes no responsibility for the opinions expressed by authors in this publication.

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Where the Action Is

From the standpoint of membership involvement, Federation committee work is "where it's at." Over the years, the volunteer group efforts that have gone into projects, whether at the national or local level, have been the keystone of Federation activities.

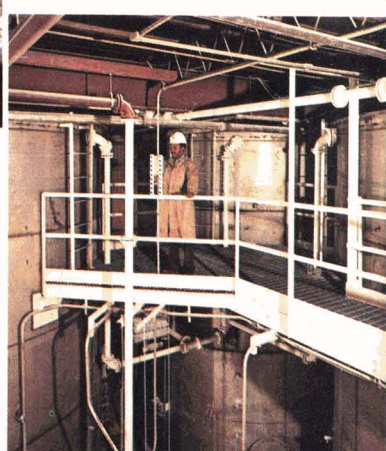
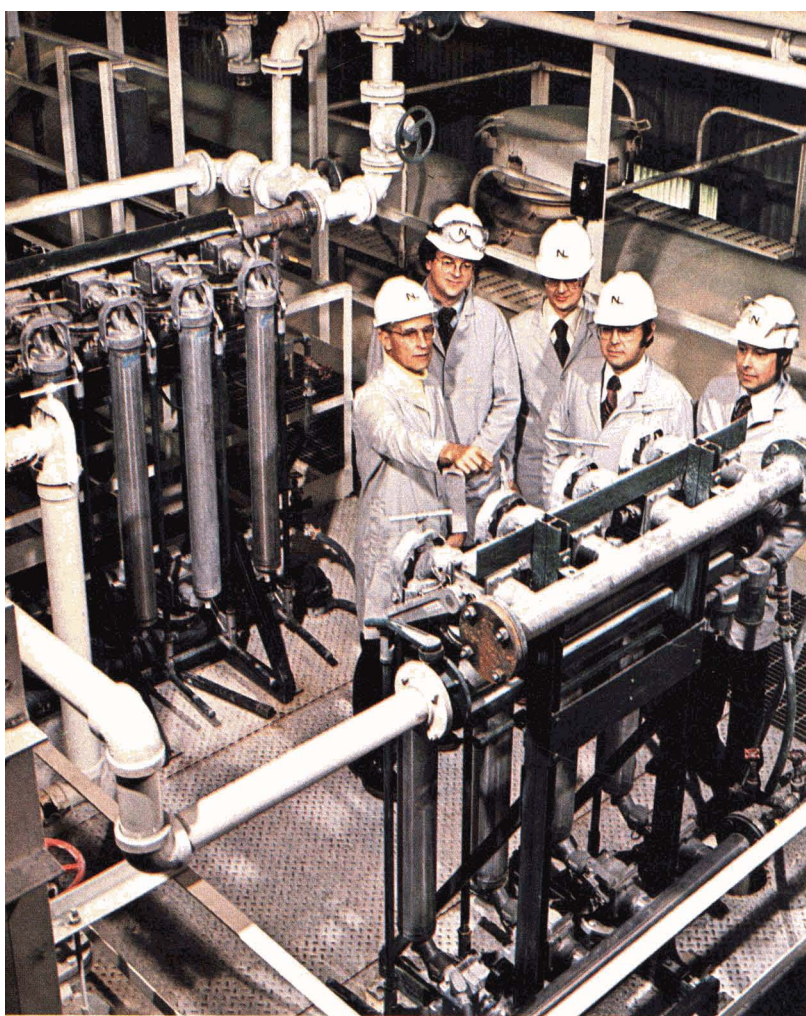
The scope of committee work, the projects underway and planned, and the contributions of a goodly cross-section of the membership are reflected in the committee reports that accompany the review of the Spring Council Meeting in this issue (see pages 21-35).

It's been said that the volunteer work ethic isn't what it used to be and that fewer members are inclined to donate their time and effort. But, on the positive side, we'd point to such contributions as the Definitions Committee's Paint/Coatings Dictionary project (effort of the Philadelphia Society members); audio/visual production of Volume I of the Federation's Training Series on Test Methods (project of the Federation Educational Committee, to which eight Societies contributed 12 presentations); and the update on the Infrared Spectroscopy book (project of the Chicago Society's Technical Committee).

These and other committee efforts are typical of the kind of work that is being done by dedicated Federation members. They devote much of their leisure time in helping to advance knowledge in their industry; in return they enjoy the pleasure of participation in such meaningful efforts with their peers.

If you'd like to be part of this effort, contact the Federation office and let us know your area of interest; we'll put you in touch with the chairman of a committee that fits your expertise. Now is the time when new committees are being formed for the 1976-77 term, and Chairmen, like the Marines, are always looking for a few good men — or women.

Do yourself and the industry a favor and get involved.—TAK



Meet the NL-5...

It's their job to keep you in the know on TiO_2 slurry.

Who are the NL-5? They are NL's five Regional Sales Managers whose job it is to serve your needs for TiO_2 in their geographic areas. They are shown above inspecting the final filter installation at NL's new St. Louis slurry plant. Left to right: Hank Melvin, Western Region; Tom Pettijohn, Central Region; Bob Brickhouse, Lake Central Region; Jack Goldhammer, Southern Region; Dennis Tabisz, Eastern Region.

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Abstracts of Papers in This Issue

ALPHA BACKSCATTERING TECHNIQUE TO ESTABLISH PARAMETERS FOR CURING OLEORESINOUS LACQUERS ON TINPLATE—
V. W. Wilson and M. Peisach

Journal of Coatings Technology, 48, No. 618, 43 (1976)

Alpha particle backscattering has been used to follow the curing of oleoresinous lacquers on tinplate by measuring the carbon to oxygen ratios in the outer layers of the lacquer. The precision of the method has been established and the effects of stoving temperature, duration of stoving, and batch variation have been studied.

REACTIONS OF UV CURABLE RESIN FORMULATIONS AND NEAT MULTIFUNCTIONAL ACRYLICS—I. APPARATUS AND PROCEDURE—
G. L. Collins, D. A. Young, and J. R. Costanza

Journal of Coatings Technology, 48, No. 618, 48 (1976)

Using a leaf shutter, a device was constructed for the controlled exposure of UV curable resins and monomers to ultraviolet radiation on standard laboratory UV curing units. The sample is held between two NaCl flats in the cavity formed by a metal spacer of specified thickness. The course of the photoinitiated polymerization is monitored by changes in the IR spectra.

TWO APPROACHES TO HIGH SOLIDS COATINGS FOR METAL AND NON-METAL SUBSTRATES—
L. Gott

Journal of Coatings Technology, 48, No. 618, 52 (1976)

Neopentyl glycol and trimethylpentanediol were used to synthesize low viscosity polyester resins. These resins were formulated into high solids/melamine or high solids/polyisocyanate enamels which were hot and cold spray applied. Evaluation of the one-component high solids/melamine enamels indicated these coatings have excellent properties for appliance and coil coating applications. The two-component high solids/polyisocyanate enamels were found to cure at low baking temperatures.

CONTINUING STUDY OF NON-MERCURIAL MILDEWICIDES IN ALKYD AND ACRYLIC HOUSE PAINTS—Louisville Society for Coatings Technology

Journal of Coatings Technology, 48, No. 618, 62 (1976)

This study utilized long oil alkyd and acrylic latex house paint systems. The long oil alkyd vehicle system was used because of the recent escalating cost of linseed oil and zinc oxide, rendering that combination uneconomical for house paints. The non-mercurial mildewcides were compared to mercurials and zinc oxide and exposed under various climatic conditions. A cost comparison of the systems under study were made.

Papers to be Published in Future Issues

"Electrodeposition of Thin Primer Coatings On Aluminum" — A. H. Bushey, of Kaiser Aluminum and Chemical Corp.

"Yellowing and Other Film Properties of Linseed-Derived Paints Influenced by Linolenate Content" — H. Rakoff, F. L. Thomas, and L. Gast, of U. S. Department of Agriculture.

"Viscosity of Oligomer Solutions for High Solids

Coatings" — J. R. Erickson, of Glidden-Durkee Div., SCM Corp.

"Microbiological Considerations in the Manufacture of Paints and Latices" — T. B. Young, of ICI United States, Inc.

"Use of Computer Technology in the Coatings Industry" — T. H. Weakley, G. L. Waller, and R. Stahl, of DeSoto, Inc.

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Proof



NJZ tested mildew resistance of zinc oxide alone, leading non-mercurial biocides alone, and various combinations of the two together. Coated test panels were exposed at commercial test fences in Puerto Rico and Florida for nine months. Mildew ratings were determined for test paint over unprotected alkyd primer, test paint over alkyd primer with mildewcide, and test paint over self-primed section of panel. Results proved that panels protected with ZnO + non-mercurial biocide (A) show greatest mildew resistance, panels with zinc oxide alone (B) or biocide alone (C) are less mildew resistant.

in Black & White...

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Annual Meeting Programming Will Feature Three Days of Technical Presentations

Registrants at the Federation's 54th Annual Meeting in Washington, D. C., October 27-29 will be treated to three days of sessions on a variety of topics of interest to coatings industry personnel.

Program Chairman Harry Poth, of Dean & Barry Co., Columbus, Ohio, reports that on opening-day, a panel discussion of legislative activity by industry and government speakers will focus on such issues as pollution control, occupational safety and health, and labeling. The panel presentation will be followed by an open-forum exchange with the audience.

On Thursday, October 28, the Paint Research Institute will present a Mildew Encounter Session, in which a panel of researchers will provide background information on the complexities of the mildew problem, discuss PRI's research efforts in attacking it, and explore possibilities for further work. Following formal speaker presentations, the session will focus on audience participation in a question-and-answer period.

Another Thursday session will feature a presentation by the Federation Manufacturing Committee on "The Hazards and Solutions to Employee Exposure to a Paint Plant's Environment." Speakers will discuss: medical and health aspects of employee exposure to dust, toxic vapor and fumes; analysis of where and how employees are exposed to these hazards; update on current and/or NIOSH testing programs; and methods of reducing employee exposure in a plant environment.

Concurrent Thursday sessions will be devoted to Roon Awards papers and those presented by Constituent Societies, as well as a presentation on the activities of the Problems Subcommittees of the Inter-Society Color Council.

On Friday, a group of guest speakers from overseas will present papers on: "Polymeric Granules in Low-Gloss Coatings;" "Dirt Retention on Paint Films;" and "Correlation of Weathering Results," and the Federation Technical Information Systems Committee will present a workshop on information retrieval. Meanwhile, a Bicentennial Color Program will trace the history of colors as associated with architectural and furniture styles from the 17th through the 20th Century and the future. These two presentations will be geared to general interest.

Registration Fees

	Member	Non-Member
Advance*	\$35	\$50
In D. C.	\$40	\$55
One-Day	\$20	\$25

*Special for retired members only, and applies to advance registration: \$15.

Registration fees for ladies' activities are \$20 in advance, and \$25 on-site.

Registration form is included in this issue (see pages 18 and 19), and will also be mailed to all members in August.

Note: Purchase of banquet tickets is again optional for both advance and on-site registrations.

There will be an additional session focusing on the field of color: "Current State of Colorant Formulations by Instrumental-Computer Techniques;" and "Exposure Evaluation: Quantification of Changes in Appearance of Pigmented Materials."

Climaxing the program sessions will be the Mattiello Lecture on Friday afternoon. Dr. Howard Gerhart will speak on "The Coatings Engineer, the Corporation and the University."

The preliminary program, listing the complete schedule of events for the three-day Annual Meeting will be published in the August issue of JCT.

Paint Industries' Show

Running concurrently with the Annual Meeting at the Sheraton Park Hotel, the Paint Show will open at 1:00 pm on Wednesday, October 27. Show hours will be 1:00 to 6:00 pm on Wednesday; 10:00 am to 5:00 pm on Thursday, October 28; and 10:00 am to 5:00 pm on Friday, October 29.

All available booth space has been sold for the Paint Show, the only national exhibit of raw materials and equipment used in the formulation, testing, and manufacture of coatings. A total of 118 supplier companies will occupy the 250 booths in the exhibit halls of the Sheraton Park, and will have their top technical representatives on hand to discuss latest developments with coatings manufacturing personnel.

Annual Banquet

The annual Federation banquet will be held on Thursday, October 28 in the Sheraton Ballroom, beginning at 7:00 pm, and will feature a steak dinner, entertainment by political satirist Mark Russell, and music by the Howard Devron orchestra.

Tickets are \$20 each, and may be purchased in advance or at the registration area in the Sheraton Park.

Ladies' Program

A program of activities has been scheduled for the gals attending the Annual Meeting, and the Continental Room of the Sheraton Park will serve as Ladies' Headquarters. Continental breakfasts will be served there Wednesday, Thursday, and Friday from 8:00 to 10:00 am.

An all-day bus tour of the nation's capital and its environs has been scheduled for Thursday, and will include lunch, as well as the opportunity to do some shopping along the way.

Registration forms for the ladies' activities will be included in the convention package which will be mailed to Federation members in August. Fees are \$20 in advance, and \$25 on-site.

Housing

The Sheraton Park will be Federation headquarters, with the Shoreham Americana serving as co-headquarters. Blocks of rooms have been set aside for the Annual Meet-

ing at both, as well as at the Washington Hilton and the du Pont Plaza.

Room Reservations

All requests for room reservations and suites must be made on the official housing form provided by the Federation.

NPCA Meets Same Week

The National Paint and Coatings Association will hold its Annual Meeting on October 25-27 at the Washington Hilton.

NPCA badges will again be honored for admission at the Federation Annual Meeting and Paint Show.

Council Meeting

The Federation's Fall Council Meeting will be held on Tuesday, October 26 at the Sheraton Park Hotel.

Program Committee

In addition to Mr. Poth, the following members are serving on the Program Committee:

Vice-Chairman — Elder C. Larson, of Shell Development Co., Houston, Tex.; Richard R. Blizzard, of the Levey Div., Cities Service Corp., Cincinnati, Ohio; Richard G. Fortener, of Celanese Coatings Co., Jefferson-town, Ky.; Howard L. Gerhart, of Carnegie-Mellon University, Pittsburgh, Pa.; Paul R. Guevin, Jr., of Hughson Chemicals, Erie, Pa.; Helene R. Johnson, of Lenmar Lacquers, Inc., Baltimore; Ruth Johnston-Feller, Consultant, Pittsburgh; Gabe Malkin, of Benjamin Moore & Co., Newark, N. J.; William Mirick, of Battelle Memorial Institute, Columbus, Ohio; Gene LeVe, of Pratt & Lambert, Inc., Buffalo, N. Y.; Harry Scott, of Glidden-Durkee Div., SCM Corp., Strongsville, Ohio; Helen Skowronska, of Sherwin-Williams Co., Cleveland, Ohio; and Roy W. Tess, of Shell Chemical Co., Houston.

Meetings Committee

Members of the Baltimore Society for Coatings Technology will serve as Chairmen of the various subcommittees of the Meetings (Host) Committee under General Chairman James McCormick, of Leidy Chemicals Corp., Baltimore, Md. They are: Program Operations — Gordon Allison, of McCormick Paint Works Co., Rockville, Md.; Information Services — William (Tom) Cochran, of Bruning Paint Co., Baltimore; Entertainment — Colin Penny, of Hampton Paint Mfg. Co., Hampton, Va.

Mrs. James (Elaine) McCormick is in charge of the Ladies' Program.

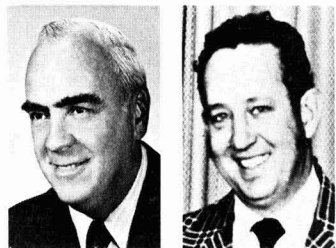
Federation Nominates John Oates, of New York Society, And James McCormick, of Baltimore, to Officer Positions

John J. Oates, of Troy Chemical Corp., Newark, N. J., has been nominated to be President-Elect of the Federation of Societies for Coatings Technology. Mr. Oates, currently Treasurer, is a Past-President and Past Council Representative of the New York Society, and a Past Chairman of the Federation's By-Laws, Host, and Program Committees.

James A. McCormick, of Leidy Chemicals Div. of Inland Oil & Chemical Corp., Baltimore, Md., has been nominated to the post of Treasurer. He is the current Treasurer of the Baltimore Society and also Chairman of the Host Committee for the Federation's 1976 Annual Meeting in Washington, D. C.

At the Federation's May Council/Board meetings in Toronto, the Nominating Committee presented two other sets of nominations:

(A) Four nominees for two positions (three years each) on the Board of Directors as members-at-large: (1) Ruth M. Johnston-Feller, industry consultant, Pittsburgh, Pa. She is Chairman of the Federation's Inter-Society Color Council Committee; (2) John A. J. Filchak, of the General Services Administration, Auburn, Wash. He is a current member of the Board, Chairman of the Federation's Specification Committee, and Council Representative of the Pacific Northwest Society; (3) Howard Jerome, of Vane-Calvert Paint Co., St. Louis, Mo. He is Council Representative of the St. Louis Society and Chairman of the Federation's By-Laws Committee; and (4) Horace Philipp, of Sherwin-Williams Co. of Canada Ltd., Montreal, Que. He is Council Representative of the Montreal Society and Chairman of the Federation's Membership Committee.



J. J. Oates

J. A. McCormick

(B) Two nominees for one position (two years to fill the unexpired term of Treasurer-Nominee McCormick) on the Board of Directors as a member-at-large: (1) Donald J. Fritz, of the Industrial Chemicals Div., NL Industries, Inc., Philadelphia. He is the current Technical Committee Chairman of the Philadelphia Society and (2) Dr. Thomas J. Miranda, of the Whirlpool Corp., Benton Harbor, Mich. He is Chairman of the Federation's Publications Committee and Technical Editor of the JOURNAL OF COATINGS TECHNOLOGY.

In a coming issue of JCT the nominees will respond to questions on a variety of topical issues.

Elections will be held on October 26, during the Federation Council Meeting at the Sheraton-Park Hotel in Washington, D. C.

Also during the May meetings, the Federation Board of Directors:

(1) Approved the addition of a technical/educational coordinator to its permanent staff in Philadelphia.

(2) Referred the Planning Committee's report (on restructuring the Federation) to an Ad Hoc Committee to be appointed by President William Dunn.

See pages 33-35 for details.

Federation Seeks Technical Administrator For Permanent Staff in Philadelphia Office

The Board of Directors of the Federation, at its meeting of May 15, 1976, approved the addition of a new position — Technical/Educational Director — to its permanent staff operation in Philadelphia. In accordance, therefore, Frank J. Borrelle, Executive Vice-President of the Federation, is seeking a person with a B. S. Degree, some background or experience in the coatings field, and administrative ability for the new post.

The T/E Director will: coordinate the technical, educational, and manufacturing activities of the Federation and its Societies; represent the Federation in several industry li-

aison capacities; and become involved in other day-to-day staff responsibilities such as the Annual Meeting, Communications, and Field Travel.

The addition of a T/E Director to staff was recommended to the Federation Board and Council by the 1976 Planning Committee which noted, "The scope of Federation responsibilities in educational, technical, and manufacturing areas has increased so that these industry obligations can only be performed effectively by a full-time person on staff." The committee's recommendations were approved by both groups in May.

"SUPPORT A WINNING TICKET"

Mattiello
Lecture



Manufacturing
Committee
Session

PRI Seminar
On Mildew
Defacement

Legislative
Update

Color
Program

E.W. Fasig
Keynote
Address

Society
Papers

Overseas
Papers

Roon Award
Papers

ANNUAL MEETING
PAINT SHOW EXHIBITS
Sheraton Park Hotel
Washington, D.C. • Oct. 27-29

Federation of Societies for Coatings Technology
1315 Walnut Street • Suite 830 • Philadelphia, Pa. 19107

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Annual Meeting and Paint Show

October 27-29

Washington, D. C.

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ON FACING PAGE**

You can pre-register for the 1976 Annual Meeting and Paint Show by completing this advance registration form and mail with your check to FSCT headquarters. Your registration package will be mailed to you, and you'll avoid standing in line to register during the meeting.

Advance registration packages will be mailed about October 8.

REGISTRATION FEES

	Member	Non-Member	Ladies' Activities
Advance*	\$35	\$50	\$20
On-Site (Full-Time)	\$40	\$55	\$25
On-Site (One-Day)	\$20	\$25	—

Note: You save \$5.00 by registering in advance.

***Special advance registration for Retired Federation Members only \$15.00.**



To register in advance for the 1976 Annual Meeting and Paint Show, please fill in the adjacent form and return, with your remittance, to:
Federation of Societies for Coatings Technology
Suite 832
1315 Walnut Street
Philadelphia, Pa. 19107.

Forms must be received by October 1.
Your advance registration package will be mailed to you on or about October 8.

Federation Dinner Dance
Thursday, October 28

Sheraton Park Hotel

Purchase of Dinner Dance tickets is optional this year, and is not part of advance registration. Please check square and send additional \$20 if you wish to attend.

Dinner Dance (\$20)
(Per Person)

Note: Emphasis will be on socializing.
Business formalities will be kept to minimum.
Ticket includes a steak dinner, entertainment and dancing.

Title _____
Name of the Federation Society
Of which you are a paid member _____
Hotel at which you are staying _____

Federation Member **\$35.00** | Non-Member **\$50.00**
Washington, D.C. • October 27-29
ADVANCE REGISTRATION

FSC T Annual Meeting and Paint Show

Mail to: FSC T, 1315 Walnut St., Philadelphia, Pa. 19107

YOUR COMPANY (Check One):

<input type="checkbox"/> 01 Manufacturers of Paints, Varnishes, Lacquers, Printing Inks, Sealants, etc.	<input type="checkbox"/> 01 Management/Administration
<input type="checkbox"/> 10 Manufacturers of Raw Materials and Containers	<input type="checkbox"/> 05 Manufacturing and Engineering
<input type="checkbox"/> 14 Manufacturers of Equipment	<input type="checkbox"/> 09 Quality Control
<input type="checkbox"/> 18 Sales Agent for Raw Materials and Equipment	<input type="checkbox"/> 10 Research and Development
<input type="checkbox"/> 19 Government Agency	<input type="checkbox"/> 16 Technical Sales Service
<input type="checkbox"/> 20 Research/Testing/Consulting	<input type="checkbox"/> 17 Sales and Marketing
<input type="checkbox"/> 21 Educational Institution/Library	<input type="checkbox"/> 18 Consultant
<input type="checkbox"/> 22 Paint Consumer	<input type="checkbox"/> 19 Educator/Student/Librarian
<input type="checkbox"/> 23 Other	<input type="checkbox"/> 20 Other

YOUR POSITION (Check One):

You pay a little bit more for Celite[®] diatomite's higher flattening efficiency. You also buy a satisfied customer.

When you pay a little bit more for Celite functional fillers, you're really making an investment. You're investing in a quality ingredient that can take that first-time user of your paint and turn her into a satisfied lifetime customer.

She may not know what diatomite is or what it does for your paint formulation, but she can easily tell the difference Celite diatomite makes in the way your paint dries to a soft matte finish. And the way it covers in one coat. And stands up to all the scrubbing she'll likely ever have to do.

Those are the differences that make your paint better than the paint she bought last month. Those are the differences that will bring her back for more. And those are the reasons why Johns-Manville will not compromise its commitment to fine quality functional fillers.

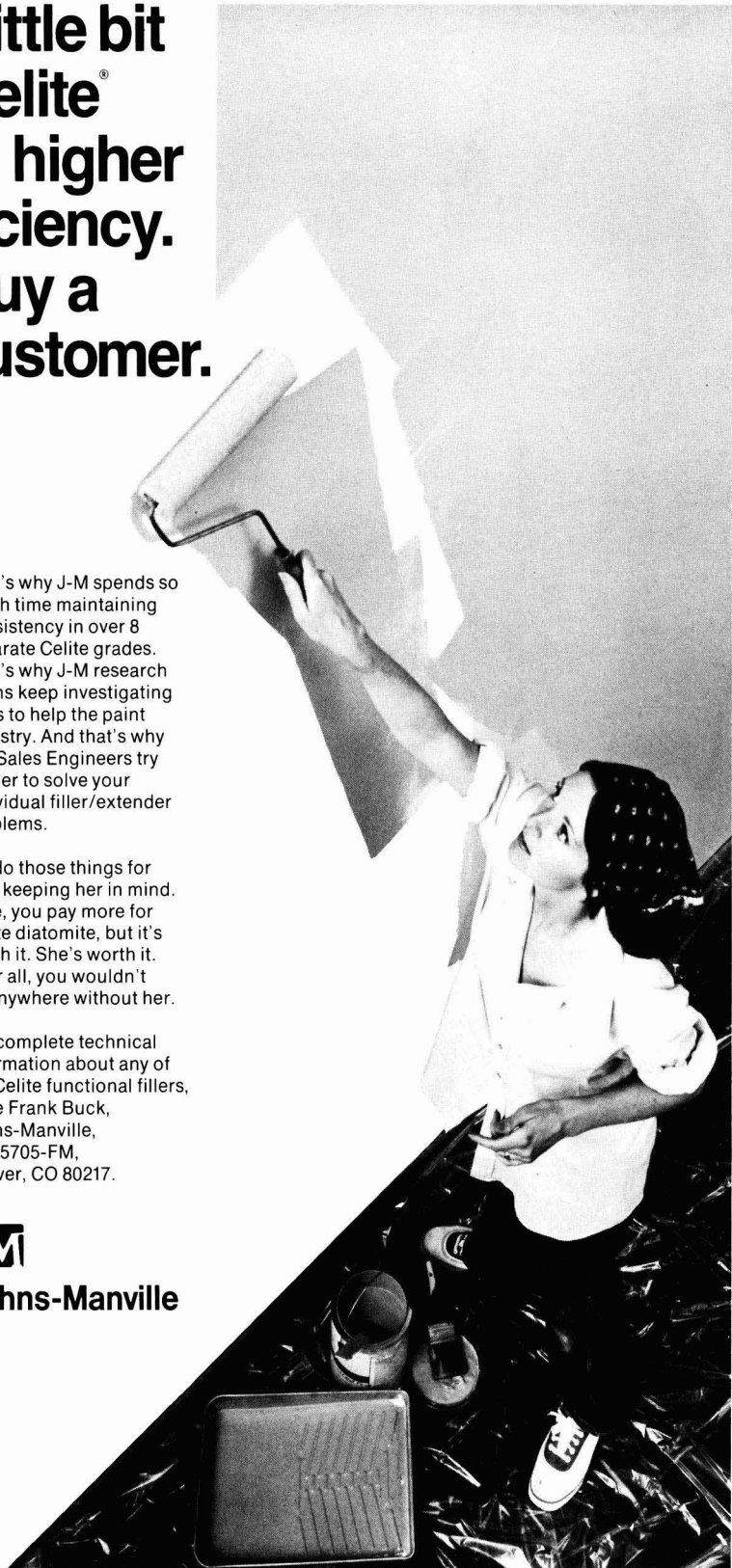
That's why J-M spends so much time maintaining consistency in over 8 separate Celite grades. That's why J-M research teams keep investigating ways to help the paint industry. And that's why our Sales Engineers try harder to solve your individual filler/extender problems.

We do those things for you, keeping her in mind. Sure, you pay more for Celite diatomite, but it's worth it. She's worth it. After all, you wouldn't be anywhere without her.

For complete technical information about any of the Celite functional fillers, write Frank Buck, Johns-Manville, Box 5705-FM, Denver, CO 80217.



Johns-Manville



FEDERATION OF SOCIETIES FOR COATINGS TECHNOLOGY

Spring 1976 Council Meeting

There were 37 members of the Federation Council in attendance at the Spring Council Meeting of the Federation of Societies for Coatings Technology, held in Toronto, Canada on May 14, 1976.

The following members were present:

Officers

President William Dunn
Pres.-Elect Neil S. Estrada
Treasurer John J. Oates

Society Representatives

Baltimore John Emmerling
Chicago Victor M. Willis
C-D-I-C William Mirick
Cleveland Michael W. Malaga
Dallas William F. Holmes
Detroit Richard W. Partusch
Golden Gate A. Gordon Rook
Houston Willy C. P. Busch
Kansas City Terryl F. Johnson
Los Angeles William H. Ellis
Louisville Joseph A. Bauer
Montreal Horace Philipp
New England Robert Perry
New York S. Leonard Davidson
Northwestern Lowell Wood
Pac. N'West John A. J. Filchak
Philadelphia J. Richard Kiefer, Jr.
Piedmont James Bohlen
Pittsburgh Gerry Ward
Rocky Mt. Edmund H. Peterson
St. Louis Howard Jerome
Southern Robert F. Hall
Toronto A. Clarke Boyce
Western N. Y. Eugene LeVe

Other Members

Elder C. Larson
J. C. Leslie
Hugh W. Lowrey
Robert W. Matlack
James A. McCormick
Raymond R. Myers
George L. Poy
Harry A. Scott, Jr.
Jean P. Teas
Joseph W. Tomecko

Guests

Dean Berger
Royal A. Brown
Charles H. Kaufmann
Kurt F. Weitz

Staff

Frank J. Borrelle
Thomas A. Kocis

Executive Vice-President Frank J. Borrelle called the roll of members and reported a quorum present. Following introduction of guests, the report of the Fall 1975 Council Meeting was approved as published in the January 1976 JOURNAL OF COATINGS TECHNOLOGY.

Reports Of Officers

PRESIDENT DUNN

During my three years in office, I will have visited all the Constituent Societies (including Birmingham this fall), and have also attended a number of special meetings.

The Societies have been unanimous in their views of the value of yearly visitations by the officers and staff. They have stressed that the visits provide the only opportunity for face-to-face discussions of mutual problems, as well as the communication of Society viewpoints and needs.

I believe my goals for the Presidency were pretty well set by the Society Council Representatives last fall when they requested the Board of Directors to review (1) the usefulness of the Federation Council, (2) whether there would be wider membership participation if the Federation assumed more of the travel expenses involved, and (3) the role of

the Federation as the technical arm of the industry.

I charged the Federation's Planning Committee to study the first two points. The committee met in December and again in March, and have submitted their report. [See page 33—Ed.]

The Federation must become more responsive to the needs of its members and the industry and, as a first step in this direction, the Technical Advisory Committee has been charged to revitalize its and the Societies' technical activities. The Executive Committee has asked the Chairman to hold a meeting of all Society Technical Committee Chairmen. We also want the TA Committee to follow the lead of the Educational Committee and organize itself regionally.

The Paint Research Institute, under the capable leadership of President Roy Tess and Research Director Ray Myers, continues to make excellent progress. They have spoken to some of our Societies and have shown that, in addition to research concepts, there are "seeds" that can be sown by Societies as projects to further the basic research efforts. Typical examples are in the fields of mildew-resistant coatings, corrosion, and hiding.

The Educational Committee, led by Chairman Harry Scott, has done a fine job, and it was a pleasure for me to attend the meeting of the Steering Committee during the Southwestern Paint Convention in April.

The Federation's 1976 budget was presented as a balanced one and approved by the Board of Directors at the January meeting. The Finance Committee's proposal of a dues increase, endorsed by the Board, is to fund increased activities of our committees and the greater involvement of our membership in committee work.

The officers and staff have continued to maintain excellent relations with other organizations such as NPCA, CPMA, OCCA, FATIPEC, SLF, etc. I attended my first meeting of the Joint Paint Industry Coordinating Committee in March. It was a most informative report session of what the member groups (National Paint and Coatings Association, National Decorating Products Association, Painting and Decorating Contractors of America, and the Federation) are currently accomplishing in their respective spheres of activity within the U. S. paint and coatings industry. The Federation's report centered around PRI and the Technical Advisory Committee.

May I express my personal thanks to all committee chairmen, my fellow officers, the PRI Trustees, and the Federation staff for their cooperation — the most important ingredient required for the success of any administration.

WILLIAM DUNN
President

PRESIDENT-ELECT ESTRADA

My activities, since the Annual Meeting in Los Angeles, have been rather routine. I have visited the Philadelphia, Rocky Mountain, Los Angeles, New England, Cleveland, C-D-I-C, Western New York and Golden Gate Societies at regular monthly meetings. I attended the Budget Committee and Board of Directors Meeting, January 16 and 17 in Philadelphia, the Southwestern Paint Convention in Dallas, April 8, 9, 10, and the NPCA Board of Directors Meeting in Litchfield Park (Phoenix) Ariz., April 21, 22, 23. I also attended the Pacific Northwest Symposium, May 6, 7 and 8 in Vancouver, but as a representative of my company. I have been fortunate in being able to coordinate several Society or other meetings with visits to several of my company's facilities, thus lessening time spent away from "work" on Federation activities.

The other major activity of the President-Elect, that of selecting the various Committee Chairmen for service in 1976-1977, is well underway. At present, the Federation has 37 active committees, with a total membership of 310 (including seven delegates to other organizations). The importance of the total activity of this large group to the successful operation and accomplishments of the Federation cannot be underestimated. Service on committees at the local (Society) level and at the na-

tional (Federation) level benefits both the individual and the organization served. Without this effort, we could not hope to carry on the many activities we feel are necessary within the Federation. It should also be evident that the Federation staff also participates importantly in many committee activities. Their generous and able support makes the operation of the various committees much more effective.

The policy adopted last year of establishing Committee budgets at the time of the Annual Meeting will be continued this year. While some slight restrictions were put on requested funds last year, it is hoped that this will not be necessary this year. Present indications are that we will have a most successful Annual Meeting in Washington this year. I trust you will join with me in doing all that is possible to insure this.

NEIL S. ESTRADA
President-Elect

TREASURER OATES

As is the case with most men who undertake Federation office, my first months have been spent familiarizing myself with the duties of office, through visits with the Federation staff, meetings of the PRI Trustees, and visits to a number of the Constituent Societies.

For whatever value it may have, I will summarize the major impressions developing from my experience as Federation Treasurer to date:

(1) Our Philadelphia headquarters is organized for effective day-to-day administration of Federation business. This includes effective communication among officers and staff on all matters requiring action. The effective functioning of the staff serves to keep unnecessary demands on officers' time to a minimum.

(2) It is obvious, also, that Constituent Societies, by and large, are directed by competent, dedicated people. It is equally obvious that local officers and executive committees are hungry for information about the problems and challenges, and future plans of their Federation.

Although newsletters and written communications can do part of the job, it would appear that nothing can take the place of probing face-to-face discussions, particularly in problem areas. This observation is consistent with the formally expressed request of the Society Representatives that more time be scheduled at semi-annual Council Meetings for more thorough discussion than is presently the case.

JOHN J. OATES
Treasurer

EXECUTIVE VICE-PRESIDENT BORRELLE

The Federation staff is comfortably established in its new offices at 1315 Walnut St. in Philadelphia. Our new quarters are a vast improvement over the old, as Board members will agree.

The usual publication and convention details will be reported only briefly in this report.

PUBLICATIONS

JCT: The switch from OD to JPT to JCT was cleverly depicted on the cover of the January issue. Advertising pages in 1975 were up 17% over the previous year, and we anticipate a good sales record in 1976, as manufacturers are once again promoting the sale of their products. Editorially, we have accented news in the legislative arenas with the expanded department, "News From Washington."

Year Book: Under the capable direction of Rosemary Falvey, the entire publication was redone this year. The change in printer, style, and size did contribute to its later release.

Federation Series: Number 23 on "Interior Finishes" has been published, and is selling very well. Its publication has also helped spur sales of all the booklets in the Series on Coatings Technology.

MEMBERSHIPS

The names of 6130 members were published in the 1976 Year Book — a gain of 119 members from the 1975 edition. It should be pointed out that Associate Membership is climbing gradually; Active Membership is static.

ANNUAL MEETING AND PAINT SHOW

Registered attendance at the 1975 Annual Meeting was a disappointing 3747. Washington this year looks more promising and we anticipate a return to our normal 4500-5000.

There were 210 paid booths in the 1975 Paint Show. The "Bicentennial Show," in D.C. is attracting wide attention and may be a sellout (250 booths). [*The show is a sellout, as of May 28—Ed.*]

AUDIO-VISUAL

A major new development this year was the introduction — at the Western New York Society meeting on March 9 — of the Federation's new "traveling slide show." The slides illustrate various Federation activities (Annual Meeting, Paint Show, Publications, PRI, Committees) with special focus on people — the Federation's most important ingredient. Descriptive commentary is included with each slide. The program will be maintained and up-

dated on a continuing basis, and will be shown during visits to Societies.

We are pleased to report that sales of our three audio-visual programs are going well. They are (1) Discoloration of Paint Films; (2) High Speed Dispersion; and (3) Training Series on Test Methods.

MEXICAN SOCIETY

Attempts to maintain contact with the Mexican Association Nacional de Fabricantes de Pinturas y Tintas A.C. have not materialized. The Federation office has yet to receive a formal communication from ANFTAC regarding affiliation with the Federation.

COMMUNICATIONS

The most important Federation/Society communications link is the Society Council Representative, and we suggest that all representatives be on each Society's mailing list. As a matter of Federation staff policy, Society Representatives receive copies of all pertinent correspondence.

It is the Society Representative's responsibility to digest Federation/Society information received and relay it, with interpretation, to his Executive Committee and, where necessary, the general membership.

In travels to Societies, we have noticed that a few are not "getting the message" (if you will). We believe communications and knowledge can be improved if a report from the Society Representative is included on the agenda at every Society's Executive Committee meeting and, perhaps, general meeting as well.

To further strengthen the communications chain, we also recommend that each Society President be included in the mailing file.

OTHER ORGANIZATIONS

JPICC: The Federation hosted the semi-annual meeting of the Joint Paint Industry Coordinating Committee (NPCA, PDCA, NDPA, FSCT) in March. The twin thrust of the Federation's majority report comprised a review of Paint Research Institute research grants (especially those on Mildew) by John Oates, Federation Treasurer, and a report on plans to spark Society and Federation technical activities. The latter was given by Sid Lauren, Chairman of our Technical Advisory Committee. We took advantage of the opportunity to explain the new direction of some PRI research and the Federation's hopes to stimulate the work of Technical Committees. The NPCA reacted favorably to both of these developments. From the Federation point of view, this was the most productive, interesting, and beneficial JPICC meeting we have ever attended.

NACE: The Federation has reciprocal arrangement with the National Association of Corrosion Engineers with regard to booth space at our respective Shows. NACE had complimentary booths at the 1974 and 1975 Paint Shows. This year, the Federation had two complimentary booths at the March 23-25 Corrosion Show in Houston. Tom Kocis and Dick Gross prepared all the literature and display materials for the booth and manned it as well. In his post-Show report to the Executive Committee, Tom commented that "we had a fair amount of traffic in the booth and of particular interest to visitors was the Federation Series on Coatings Technology."

NPCA: I attended the first Chemical Coatings Conference of NPCA in Cincinnati on April 21-22. The number of registrants (900) was remarkable, considering it was the first such three-day meeting sponsored by NPCA.

Designed for users of coatings, there was nevertheless an appreciable number of Federation members (technical/scientific), NPCA members (management), and raw material suppliers present.

The three speakers at the opening session were: Robert A. Roland, President of NPCA (Government Interface With Business); Dr. Carl Madden, of the Chamber of Commerce of the U. S. (National Economic Trends); and Harry Holiday, Jr. President of Armco Steel Corp. (A Challenge to the Coatings Industry). Their talks were aimed at the same target — governmental regulatory agencies and legislative rulings. Their remarks underscored the need to meet industry challenges with heavy reliance on: leadership, communications, and science/technology.

COMMITTEES

More and more, staff is cooperating with various Federation committees and helping to coordinate and organize their activities. And, more and more, committees have come to expect this support from their staff office.

Educational: Tom has worked very closely with Harry Scott, Chairman of the Educational Committee, and has set up, coordinated, and been Secretary for the committee's national meeting of November 21 and the April 9 meeting of the Steering Committee in Dallas.

Technical Advisory: We are counting on this committee to organize itself on a regional basis (as did the Educational Committee) and hold a national meeting of all Society Technical Committee Chairmen. We heartily endorse this idea and stand ready to give Chairman Sid Lauren whatever support he requires.

Dictionary: This committee keeps plugging away and burning the mid-night oil at Chairman Stan LeSota's home one night monthly. Tom Kocis represents staff at these meetings. Progress is being made. The committee is in the final stages of compiling, correlating, and correcting both the original and second generation sets of definitions.

Planning: I have participated in the discussions at the two Planning Committee meetings and served as Secretary. I support the committee's recommendations re: a Technical/Educational Coordinator (as pointed out above, staff is presently carrying out some of these duties so, in effect, the "job" already exists); Attracting New Blood into the Federation (if reimbursement of complete expenses is required, then that is what we must do); Regionalization (the Educational Committee is precedence and proof that it works); and the New Board of Directors (the Societies will have a direct voice in the operation of the Federation).

UNIVERSITY OF SOUTHERN MISSISSIPPI

In January, Federation attention was brought to the possible consolidation of Doctoral Programs in Mississippi State Universities. Such an action would serve to seriously endanger the life of the Polymer Science Department at the University of Southern Mississippi.

Appeals for industry help were sent to various Federation members and, as a result, the Board of Trustees of Mississippi State Institutions of Higher Learning were flooded with letters of support for USM and protest of the planned consolidation.

The letter I wrote, on behalf of the Federation, was published as an editorial in the *Hattiesburg American* under the banner heading, "Paint Industry Goes to Bat for PSD/USM."

Proving that the pen is mightier than the sword, the Board of Trustees abandoned their consolidation plans.

VISITS

For the 1975-76 season, I have so far visited the following Societies: Dallas, Houston, New York, Baltimore, New England, Cleveland, Chicago, Western New York, Southern, Detroit, Pittsburgh, and Montreal.

Tom Kocis has been to: New York, Philadelphia, St. Louis, Louisville, Chicago, C-D-I-C, and the Southwestern Paint Convention.

All visits (except Montreal which was a solo) were in the company of an officer.

At both the Executive and General Meetings during these visits, we

have reported on the complete spectrum of Federation activities, with emphasis on the income and expense segments of the annual operating budget, the slide show, reasons for a dues increase, and the deliberations of the Planning Committee.

A common question at any given Society meeting is — "what's new with the Federation in Philly?" I have a feeling that some members feel that their Society and the Federation are distinct and separate organizations — that there is only a casual relationship between the two.

All members should realize that each Society has a 4% share of the Federation and that there would be no Federation without the 25 constituent organizations.

SPRING MEETING

My idea for expanding the Spring Council Meeting by adding another activity — and thus create an official Federation Spring Meeting — has fallen on deaf ears.

The original proposal suggested that one such extra activity could be a technical, manufacturing, or PRI seminar.

Judging from the silence, the seminar idea is stone cold because the Societies feel it would conflict and interfere with their own special events.

Another activity I suggested for the Spring Meeting was an orientation session for Society Presidents-Elect. I believe there is much merit in Federation sponsorship of such a meeting. Based on observations from our Society visits, we believe there is a genuine need for a better understanding of the operations of the Federation office/staff. Further, such an orientation meeting would afford the opportunity for incoming Society Presidents to learn more about the duties and responsibilities of the presidential position.

FRANK J. BORRELLE
Executive Vice-President

Society Representatives Report

Terry Johnson, of the Kansas City Society and Chairman of the Society Representatives, presented the following report from the Society Representatives' Meeting held earlier in the day:

(1) The Society Representatives recommend that the Annual Meeting Keynote Address be commemorated in the name of the first President of the Federation, E. W. Fasig, and that

a suitable certificate of award be included.

(2) The Society Representatives wish to commend the Planning Committee for its report and the thought it has stimulated.

Paint Research Institute

BUDGETS AND FINANCES

In 1975, receipts were \$106,735.73 and expenditures were \$95,949. One reason for the difference is that the Board of Trustees of PRI pursued a conservative policy of disbursements in view of anticipated possible difficulties in making ends meet. The Federation appropriation of \$53,000 for 1975 was less than the \$65,000 for 1974. Another reason for the relatively low expenditures was that about \$8,000 was earmarked and reserved in advance for a given project that would be carried out in 1976. Finally, it is recognized that some working funds must be available as cash on hand at the start of the year because donations are uncertain, are concentrated at the end of the year, and cannot always be counted on to bail us out of financial difficulty. When projects are selected and authorized, the PRI Board is usually committed for support for well over a year in most cases. At the start of 1976 we had \$16,800 on hand to enable us to carry out our business in a sound manner.

For 1976, the Federation has appropriated \$57,000 toward our goal of \$124,000 for the year. This is an ambitious goal which will require outstanding support by the local Societies, associations, and industry.

RESEARCH PROJECTS FOR 1976

Projects fall in the categories of (1) overcoming the mildew problems in coatings; (2) improvement in corrosion resistance of coatings; (3) studies in water-based products; and (4) general studies. In conformance with the policy of emphasizing basic work related to current problems in the industry, the projects are concentrated in selected specific areas rather than in general projects.

In the field of mildew control three new grants have been made as follows:

Dr. Charles U. Pittman, Jr., University of Alabama, "Preparation of Mildew Metabolites and Their Degradation of Paints. Preparation of a Paint Polymer Which Fights Back."

Dr. R. A. Zabel, State University of New York at Syracuse, "The Role of *Aureobasidium Pullulans* in the

Deterioration and Disfigurement of Paint Film."

Dr. R. E. Crang, Bowling Green State University, "Ultrastructural Analyses of *Aureobasidium Pullulans* and Localization of Inhibitory Agents Related to the Paint Research Institute Midos Program."

Still underway is the attractive project by Dr. Harvey Winters, Fairleigh Dickinson University, "A Study of the Microbial Enzymology and Physiology in Biodeterioration of Paint Films."

In the general sphere of corrosion control, a new project by Fred Fowkes is being initiated and two current projects are being continued as follows:

Dr. Fred Fowkes, Lehigh, "Acid-Base Interactions in the Control of Diffusion of Corrodents through Paint Films."

Dr. R. N. O'Brien, University of Victoria, British Columbia, "Laser Interferometry Study of Corrosion."

Dr. Tobin J. Marks, Northwestern University, "Chemical and Spectroscopic Studies of Metal-Metal Bonding."

In the area of water-based systems, a new grant to George Bufkin has been authorized, and the grant to Irvin Krieger has been renewed:

Dr. George Bufkin, University of Southern Mississippi, "Novel Thermosetting Emulsions which Crosslink at Room Temperature or under Low Energy Thermal Cure to Generate Thermosetting Water-Borne Coatings."

Dr. Irvin M. Krieger, Case Western Reserve University, "Preparation of Emulsifier-Free Latices."

In the general research category, the Ray Myers grant has been renewed and the Raymond Seymour grant will be terminated July 1, 1976.

Dr. R. R. Myers, Kent State University, "Kinetic Rheology."

Dr. R. B. Seymour, University of Houston, "Investigation of Block Polymers Prepared from Macroradicals."

In the area of hiding by microvoids, the two-year project by Dr. Milton Kerker, of Clarkson College of Technology, is being concluded and a report on the work will be published in JCT.

The Board of Trustees at their next meeting will review progress in the grants and discuss new topics which might be suitable for current and future grants.

The annual report by Dr. Myers will appear soon in JCT and should be read to learn about progress in the PRI projects. [See May JCT—Ed.]

PRI SYMPOSIA

The half-day seminar sponsored by PRI at the Annual Meeting in Los Angeles drew a fairly large responsive audience. Speakers were Drs. O'Brien, Krieger and Richards. Dr. Myers provided a popular exhibit at the Federation booth of the Torsional Braid Analyzer, an established instrument developed under PRI sponsorship.

At the 1976 Annual Meeting in Washington, D. C. on October 27-29, PRI will sponsor a program on mildew defacement. Tentatively we plan to follow this after a few months with a full-scale PRI symposium on this topic.

ROY W. TESS, *President*

[In the absence of Dr. Tess, PRI Research Director Dr. Raymond Myers updated the report and reviewed current projects at some length, with particular emphasis on the mildew program.]

Following his remarks, there was a discussion of how efforts could be strengthened to obtain more industry financial support for PRI, particularly from the larger firms.

Society contributions were then presented to Dr. Myers from the Baltimore, C-D-I-C, and Toronto Societies. The Cleveland, Detroit, Golden Gate, Montreal, New England, Pacific Northwest, and Southern Societies had presented their contributions earlier in the year.]

Committee Reports

BY-LAWS

[See page 35 in this issue—Ed.]

CORROSION

JOINT CORROSION COMMITTEE/SSPC ACTIVITY

John Keane, of SSPC, reported on these projects:

(1) "Surface Preparation Profile"—Preparation of a final report is underway. Experimental work has been completed on scanning electron microscopy, methods of measuring profile, and effect of surface preparation parameters on profile. It is believed that results in all phases of this project will exceed original expectations and open the way for further application of several breakthroughs achieved in this project.

A rough draft of a specification for measuring surface profile is to be issued. This specification centers

around the peak/valley microscopic method as a referee method.

(2) "PACE" (Performance of Alternate Coatings for the Environment) — This project is in the organizational process, including sample procurement, test plans, and statistical design. At this point, standards (controls) have been exposed.

The Federation is faced with new charges for exposure test panels at Kure Beach. Most of this work will be evaluated by John Keane during Sea Horse Institute Week of May 17, 1976. Many tests will be terminated.

BUDGET

Consideration was given to the 1976 Corrosion Committee budget. The proposed budget will also include travel expenses for NACE and SSPC delegates.

One final item was discussed concerning SSPC specifications. There has been much discussion on the use of formulation specs. The Corrosion Committee recommended to SSPC that performance rather than formula be considered in preparing specifications.

D. M. BERGER, *Chairman*

DEFINITIONS

The time-consuming job of correcting the first proofs and correlating these with the second generation definitions to make the final proof is well underway.

All the reviewers are ready to edit the final proofs. When the corrected copies of the final proofs are combined, we will be ready for printing. We are still optimistic that this can be done by the end of this year.

STANLEY LESOTA, *Chairman*

EDUCATIONAL

A meeting of all Educational Committee Chairmen was held in Cleveland on November 21, 1975, with all Societies represented except Kansas City, New England, and Western New York. This meeting had been planned for September; however, some Societies' Education Committee Chairmen had not been selected at that time for the current year. These meetings have definitely provided a forum for a cross-fertilization of educational ideas among the various Societies. The format of the program has been to use the regional concept. Time is allotted for the regional people to meet, and a report is received from each group.

As an outgrowth of this meeting, regional subcommittee project responsibilities were assigned, following the current regional Society alignment. The region subcommittee

assignments are as follows: Central — Slide/Tape Program; Western — Federation Booklets; Northeast — Coating Courses; Southern— Annual Meeting; and Eastern — Feasibility of Taping Seminars.

The regional Vice-Chairman is in charge of the subcommittee, and the members of his region are the subcommittee. It was felt that this arrangement would tend to provide continuity, for even though the regional Vice-Chairman is normally on the Steering Committee for only two years, all members of the subcommittee are familiar with the particular area he has been covering.

The Steering Committee met in Dallas on April 9-10, 1976 in conjunction with the Southwestern Paint Convention. Although only a relatively short time had elapsed between the regional subcommittee assignments and the Steering Committee Meeting, meaningful progress was reported.

SLIDE/TAPE PROGRAM

Thirty-five copies of the Federation Training Series on Test Methods, Volume I, have been sold, with a very wide distribution. Plans are underway for a second volume, and many of the programs are presently in production. The subcommittee has developed a plan for review and follow-through on those subjects accepted by the various Societies. They do not plan to have another volume completed within this calendar year.

FEDERATION SERIES BOOKLETS

All Societies have been asked to review a particular booklet with regard to the need for revision. A number of Societies have reported and those that have not will be contacted. Outlines are being secured from the new authors, as selected, and a follow-up will be made to see that additional booklets can be produced within the next two years. This program will be reviewed at the next Publications Committee Meeting.

COATINGS COURSES

This subcommittee has begun a compilation of educational programs being offered in the United States and Canada for the training of persons in the coatings field. They plan to publish this listing by September 1st. This is a new program which grew out of a common interest and request at the November 1976 meeting. They intend to issue periodic supplements to this publication.

ANNUAL MEETING

It was recommended that no specific program be developed for the 1976 meeting in Washington, and

that a very intensive effort be started for developing a program for 1977 in Houston. It was felt that the entire Annual Meeting is an educational function, and that presentations should be made on merit and not specifically to fill a time slot. This will be a continuing program.

TAPING SEMINARS

Questionnaires have been sent to each of the Educational Committee Chairmen to determine the interest and capabilities of their participating in this program. Not all questionnaires have been returned and a follow-up is being made. A report will be issued in the future.

SCHOLARSHIPS

After a consideration of the current scholarship program, the committee recommended that the program remain the same this year, with grants to: North Dakota State University \$4,000 — University of Detroit \$2,000 — University of Southern Mississippi \$4,000 — for a total of \$10,000. This recommendation was subsequently forwarded to the Board of Directors and approved at the January meeting.

CORRESPONDENCE COURSE

At the Steering Committee Meeting in Tampa last year, the staff from the University of Southern Mississippi discussed, at my request, the mechanics of a correspondence course in Coatings Technology. At that time, there were mixed emotions with the group as to how, and if, we should proceed with such an undertaking. The Committee at the November 1975 meeting expressed a positive, though not conclusive interest in the program. The staff at University of Southern Mississippi has prepared a rough proposal for our consideration. The Steering Committee was favorable to further consideration. A letter will be forwarded to all Educational Committee Chairmen further explaining this program and asking for their consideration and recommendations. The Regional Vice-Chairmen will be following on this proposal.

COMMENTS

The Western Region intends to again hold its regional meeting this year. As an outgrowth of the Cleveland meeting and the success of the Western Region, the Northeast Region agreed to meet on May 1. (In both cases, the expenses are shared by the Societies in the Region). I am very pleased to see this concept expanding.

The next meeting of the Educational Committee Chairmen will be held in September in Cleveland and it is essential that all Societies have

their Educational Committee Chairmen selected by that time so that the new members can attend. All Educational Committee Chairmen should be selected for at least two years, and then a Vice-Chairman or assistant should work with them to take over and continue the continuity of the program. I ask each of you as Council Representatives from your Societies to stress this fact in your Executive Committee Meetings.

We feel we have a plan; we feel that the plan is working and that more and more people are becoming involved in this Society work; let's keep the momentum going for an effective program.

I want to thank President Dunn and President-Elect Estrada for the time they took to meet with us in Dallas and their input to our meeting.

H. A. SCOTT *Chairman*

ENVIRONMENTAL CONTROL

A committee meeting was held February 20 in Cleveland, Ohio to discuss current and future programs.

A letter has been sent to all Society Presidents asking for the name of their local Environmental Control Committee Chairman and to assist in gathering input on local environmental changes.

The Rocky Mountain Society works jointly with the local PCA. They reported they are assisting the Colorado Air Pollution Control Commission in modification of the existing Regulation No. 7.

The Southern Society reports that they are currently working on a project to measure the comparative dusting of pigments.

Gabriel Malkin, Liaison to NPCA and governmental agencies, reported that he is now Chairman of the Mechanical Compliance Sub-Committee of the Air Quality Task Force. This subcommittee is searching for industrial applicators who have an advanced technology of application. He solicited help in finding such applicators.

The NPCA Air Quality Task Force is recommending a modified Rule 66 regulation as a model regulation on air quality. We, as a committee, agreed to support NPCA in its recommendation.

Mr. Malkin discussed the Moodus Report and a Moodus Steering Committee report that was derived from the Moodus Conference in Connecticut. The conference was held to obtain uniform Hydrocarbon Emission Regulations in the Northeast sector of the United States. Some industry members that attended the Conference feel that the Steering Committee is not carrying out the wishes of

the conference. They are, therefore, trying to alert all members of the conference to the actions of the Steering Committee. We, as a Committee, support the actions of industry and its comments on the Moodus Conference.

In reference to the Water Regulations concerning our industry, we discussed the three sub-categories. Their status is: (1) Oil Base — Solvent Wash System — no discharge; (2) Oil Base — Caustic Wash System — still under study by EPA; and (3) Water Base — still under study by EPA.

Mr. Malkin reports that the NPCA Water Quality Task Force is studying the Hazardous Substances Regulation and will comment to EPA on its findings.

It was discussed how our committee could best serve the membership of the Federation. It was pointed out that one of our prime objectives is to keep Federation members appraised of the ever-changing Environmental Regulations. To do this we must first gather the information and then channel it as rapidly as possible to the proper Societies. It was suggested that an Environmental Bulletin be sent direct to the local Society Environmental Control Chairman so that he may take more immediate action. This approach will be tested.

SAMUEL D. YANKEE, *Chairman*

ISSC

The 1976 Annual Meeting of the Inter-Society Color Council was held April 26 and 27 in New York. Activities included a Symposium in honor of Ralph M. Evans. The Symposium presented a summary of Ralph's life's work on perception by Bonnie Swenholt, a long-time co-worker of Ralph's (and chairman of Subcommittee 10 on the CAT test), a presentation by Edwin J. Brenneman, of Kodak, on the differences between photography for transparencies and prints, and a "Recollection of Ralph M. Evans" by George B. Gardner, his long-time friend and co-worker. Reminiscences of Ralph were presented by Dorothy Nickerson (USDA, retired), Isay Balinkin (U. of Cinn., retired), Richard S. Hunter (Hunter Labs), and Max Saltzman (FSCT delegate to ISSC, late of Harmon Colors, Division of Allied Chemical Corp.)

At the evening banquet, the Macbeth Award was presented to Richard S. Hunter. The speaker of the evening was Dr. Leon M. Greenstein, Consultant to the Mearl Corp. (and FSCT member) on "Iridescence, Natural and Synthetic."

Of interest to FSCT members are

the activities of some of the subcommittees. Subcommittee for Problem 10, the Color Aptitude Test, chaired by Bonnie Swenholt, had no activity during the year because of the contractor's problems in producing available prototype models of the newly designed set. Contractor has assured the subcommittee that sets will be available soon for validation. Validation will be carried out by Dr. Angela Little at the University of California (Berkeley) and by Herb Aach at Queens College. It is hoped that these validations will be completed this coming year so that the new test will be ready for sale by the FSCT when the current supply of the old tests is depleted.

Subcommittee for Problem 25P, The Tinting Strength of Pigments, chaired by Joyce Davenport of DeSoto (ISCC Committee Member), conducted a round-robin of tinting strength determination of a phthalocyanine green and a cadmium red in paints and plastics. Insufficient data in plastics was acquired but the results in paints were significant. Further work will be conducted in plastics and in paints with more detail as to describing the technique used. The work of this subcommittee is of great value to our industry, and it is hoped that work carried out in the next year will result in some definitive information on this problem.

As a result of the meeting of Member Body Chief Delegates, the program of describing the activities of the Problems Subcommittees to member bodies at their annual meetings, begun with a presentation at the Optical Society Meeting in the Fall of 1975, will be continued and expanded. Such a presentation is scheduled for the Fall FSCT meeting in Washington, pending approval of the Program Chairman.

During the ISCC Meeting, a meeting of the FSCT's ISCC Committee was held. Sam Huey agreed to chair the DCMA Award Selection Committee and Dr. Robert Marcus has agreed to chair a committee to get the production of the slide-tape color course produced this year. The definitions of color terms was completed and sent to the Glossary Chairman, Stanley LeSoto, early in December for editing.

The Williamsburg Conference on "Colorant Formulation" was held January 25-28. Though the program was interesting, there was nothing significantly new presented that is directly applicable to practical problems. Many of the papers presented will be published in the new journal, *Color Research and Application*. The first issue of this journal appeared early in 1976.

Plans are proceeding for the 3rd Congress of the International Colour

Association, AIC, "Color 77", to be held July 10-15, 1977, at Rensselaer Polytechnic Institute, Troy, N. Y. This is the first time that this group will meet in the United States. The ISCC is making plans and arrangements, and acting as the host organization.

RUTH JOHNSTON-FELLER, *Chairman*

INVESTMENT

Your Chairman, together with Treasurer John Oates and Executive Vice-President Frank Borrelle, met with Pittsburgh National Bank officials in April to discuss the Federation's investment program at PNB. These discussions confirm that the current status of our investments is about as good as can be expected, and that the PNB people are knowledgeable and are doing a good job of handling Federation funds.

S. L. DAVIDSON, *Chairman*

LIAISON

The Committee was host at Los Angeles on October 30, 1975 to representatives of overseas societies from Australia, Germany, Japan, Scandinavia (Finland), and the United Kingdom. Papers representing four societies were presented at a well-attended Friday morning meeting.

The Federation representatives to the SLF tri-annual meeting (at Helsinki) are Harvey Winters and Milton Goll. Their paper is entitled, "Non-Enzymatic Oxidative Degradation of Latex Paints." At the FATIPEC CONGRES, Werner Zimmit will be our representative, speaking on the subject, "Air Pollution from Solvents and its Effect on the U.S.A. Coatings Industry."

Three Liaison Committee members will also attend the FATIPEC event at Cannes. In addition to our presence at the technical sessions, we shall meet with representatives of the six member companies on subjects appropriate to Liaison concerns. At a January meeting of the Committee it was decided that this year we shall make proposals for low-key activities, i.e., those that do not require costly effort or substantial manpower. This is in keeping with the feeling that coatings R & D is struggling through a transition which calls for a conservative but, nevertheless, coordinated activity. We shall meet the new leaders, identify mutual problems (not necessarily technical), and establish communications for the balance of the year.

Looking ahead to 1977, we have

sent letters suggesting the support of overseas societies to the first Symposium/Workshop on the subject "Interfacial Phenomena in Corrosion Protection." This is scheduled for March 20-25 in New Orleans. The prime sponsor is the American Chemical Society, with support from the Federation, the Electrochemical Society, and NACE. The chairman representing the overseas societies is Professor Karl Hamann, Director, the German Coatings Research Center at Stuttgart. The international aspect of the event is assured by the early provisional acceptance of distinguished scientists in the U.K. and central Europe. This subject will be facilitated by personal contacts at Cannes in May.

Your chairman will lecture on corrosion control and conduct symposia on new developments in coatings technology in the U.K., Germany, Poland and Czechoslovakia. There may possibly be news to report along with a synopsis of the FATIPEC papers

Dr John Weaver has developed an exciting concept which is structured to coordinate the prompt assembly, worldwide, of reports on topical coatings progress. This is intended to be placed before the Liaison Committee and will be exposed during the meetings in Europe. Reports on details and attitudes from abroad will follow.

HOWARD L. GERHART, *Chairman*

MANUFACTURING

The Manufacturing Committee of the Federation met in St. Louis on April 22 and 23.

Among the topics discussed was the continuation of the waste water project agreed upon at the last meeting. At this time it was decided to proceed with the first step of this project, the technology search. Bill Russell will contact Dr. Shelby F. Thames of the University of Southern Mississippi to get his thoughts on a proper outline and initial costs involved. Chairman LeVea will contact Dr. Myers of PRI and Ray Tackett will contact the Chemistry Department of St. Louis University for additional information. The new title for this project will be: "Develop Technology for Disposing of Process Water Waste from a Coatings Plant."

Our next meeting will be July 22 and 23 in Newark, N. J. This meeting will follow our regular format of two plant tours plus our business meeting. The first meeting of 1977 will be on February 24 and 25 in Tampa, Fla.

The Manufacturing Committee's portion of the 1976 Annual Meeting will consist of an in-depth discussion

of the OSHA requirements for personal air sampling in the coatings plant in four main areas:

(1) Summary of the medical and health aspects of employee exposures to dust, toxic vapors and fumes in the coatings plant.

(2) Analysis of where and how employees are exposed to dust, toxic vapors and fumes in the coatings plant.

(3) OSHA and/or NIOSH testing programs for dusts, toxic vapors and fumes.

(4) Methods of reducing employee exposure to dusts, toxic vapors and fumes.

SLIDE TAPE PROGRAM: Gabriel Malkin asked to be relieved of the responsibility of this project due to other commitments. Omer Petts has volunteered to take over.

EQUIPMENT UTILIZATION FORMULA: Len Magnusson will present this to the JCT for publication.

QUALITY CONTROL PROJECT: Ray Tackett reported project again delayed due to job change. He will contact the local Society Manufacturing Committee Chairman for review prior to publication.

Our discussion again turned to the area of what the Manufacturing Committee can do to help stimulate interest at the local Society level. Len Magnusson suggested that we compile a list of topics and speakers available from our committee to the local Societies. It was agreed that this list should be presented as a fill-in for a last-minute speaker cancellation, with the provision that speakers will not travel over 500 miles, at local Society expense, to reduce time away from the job.

It was also decided to work up a slide tape presentation of the activities of the Federation Manufacturing Committee.

RAY TACKETT, *Secretary*

MATTIELLO LECTURE

The Mattiello Lecture Committee met by conference telephone and unanimously selected Dr. Howard L. Gerhart to deliver the 1976 Mattiello Lecture. Dr. Gerhart graciously accepted.

It was proposed by the Executive Committee that the Mattiello Lecture be given Friday afternoon, October 29. The Mattiello Lecture Committee concurs with this recommendation. In line with this, the Mattiello Committee plans to host Dr. and Mrs. Gerhart at an informal luncheon just prior to the lecture.

R. B. GRAVER, *Chairman*

MEMBERSHIP

From the Constituent Society membership figures, based on the 1974-1975-1976 Year Books, some meaningful data were extracted. While there has been a decrease of about 2½% in Active members, the number of Associates has increased 34%, largely by the addition of former "Society" Associate members of the Los Angeles and Montreal Societies. Although there has been a 5% increase in the total number of Federation members, a further analysis will have to be made to determine the reasons for this particular growth in membership.

With an ever-increasing number of symposia both in the U. S. and Canada, a start has been made to collect the names of attendees whose names *do not* appear in the 1975 Yearbook. John Kenney, of the Southern Society, and a member of this committee, has made a geographical breakdown of the above people attending the recent Water-Borne and High Solids Coatings Symposium in New Orleans, in addition to listing nonmembers at the Southern Society Convention. It is absolutely vital that all local Society Membership Chairmen take the initiative to develop, contact and promote Federation membership at such functions in their areas.

In another bid to search for new sources of members, the lists of firms having members in NPCA and CPMA have been compared with the latest FSCT Yearbook, and names sent to the Federation Membership Committee members and selected Council Representatives for further geographical delegation among local Society Membership Chairmen. Since this project was initiated early in 1976, no results as yet are available.

Furthermore, another list of names of nonmember authors found in copies of JCT over the last five years and a list of speakers at the L.A. Convention who are nonmembers, was prepared by Tom Keene of the Cleveland Society — a service similar to the one Frank Borrelle does for nonmember registrants of the Paint Show for the Societies. Here, too, the list shows the names, company affiliations, and addresses as per geographic area, plus overall results of this information retrieval study.

Since the last report by the Membership Committee for the Fall Council Meeting, several letters of encouragement have been sent to all Society Membership Chairmen. It is hereby recommended that more consideration be given in the planning of Society dinner speakers, taking into consideration the direct bearing on attendance at meetings and subsequent effect on membership.

Thanks to Frank Borrelle and his staff, a close liaison with all Societies has been maintained, and our gratitude is also expressed to him for the latest modification of the membership application forms — which hopefully will see the influx of many new members in the year ahead.

HORACE S. PHILIPP, *Chairman*

METRIC SYSTEMS

The study of conversion of tinting systems to metric use has been completed. Assuming metric cans of size 250 and 500 ml, and 1 and 4 liter, the present tinting systems can be adapted in one of three ways: (1) alter tinting strength of base—i.e. decrease in U.S., increase in Canada; (2) alter stroke of dispensing machine piston—i.e. increase in U. S., decrease in Canada; (3) alter tinting strength of colorant—i.e. increase in U. S., decrease in Canada.

Studies on conversion costs were also carried out. Data obtained were scant and slow to collect. They are, however, well in agreement with U.K. experience. They indicate a basic "one-time-only" basic conversion cost of approx. 0.25%-0.5% of annual sales. Where exceptional circumstances prevail, these costs can be lower or higher than the basic, and we know of examples of both situations.

Contributions to JCT were continued on a regular basis. A talk, describing FSCT's Metric Systems Committee's activities, past and present, were given to the Ontario Paint Association at their Spring Meeting.

Good liaison has been maintained with NPCA's Metric Task Force, and their meetings have been attended. NPCA will prepare an industry-wide conversion plan for submission to, and approval by, the American Metric Board, probably by year's end. This is to forestall any compulsory legislated plan. Liaison has also been maintained with CPMA. This organization informs us that initial reports of difficulties with tinting system conversion were grossly exaggerated and little, if any, difficulties exist.

The Chairman now also serves as a member of Sector Committee 3:8 of the Canadian Metric Commission. It is hoped that a lot of useful information for the work of our committee will be obtained through this connection. A statement at a recent meeting of this Sector's subcommittee's chairman on packaging is worth reporting. He said that "the deeper one gets into the matter of conversion the easier it becomes." Our committee agrees.

E. L. HUMBURGER, *Chairman*

NOMINATING

The Nominating Committee presents the following slate of officers for 1976-77:

President-Elect — John J. Oates, of New York Society (Troy Chemical Corp.).

Treasurer — James McCormick, of Baltimore Society (Leidy Chemical Corp.).

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

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

(2) Horace Philipp, of Montreal Society (Sherwin-Williams of Canada, Ltd.).

(3) John Filchak, of Pacific Northwest Society (General Services Administration).

(4) Howard Jerome, of St. Louis Society (Vane-Calvert Paint Co.).

Two nominees are presented for a two-year term (to fill the unexpired term of Treasurer nominee James McCormick).

(1) Donald J. Fritz, of Philadelphia Society (N L Industries, Inc.).

(2) Dr. Thomas J. Miranda, of Chicago Society (Whirlpool Corp.).

The Nominating Committee suggests that beginning this year each nominee be asked to respond to a series of questions regarding Federation activity, and their answers be published in JCT, along with their biographical sketches and photographs.

J. C. LESLIE, *Chairman*

PLANNING

[See page 33 in this issue—Ed.]

PROGRAM

The Program Chairman has taken the attitude that the Annual Meeting should have on its program the best that the coatings industry has to offer. Therefore, we are striving to select quality over quantity.

The economic situation in recent years has inhibited new coatings development, and it is difficult to find topics that are really new. With this in mind, we are trying to emphasize solutions to ever-present problems, hoping to have discussions in which the audience can take part. Many of the problems encountered are government-oriented, so Washington, D. C. in a bicentennial year offers an excellent opportunity to have discussions of all types of government regulations, services, and philosophies.

We are pleased that PRI will have another mildew encounter, with audience participation, for their part in the program. We will also have the usual convention material, such as overseas papers, Roon awards papers, some excellent general interest papers, and Society papers.

HARRY POTH, *Chairman*

PUBLICATIONS

So far this year we have been unable to coordinate a meeting of the Publications Committee; however, we are still active in the review of papers and books, and other committee activities.

The recent proliferation of symposia and seminars which are competing with the Federation is of significant concern to the Publications Committee. Of note is the recent Chemical Coatings Conference sponsored by NPCA, which was extremely successful. This committee has previously recommended, through the Board, an industry-wide symposium. Attention should be directed to this effort at the earliest possible time. One suggestion is that we form a Seminar Committee or Symposia Committee to undertake such sponsorship.

Another concern of the Publications Committee is to find a mechanism for alerting our readers to governmental impact on our business.

Finally, we are concerned with the quality of Society papers, and will be taking steps to review this situation.

T. J. MIRANDA, *Chairman*

TECHNICAL ADVISORY

I know the general reluctance of busy people to read long reports, so I spent some time in considering how I could convey the true flavor and essence of reports that I have received from the Technical Committee Chairmen (in one case, the Council Rep) of nine of the Societies. After struggling with some extreme condensations, I finally decided to excise only some repetitive and marginally relevant remarks, and to "play back" the responses in a form that does convey their substance and spirit (very low spirit, in a couple of cases!) even though this report would thus be longer than desired.

RESPONSES FROM SOCIETY TECHNICAL COMMITTEES

Baltimore — E. B. Countryman reported on the following current projects:

- (a) Direct Emulsification Technique of Various Polymer Systems;

- (b) Adhesion of Latex Paints to Chalky Substrates, Part II;

- (c) Correlative Testing, A Service to You;

- (d) A Qualitative Control Test for Hydrolytic Stability of Water-Borne Coatings (Paper for 1976 Annual Meeting).

Birmingham — A questionnaire entitled "Testing Cooperation," addressed to all members and referring to test methods for paints, yielded an 85% response. The result was the development of a program of free discussion evenings at which correct test methods were elaborated, and erroneous or fallacious methods were spotlighted.

A forum on determination of viscosity and density of a wide range of materials was scheduled for April 29. Responses to the questionnaire had indicated an adequate need for refinement of the techniques that are used by many for these seemingly simple determinations.

A long list of subjects still awaits treatment, and the Committee looks forward to having sufficient work for the next two or three years.

Golden Gate — The Technical Committee has started a project to investigate the relationship between the flash point of a solvent, the flash points of a series of resin solutions containing the same solvent, and the flash points of a series of standard paints containing the same resin solutions with the test solvent.

The Philadelphia Society is engaged in a somewhat similar project, but there are sufficient differences in the project outlines to preclude duplication of effort; in fact, the possibility for coordination of effort exists, with resulting generation of more useful information.

Consideration should be given to the problem of flash point or "fire point" of water-reducible coatings containing organic coupling solvents. This problem is rapidly coming to the fore, and is engaging the attention of ASTM, among others.

Montreal — Two currently active projects are: Subcommittee #1 — "Adhesion of Latex Paints;" and Subcommittee #2 — "A Study of Freeze-Thaw Stability of Latex Paints."

Through these active subcommittees and through other work, the Montreal Society feels its activity belies the published comment in JCT (August 1975) about "the sagging backbone of the Federation's technical effort." Specifically cited is the Montreal Society's receipt of the first prize award for Society papers at the 1975 Annual Meeting in Los Angeles.

In response to suggestions for new projects, the following were proposed:

(a) A better method for measuring film integrity of latex paints.

(b) Finding a substitute for asbestos in texture coatings.

(c) A study of the relationship between tensile strength [of films] and low temperature flexibility.

(d) A study of chelating agents as corrosion inhibitors for aluminum substrates. (Analogous to Zn for galvanic protection).

(e) Preparation of a detailed text on hazardous products used in the paint industry. This would be a literature search and collation, not a laboratory project.

(f) A study of the relevance of oven stability aging of latex paints.

New England — Several years ago, the Society had three technical subcommittees which had become entangled in long, involved, and cumbersome projects and the subcommittees just "faded away slowly." In an attempt to revive the committee, the idea was proposed to adopt projects which would be "completable within a year."

There was now only one subcommittee, which presented a paper at the Atlanta (1974) meeting. Under Mr. Tracton's direction, the committee continued its work and produced a paper for the Los Angeles (1975) meeting which won a fourth-place Award.

The Society is now continuing its previous project with a more complex pigmentation system. Mr. Tracton observed that these projects are more practical than theoretical, and that "this type of paper is what is needed for the majority of small companies which comprise the Federation."

New York — Tom Ginsberg, Chairman of the Technical Committee, reported that subcommittees (by number) are active in the following projects:

No. 44: Leveling of Latex Paints

No. 69: Discuss Topics of Current Interest [A long term, "current awareness" Committee. See Philadelphia's "Topic of the Month."]

No. 81: Vehicle Migration Through Can Lids

No. 82: Mechanism of Action of Zinc-Rich Coatings

No. 84: Effect of Dispersion Methods on Properties of Latex Enamels

No. 85: Update of Government Specifications

No. 89: Wetting Parameters of Pigments

No. 91: Methods for the Evaluation of Defoamers

Despite the interesting character of these subjects, there is some difficulty in "generating output," and it is felt that the problem behind participation is in getting *management support*. It is proposed that managers who have demonstrated interest and willingness in support of Society technical activities be given "an opportunity to voice their reasons why they believe that technical participation by their personnel benefits them." A "Managers Corner" or "Managers Column" in JCT could supply a forum to supportive managers. Publication of their names, titles, affiliations and brief biographical notes, along with their photographs, would constitute "well-earned recognition" for management people who support the Federation in this way.

Philadelphia — The following are Society projects:

(1) Pigment Dispersion and Weathering: To be presented at the 1976 Annual Meeting.

(2) Dictionary Committee: Now a Federation activity, with Philadelphia Society members spearheading the project.

(3) Updated Pictorial Standards Committee: Joint with ASTM; to replace the Federation Exposure Manual.

(4) Flash Point of Solutions: Work is just beginning, and should be completed for presentation in 1977. [See summary of report from Golden Gate Society.]

(5) Slide/Tape Committee — Microbiological Infestation: Script and slides are completed and were scheduled to be taped for presentation to the Federation Educational Committee at the 1976 Annual Meeting.

(6) Driers V Committee: To be initiated soon.

(7) Surfactant Demand: Continuation of project reported at the 1971 Annual Meeting. This project is on the books, but has not been started because of sufficient activity with other projects.

The Society's annual Seminar this year was "Thermoplastic and Thermosetting Anti-Corrosive Water-Reducible Coatings."

The Society has also been featuring an activity at the Technical Committee meeting each month to attract attendance by more than the usual "true blue" members. The technique has been to have a "Topic of the Month" presentation, involving a member or an invited guest who leads a workshop on a subject which had been selected by members at the previous meeting.

The Society has purchased the

Federation educational slide/tape collection, and is showing two of them at each monthly meeting.

Rocky Mountain — In view of the uniquely high elevation (5,280 ft) of the Denver area, the Technical Committee is considering a project to determine how the elevation and the resulting low atmospheric pressure (Denver: 627 mm; Climax, Colo.: 495 mm.) influences the evaporation of solvents, including water. According to classical theory, evaporation rate of solvents is inversely proportional to the atmospheric pressure. The project would attempt to determine the effect of this low pressure on neat solvents and blends, and their evaporation out of paint films. Help will be sought from a lab processing a thin film evaporometer.

St. Louis — Council Representative Howard Jerome expressed the opinion that the key man in any Technical Committee is the Chairman, who has most to do with "getting it all together." It is relatively easy to find people who will work in the ranks of the Technical Committees, but the leadership is the crucial factor. Since the smaller Societies have a smaller pool of prospective leadership candidates, the problem sometimes seems to be insuperable.

Increased recognition may be a favorable factor in attracting high caliber candidates for leadership positions.

It may be possible to use the enthusiasm and vigor of some of these Societies, with their abundance of ideas for good technical projects, to rejuvenate the morale of those few whose spirits have lagged. The expertly planned investigation of two different aspects of the same problem by the Golden Gate and Philadelphia Societies, may be duplicable by design with the encouragement of cooperative approaches by pairs of other Societies.

These ideas and others will be explored in a meeting that will be set up, by consultation with the Societies when the Technical Committee Chairmen will be invited to assemble for a one-day meeting in Cleveland under Federation sponsorship.

SIDNEY LAUREN, *Chairman*

TECHNICAL INFORMATION SYSTEMS

Thanks to the contributions from committee members Hans K. Raaschou Nielsen and Helen Lamrey, the Technical Information Systems Committee continues to com-

pile and combine the contents of/ from major foreign paint and coatings periodicals into the "Technical Articles in Other Publications" page published monthly in the JOURNAL OF COATINGS TECHNOLOGY.

The committee is represented on the Program Committee for the Annual Meeting in October and is planning sessions on Federal Government Agencies as sources of technical information through publications and services — quite an appropriate theme for a meeting held in Washington, D. C.

HELEN SKOWRONSKA, *Chairman*

DELEGATE TO NACE

Your delegate had the opportunity to attend the annual meeting of the National Association of Corrosion Engineers the week of March 21, Houston, Texas. Total registration was approximately 3,000, and was the largest attendance of any NACE conference to date.

T-6 STEERING COMMITTEE

The following summarizes the more important points covered:

(1) Officers of Unit Committees for the next two years. T6A — Chairman—Carroll Steely; Vice Chairman—Dave Davison. T6G — Chairman—Paul Weaver; Vice Chairman — Jim Bennett. T6H — Chairman—Bob Goggins; Vice Chairman — Parker Helms. T6Q — Chairman — Al Roebuck; Vice Chairman — Ken Tator.

(2) The 1977 Annual Meeting will be held in San Francisco. Theme is "Art is for the Gallery — Steel Protection Needs Science." Planning six papers. Technical and more scientific in nature, directed towards the fundamentals that are field oriented. A one day Coating Symposium is being recommended.

(3) Discussed T6Q and its objectives — Unit Committee to be called — Quality and Performance Assurance — Assignment is "to publish reports and standards describing methods of assuring maximum protective coating performance through specifications, quality control, procedures, inspections, and standard tests."

(4) Recommended the following grants be approved:

(1) \$500 to SSPC.

(2) \$5000 to support work on T6H15 — Effects of Surface Preparation on Service Life of Protective Coatings.

(5) Carroll Steely showed a prototype of a catalogue of all standards and informational documents published by the Task Group of T-6. It was agreed that this was an excellent piece of work and should be made available to the membership

through the NACE office. Approximate cost would be \$50 per copy. The catalogue, NACE *Coatings and Linings Handbook*, would be available in approximately 2-3 months.

(6) Stressed importance of TPC work week in Dallas. This year's work week begins September 13.

(7) NACE is revising two basic manuals: (a) Standards Manual; and (b) Technical Committee Operational Manual.

(8) Training Course for Inspectors is being developed. A successful course was held in Washington earlier this year.

(9) All T-6 published documents are to be reviewed and updated to ensure that they are current with present technology.

(10) T-6 is going to be involved with TAPPI in a coating symposium being held in Houston in October.

COATINGS AND LINING MATERIALS FOR IMMERSION

T6A25 — Inorganic Zinc Coatings for Immersion Service—Discussion centered on use in aircraft fuel tanks and the dangers. Report to be issued shortly.

T6A29 — Design Fabrication on Surface Finish of Tanks to be Lined for Chemical Immersion Service. — Group held meeting on March 21. Draft *VII* or report will be ready shortly for letter ballot.

T6A30 — Monolithic Organic Corrosion Resistant Floor Surfaces. — Proposed standard had seven negative ballots — these have been resolved, and standard will be ready for general distribution for letter comment.

T6A31 — Reinforced Thermosetting Linings for Industrial Equipment. — Negative ballots have been resolved. Editorial changes have been made. Report to be retyped and sent out for letter ballot for committee members.

T6A36 — Determination of Theoretical Coverage Rates of Inorganic and Organic Protective Coatings — Standard method being developed — one negative ballot to be resolved. Problem is still in measuring void content in inorganic zinc. Suggestion made to issue organics separately since volume solids measurements in organics are no problem. Inorganics present the real problem.

T6A37 — Electrical Inspection of Linings — Deals with inspection and use of electrical holiday detectors. Much confusion in this area. Group is trying to bring together information available from and being developed in groups T-1 & T-10. Voltages, film thicknesses precautions, etc., must be looked at before a standard can be developed. Elec-

trical inspection has to take into account thin and thick film coatings and the dielectric strength of the coating. Technical facts need to be developed in this field. Suggestion to develop an informational report on what equipment is available and their intended uses.

T6A38 — Repair and Maintenance of Lining Systems — New committee established. Informational report to be prepared.

T6A39 — Coatings in Conjunction with Cathodic Protective — New committee; needs a chairman. Require an informational report.

T6A40 — Determination of Water Extractable Substances from Organic Coatings — Informational report is being prepared for letter and comment.

COATINGS FOR ATMOSPHERIC SERVICE

T6H6 — Painter Education. — Scope has been reviewed. Inspector Training was felt to be important. Painter Education programs are available from many other sources and we would, therefore, be duplicating this work. Inspector Training as it would be constituted would come under the Unit Committee T6Q.

T6H7 — Epoxy Esters. — Informational report — negative votes have been resolved. Report is being rewritten for resubmission for publication.

T6H13 — Petroleum-Based Coatings for Atmospheric Service. — Discussion of whether we should continue this group. Group decided to continue to hold this task group active and attempt to get a chairman.

T6H15 — Effects of Surface Preparation on Service Life of Protection Coating. — A report is being given on the results of the panel testing to date.

T6H19 — Hot Dip Galvanizing. — Will be holding a meeting in Houston. Report to go out for unit review and comment.

T6H22 — Latex Maintenance Coatings. — Report has been passed and will be published shortly. Report will be called Acrylic Latex Maintenance Coatings.

T6H23 — Feasibility and Economy of Shop Priming. — One negative ballot to be resolved, then report will be rewritten and published.

T6H24 — Topcoats for Zinc Rich Primers. — Report ready for distribution and letter ballot shortly.

T6H25 — Protective Coating Ex-

posure Panel Testing. — Report has been rewritten and will be going out for unit review and comment.

T6H26 — Vinyl Coatings — This report update has been rewritten and will be ready shortly for distribution for unit review and comment.

T6H27 — Combating Adhesion Problems when Applying New onto Old Finish Coats of Paint. — Lack of interest — task group dismissed.

T6H28 — Epoxy Polyamide Coatings. — Two negative ballots need to be resolved. Once these are resolved, report can be published.

Hy Kredentser's term of office as Vice-Chairman has expired. Parker Helms succeeds him as new Vice Chairman of T6H.

T-6G—SURFACE PREPARATION

Reviewed laboratory profile work being carried out at SSPC — progress to date, answers, questions and work that still needs to be done. Expect to have a more definitive report on current work later this year.

Silica Safety Association Report — Survey re. replacement for sand due to silicosis hazard. Survey showed that there was nothing available in quantity yet to replace sand. Association hopes to have a standard to present to OSHA as an alternative.

HY KREDENTSER, *Delegate*

DELEGATE TO NATIONAL FIRE PROTECTION ASSOCIATION

The Sectional Committee on Coatings Manufacture (NFPA No. 35) met in December to evaluate 52 suggestions submitted during the public review period.

The Standard for the Manufacture of Organic Coatings is in final form for submission to the 1976 NFPA Annual Meeting, for adoption, May 17-20, 1976.

RICHARD J. HAVILAND, *Delegate*

DELEGATE TO NPCA SCIENTIFIC COMMITTEE

The NPCA Scientific Committee met in Houston on March 30 and 31.

An important subject under discussion was the alleged toxicity of chromate pigments. It was pointed out, for instance, that in paint applications the pigment is generally encapsulated in binder so that whatever may be found for dry pigments might not be applicable to paints containing the same pigments. The value and the feasibility of an epi-

demiological study were also considered.

An update on the toxic substances legislation under consideration indicated that the legislatures seem now to accept paints as mixtures and not as chemical substances. This simple change in definition would exonerate a large section of the coating manufacturers from an incredible amount of limitations and red tape.

A thorough reassessment of the options available in the field of education is underway and the Committee, no doubt, will hear more on the subject in the months to come.

More reports were presented on labeling regulations and flammability of water-borne coatings by close cup testing.

Air and water pollution controls received, as usual, a lot of attention, especially in view of the hearings being conducted in Southern California.

It is obvious that regulations will continue to come in growing numbers. It becomes more important every day that we work with the legislatures and the regulating agencies as a unified and civic-minded industry and that we support our positions with well-documented data.

UMBERTO ANCONA, *Delegate*

Fall Council Meeting

Sheraton Park Hotel

Washington, D. C.

October 26, 1976

Report of Planning Committee

The Planning Committee held its second meeting on March 22, in Philadelphia.

The report of the meeting of December 13, 1975, had been presented to the Board of Directors on January 17, 1976, with a request for transportation expenses for a second meeting — so that the Planning Committee could further amplify and explore its recommendations. The Board approved, with instructions that the Committee submit a complete report to the spring meetings of the Board and Council.

The following are the recommendations of the Planning Committee with regard to: (1) Technical/Educational Coordinator; (2) Attracting New Blood into the Federation; (3) Planning Committee a Standing Committee; and (4) Reorganization of the Federation.

TECHNICAL/EDUCATIONAL COORDINATOR

The committee reiterates that the scope of Federation responsibilities in educational, technical, and manufacturing areas is increasing, so that fulfillment of these industry obligations cannot be effectively carried out by volunteers.

Therefore, the committee recommends to the Board of Directors that a Technical/Educational Coordinator be hired and added to the Federation staff on a full-time basis.

The qualifications and duties of the T/E Coordinator in the previous report were reviewed and revised to the following:

Basic Qualifications of T/E Coordinator

- (1) Possess a Bachelor's Degree, at the minimum.
- (2) Have some experience or background in the coatings field (5-10 years).
- (3) Speak with authority and write well, so as to communicate ideas and programs effectively.
- (4) Have the personality to stimulate technical, educational, and manufacturing activities in the Constituent Societies.
- (5) Be willing to travel extensively.

Outline of Duties of T/E Coordinator

(1) Work in close cooperation with the Chairmen of the Federation's Educational, Manufacturing, and Technical Advisory Committees, attend all their meetings, and assist them with their duties.

(2) Cooperate with Constituent Societies and help coordinate and stimulate their educational, manufacturing, and technical activities.

(3) Prepare a "Technical Newsletter" for distribution to Federation members.

(4) Maintain close liaison with the technical and legal staffs of NPCA and represent the Federation at meetings of the NPCA Scientific Committee.

(5) Assist with the preparation of the Annual Meeting Program.

(6) Be available to industry management for the purpose of informing them of Federation and Society technical, educational, and manufacturing activities.

(7) Represent the Federation at all meetings of the Paint Research Institute.

(8) Publicize courses of study in coatings technology and assist in curricula preparation.

(9) Visit Constituent Societies and report to the general membership on activities of the Federation and the Paint Research Institute.

(10) Administer the Federation scholarship program.

(11) Attend and report at meetings of the Finance Committee and the Board of Directors.

(12) Report directly to the Executive Vice-President.

The person should be given a three-year employment contract so as to allow ample time for the complete development and fulfillment of the duties of this new Federation position.

Annually, the T/E Coordinator would be required to submit, to the Board of Directors, a report covering his activities and accomplishments.

The Planning Committee estimates that such a person on staff would

involve funding of about \$100,000 (salary, travel expenses, secretarial help) over a three-year period.

The Planning Committee further recommends that the Federation Board of Directors appoint a Hiring Committee (to include one member of the Planning Committee) immediately to review possible candidates for the position.

ATTRACTING NEW BLOOD INTO THE FEDERATION

So that the Federation may continue to be a viable organization, the Planning Committee feels strongly that we must bring new faces, from the rank and file, into Federation and Society activities. There is an untapped source of talent in Federation/Society membership, and ways must be found to encourage these members to participate more actively than they do.

The committee therefore recommends to the Board of Directors the consideration and implementation of the following:

(1) That Societies not appoint Federation Past-Presidents as Society Council Representatives, and further, that the Federation not appoint Federation Past-Presidents as Federation committee chairmen, with certain exceptions as covered in the By-Laws. The service of Federation Past-Presidents as members of both Society and Federation committees is, however, encouraged as their experience would be invaluable.

(2) That the Federation's current policy of reimbursement of transportation (only) expenses to the Spring Council Meeting, Board of Directors meetings, and approved meetings of Federation committees, be amended so that members fully attending these meetings would be reimbursed transportation, plus a certain maximum daily expense for meals and hotel.

The Planning Committee feels that there are many interested and capable members who would be glad to serve on Federation committees if the "money doors" did not close

the option of serving on committees.

Recommendation (1) above opens opportunities for wider participation. Recommendation (2) removes the financial restriction against members whose companies do not support their travel expenses.

PLANNING COMMITTEE

The activities and objectives of any organization, and their relationship thereto, need to be reviewed on a regular basis, and the committee recommends that a Planning Committee become a standing committee of the Federation and that Article VII, B, of the By-Laws be revised accordingly.

METHODS OF OPERATION IN THE FEDERATION

Two of the charges to the Planning Committee from the Society Representatives were: to review the usefulness of the Federation Council as presently functioning; and to encourage wider participation by the membership.

In considering these concerns of the Society Representatives, the committee devoted much discussion to several ideas:

(1) Establishing geographical regions within the Federation.

(2) Discontinuing the Federation Council.

(3) Expanding the membership of Society Representatives on the Board of Directors.

(4) Changing the number of elected Federation officers from three to two (President and Vice-President/Treasurer). Term of office for President to be two years. (see "other Recommendations").

(5) Offering two candidates for each officer position. (see "Other Recommendations").

(6) Voting for Federation elected officers by direct ballot of the Federation membership — with election to be by the Societies, each of which would have one vote. (see "Other Recommendations").

After a long and thorough evaluation of these suggestions, the committee proceeded toward "first things first." A change in Federation structure is in order now if the Federation is to fulfill its purpose and objectives in the coatings industry. Therefore, the committee decided to offer recommendations re (1), (2), and (3) above. Priority dictates that these be given immediate consideration.

Ideas (5) and (6) — while providing for a more democratic process in officer elections at the grass roots level (as does ACS and SPE)—are not urgent at this time. Most committee members felt, however, that they appear to be worthy considerations for the future.

The recommendations that follow present the basic framework for the reorganization of the Federation into regional spheres of activity. Such a reorganization is a major step toward getting meaningful participation in the Federation on a democratic basis.

Regionalization

The committee recommends to the Board of Directors that the organization of the Federation be based on a structure which would include five regional areas, as successfully practiced now by the Educational Committee:

(1) NORTHEAST — Philadelphia, Montreal, New York, Toronto, New England;

(2) SOUTHERN — Southern, St. Louis, Houston, Dallas, Kansas City;

(3) EASTERN — Baltimore, Pittsburgh, Louisville, C-D-I-C, Piedmont;

(4) CENTRAL — Northwestern, Detroit, Western New York, Chicago, Cleveland; and

(5) WESTERN — Rocky Mountain, Golden Gate, Pacific Northwest, Los Angeles.

Effective communications will be established if the Societies within each region hold annual or semi-annual meetings, to be attended by all Society officers and Society representatives.

Federation Council

The committee recommends to the Board of Directors that the Federation Council, an advisory body in its present form, be discontinued and that a new and enlarged Board of Directors, including representatives from the five regions be established.

New Board of Directors

In the reorganization plan, the committee recommends to the Board of Directors that a new Federation Board of Directors be established, to be composed of:

- The three elected officers.
- The immediate Past-President (one-year term)
- Two other Past-Presidents (two-year terms, to be selected by the Past-Presidents)
- Fifteen Society Representatives (three from each of the five regions). The representatives would be elected for three-year terms by the Constituent Societies. The terms of five would expire each year — one per region. These representatives would be elected from the Societies of each region on a rotating basis.

Every member of the Board, of course, would be a voting member. The Executive Committee will be

composed of the three elected officers and two Board members for a total membership of five.

OTHER RECOMMENDATIONS

The Planning Committee concluded its deliberations with these additional recommendations to the Board of Directors:

(1) That the President appoint a special Study Group, including one member from the Planning Committee, to further consider and evaluate the entire report of the Planning Committee.

(2) That this report be turned over to the By-Laws Committee with a request that it report back to the Board of Directors on the constitutional, legal, and procedural questions raised by the propositions contained in the report.

(3) That thorough publicity be given to the proposals — during the review by the Study Group and the By-Laws Committee — so that the membership will be adequately informed.

(4) That consideration be given to popular election of the elected officers of the Federation. Whether this would involve a change in term for officers or number of officers would be left to further discussion. It is therefore recommended that within two years, the Board of Directors consider the matter of popular election and open consideration to suggestions by the membership through their Society Representatives.

FRANK J. BORRELLE,
Executive Vice-President

Society Representatives Comments on Planning Committee Reports

Each of the major recommendations in this report was discussed by the Society Representatives, and the summary of their comments are presented herewith:

T/E COORDINATOR — The Societies endorsed this recommendation, and moved that Council recommend to the Board of Directors that a Technical/Education Coordinator be hired and added to the Federation staff. The motion carried — with two negative votes.

ATTRACTING NEW BLOOD INTO THE FEDERATION —

(1) Regarding the recommendation that the Societies not appoint Federation Past-Presidents as Society Council Representatives, this was opposed as the Society Representatives feel this would be an infringement on the rights of the Societies to choose who should represent them.

(2) With regard to policy of reimbursement of expenses to Federa-

tion meetings, it was noted that some Societies do not pay expenses currently, and these will be requested to do so. Regarding whether the Federation should assume both transportation and certain daily expenses for meals and accommodations, it was recommended that this be referred to an Ad-Hoc Committee.

PLANNING COMMITTEE — Establishment of a standing Planning Committee is opposed, as it is felt there is no continuing need for such a committee.

METHODS OF OPERATION IN THE FEDERATION —

(1) The establishing of geographical regions within the Federation is opposed with regard to government; however, it is viewed favorably as a means for closer liaison and communications.

(2) Discontinuing the Federation Council and (3) Expanding membership of Society Representatives on

the Board of Directors were treated jointly. It is recommended that the current Council and Board structure be abolished, and replaced with a reorganized Council or Board, composed of the 25 Society Representatives, elected Officers, two Past-Presidents, to be complemented with a strong Executive Committee. This matter should be referred to an Ad Hoc Committee.

OTHER RECOMMENDATIONS —

(1) A motion was made and carried that a special Ad Hoc Committee be appointed to evaluate the Planning Committee's report (with exception of recommendation concerning hiring of T/E Coordinator). The Committee is to present an interim report to the Council at the Fall Meeting in Washington, D. C.

(2) In accordance with the recommendation that an Ad Hoc Committee be appointed to further study

the Planning Committee report, it is premature to turn over the report at this time to the By-Laws Committee.

(3) It is agreed that thorough publicity should be given to all actions proposed so that the membership will be adequately informed.

(4) Popular election of Officers is opposed, as it is felt that the Society Representatives, in their role as spokesmen for their Societies, should continue to elect candidates for Officer and Board positions. It was recommended that the present 1-year term for the President be continued, as well as the three Officer positions; however, it was suggested that the Treasurer position no longer be an elected position, but that an Honorary Treasurer be appointed each year who would also serve as Chairman of the Finance Committee.

Report of By-Laws Committee

ADOPTED

The following amendment was adopted at the Spring Council Meeting on May 14, and became effective immediately upon adoption.

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 the word "eligible" as redundant, be it

RESOLVED that Article III, B be amended with an added sentence and changed as follows, added sentence in *italics* and deletions in parentheses:

"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. *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.*

TO BE PRESENTED FOR ADOPTION

The following amendment was given first reading at the Spring Council meeting on May 14, and will be presented for adoption at the Fall Council Meeting on October 26 in Washington, D. C.

ARTICLE X DUES

WHEREAS the Board of Directors has requested an increase in the member dues because of increasing costs of operation, be it

RESOLVED that Article X, A, which fixes annual dues at ten dollars (\$10.00) per capita be amended to read:

"Each constituent Society shall pay to the Federation office annual dues of fifteen dollars (\$15.00) per capita for each Active, Associate, and Society Honorary Member of the Constituent Society."

The balance of Article X is to remain unchanged.

HOWARD JEROME, *Chairman*
By-Laws Committee

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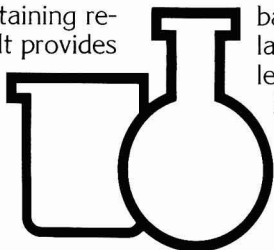
POLYWET ND-2 is recommended for slurry shipments and storage. It may be used in all types of latex

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News from Washington

Mercury Ban Lifted for Water-Based Paints

Russell Train, Administrator of the Environmental Protection Agency, in a reversal of his February 17, 1976 Order, has reinstated registrations of mercurial pesticides for use as in-can preservatives in water-based paints and coatings, and as fungicides in water-based paints used for exterior applications.

In a Decision issued on May 27, Mr. Train said, "On reconsideration of the portions of my Decision and Order of February 17, 1976 cancelling the registrations of mercurial pesticides for use in water-based paints and coatings, I conclude that I erred. Accordingly, I am today modifying my February 17 Order to reinstate such registrations."

Commenting on the Administrator's decision, NPCA President Robert A. Roland said it was "a vindication of the legal principle of pursuing rights and remedies under administrative and court law." The Association, along with three member companies (Cosan Chemical Corp., Tenneco Chemicals, Inc., and Troy Chemical Corp.) had appealed the February 17 decision with the U. S. Court of Appeals. These proceedings were stayed pending judicial review, and the briefing schedule was held in abeyance pending EPA's review of NPCA's Motion for Reconsideration.

"We are gratified," said Mr. Roland, "that the Administrator granted our Motion for Reconsideration. We are especially pleased that subsequently, Mr. Train reviewed the evidence, gave it full, serious and fair reconsideration, and concurred that the evidence supporting our case was substantial and compelling."

Mr. Roland added that the reversal Order is "in the best interests of the American consumer since it

provides the consumer with a safe, effective paint product."

The May 27 decision does not affect the status of the uses of mercurial pesticides as fungicides in oil-based paints. The cancellation of these registrations and certain other pesticidal uses of mercury have been stayed pending judicial review.

Registrations of all pesticidal uses of mercury were originally cancelled by EPA in March 1972. The cancellation order was subsequently appealed by the suppliers of these compounds. The results of the lengthy administrative proceedings were published in December 1975. In his initial decision, Administrative Law Judge Bernard Levinson concluded that the use of mercury-containing pesticides as an in-can preservative in water-based paints and coatings, and as a fungicide in water-based paints and coatings for exterior application, . . . "when used in accordance with widespread and commonly accepted practice, will not generally cause unreasonable adverse effects on the environment within the meaning of section 2(bb) of FIFRA and the registrations for such uses should not be cancelled." Administrator Train's decision of February 17 to ban the uses of phenylmercuric compounds in all paints and coatings rejected Judge Levinson's decision.

At that time, NPCA joined with Cosan, Tenneco, and Troy in seeking relief from the Administrator's Order. A Petition for Review was filed with the U. S. Court of Appeals on February 19. NPCA also joined the other parties in seeking both a stay and a reconsideration of the Order by EPA. The stay was granted on March 2; the Motion for Reconsideration was granted on March 26. Legal briefs on reconsideration were filed by NPCA and the three firms on April 16.

EPA Publishes Guidelines For Certain Raw Materials

The Environmental Protection Agency published in the May 18 issue of the *Federal Register* Interim Final Effluent Guidelines for Existing Sources to be achieved by the application of the best practical control technology currently available for certain subcategories of two point source categories (Part 454 and Part 458) of raw materials used in paint manufacturing.

Part 454 — Gum and Wood Chemicals Manufacturing Point Source Category — includes effluent limitations for the following subparts: B, gum rosin and turpentine category; C, wood rosin, turpentine, and pine oil; D, tall oil rosin, pitch, and fatty acids; and F, rosin-based derivatives.

EPA also published, in the same issue, proposed effluent limitations and guidelines for existing sources by the application of the best available technology economically achievable, standards of performance, and pretreatment standards for new sources for the above subcategories.

Part 458 — Carbon Black Manufacturing Point Source Category — includes effluent limitations for the following subparts: A, carbon black furnace process; B, carbon black thermal process; C, carbon black channel process; and D, carbon black lamp process. This part also included proposed effluent limitations and guidelines for existing sources by the application of the best available technology economically achievable, standards of performance and pretreatment standards for new sources for these same subparts.

If the final regulations differ substantially from these interim final regulations, EPA will consider petitions for reconsideration of any permits issued in accordance with these interim final regulations.

Metrication Report

"Metrication: Myths and Realities," the second annual report from the American National Metric Council is now available. Included in the 32-page report is an 8-page section on metrication in business and industry. Copies are \$4 each. To obtain copies, contact American National Metric Council, 1625 Massachusetts Ave., N. W., Washington, D. C. 20036.

OSHA Seeks Comments on Chromium Data

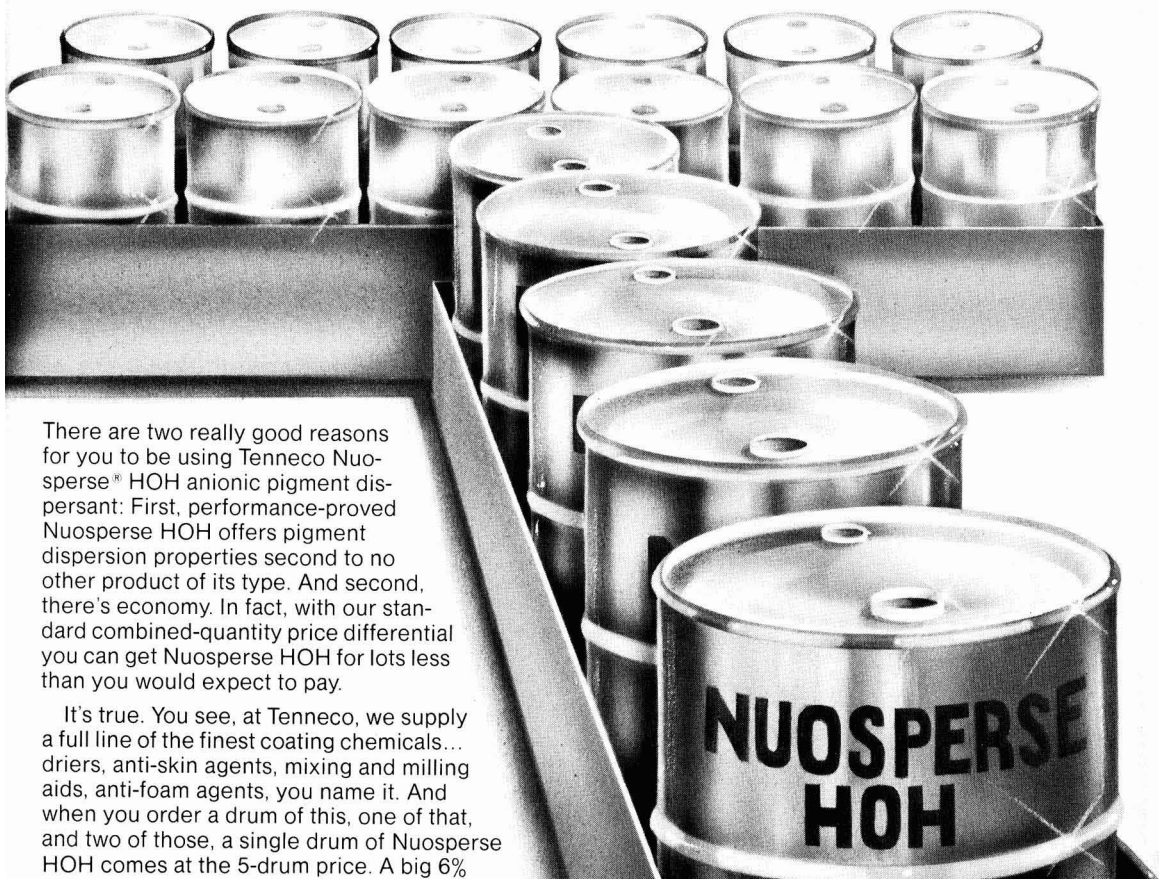
A notice of a proposed rule-making for hexavalent chromium has been issued by the Occupational Safety and Health Administration. OSHA has also asked for specific comments on the criteria document for hexavalent chromium issued by the National Institute for Occupational Safety and Health.

In the May 7 issue of the *Federal Register*, OSHA stated that "a comprehensive occupational health standard is urgently needed to protect employees from the harmful effects

of exposure to hexavalent chromium."

Comments were specifically requested on the following: (1) Delineation of carcinogenic and non-carcinogenic hexavalent chromium compounds; (2) Exposure limits; (3) Action levels; (4) Analytical methods; (5) Worker exposure data; (6) Medical surveillance; (7) Technological feasibility of compliance with the NIOSH recommendations; (8) Economic feasibility of compliance; (9) Inflationary impact.

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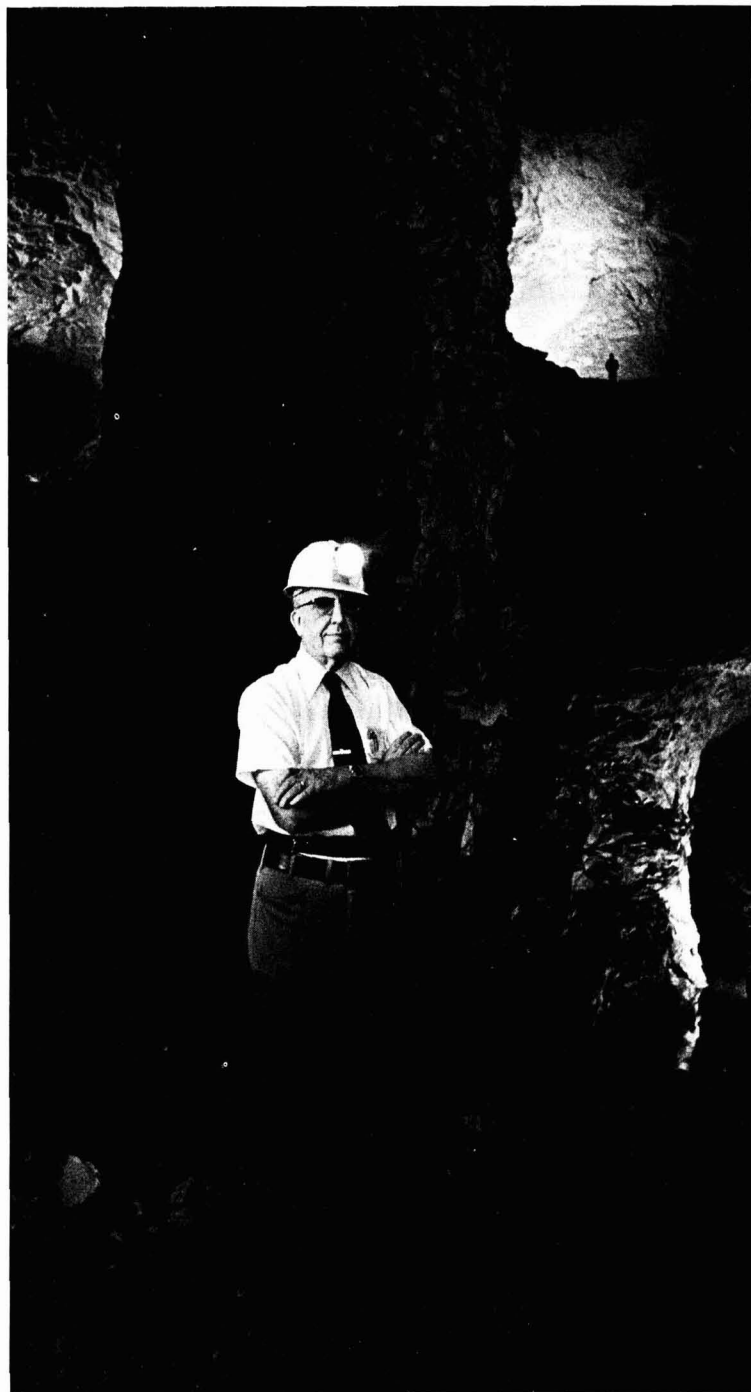
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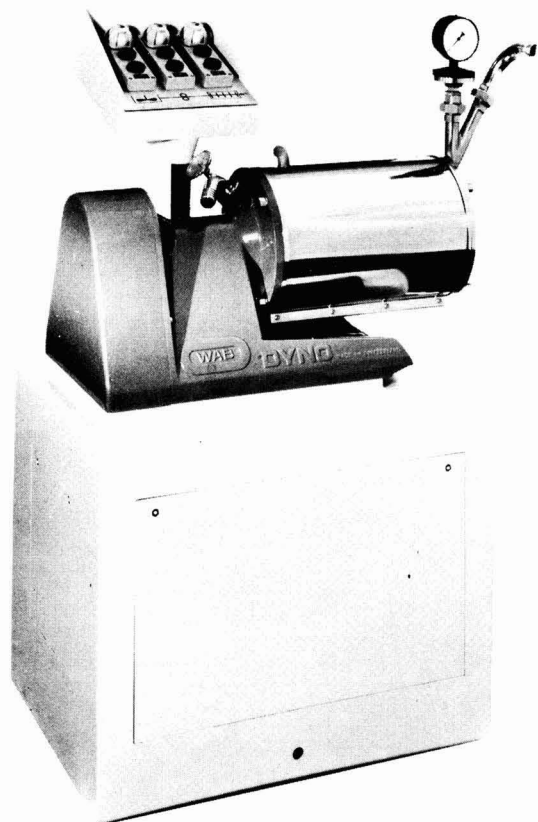
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Alpha Backscattering Technique To Establish Parameters For Curing Oleoresinous Lacquers on Tinplate

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and

M. PEISACH

Southern Universities Nuclear Institute†

Alpha particle backscattering has been used to follow the curing of oleoresinous lacquers on tinplate by measuring the carbon to oxygen ratios in the outer layers of the lacquer. The precision of the method has been established and the effects of stoving temperature, duration of stoving, and batch variation have been studied.

KEY WORDS: Alpha particle backscattering; Cans; Curing; Lacquer; Tinplate.

INTRODUCTION

In the can manufacturing industry widespread use is made of internal organic coatings for tinplate containers. Lacquer is the general name given to unpigmented organic coatings applied internally to most fruit and food containers. As the lacquer serves to extend the service performance of tinplate containers certain optimum characteristics are desirable. The lacquer must be sufficiently hard and resilient to withstand mechanical damage during manufacturing processes, and sufficiently resistant to the sterilization process and attack by the contained product.

Oleoresinous lacquers are cured by heat treatment in air. They are fairly tolerant to *overcuring* but some degree of adhesion and fabrication loss will be experienced; of course such techniques would be uneconomic with respect to stoving time and energy consumption. It has been the industry's experience that inadequately cured lacquers result in poor protective action and the risk of flavor contamination. For these reasons considerable effort

has gone into developing methods for determining whether lacquers have been adequately cured.

Numerous subjective methods¹ for evaluating state-of-cure have been developed, the most popular being those based on abrasive or scratch resistance, solvent resistance, and color changes. These techniques only serve, at best, as a guide and are not reproducible. Even though the reliability of these techniques has been improved by mechanical refinements, only very limited information can be obtained.

PREVIOUS METHODS

Very few objective methods are available for assessing the state-of-cure and it may be appropriate to examine these briefly. ERA, evaporative rate analysis,² is a method which attracted a great deal of attention some years ago.³ The technique involves measuring the rate of evaporation of a radioactive labeled high boiling material, a solution of which is applied to the surface of the lacquer under controlled experimental conditions. The analysis therefore determines the degree of resistance of the lacquer to solvent attack, and it is inferred that the property is related to the degree of oxidation. Consistent results can be obtained only when the film thickness is rigidly reproducible, but variations in film thickness lead to serious errors.

Another serious disadvantage lies in the public resistance towards the use of radioactive materials in food industries and any attempts to decrease the amount of radioactivity involved in the test will result in a decrease in analytical precision. However,

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despite its disadvantages, this method has been accepted as the best indication of the state-of-cure.

In principle the use of dyes also relies upon the penetration of the lacquer film by solvents.⁴ In this approach a dyestuff is incorporated in the testing solvent and the release of coloring matter by subsequent periodic extractions under controlled conditions is followed by spectrophotometric measurements.⁵

Infrared spectroscopy has been used to study structural changes during the curing process.⁶ However, the nature of the analytical information obtained from these tests is not suitable for determining the state-of-cure on a routine basis.

Mention should also be made of the use of electrical resistance measurements for determining whether a lacquer has been properly cured. In this technique a carefully prepared chain of gold, coated with graphite, is placed on the lacquered surface and the resistance between the chain and the tinplate is measured at 220°C at 30 sec intervals. It is claimed⁷ that the rate of change of resistance in the sample, relative to that in a known standard, is characteristic of the state-of-cure. The method is very sensitive to the nature of the graphite film on the gold chain and is difficult to apply as a routine tool.

Since the knowledge of the state-of-cure of the lacquer is so important to the canning industry, there is a need to develop objective analytical methods. It is preferable to have a more direct connection between the state of the lacquer surface after curing and the conditions under which the curing process occurred.

PRINCIPLE OF PRESENT METHOD

Oleoresinous lacquers are not thermosetting but undergo a temperature dependent process of oxidation during curing. When an applied lacquer is stoved under oxidizing conditions the curing process will proceed through (a) volatilization of solvents; (b) degradative oxidation of the long chain organic materials; and (c) the formation of cross-linkage between resin polymers with or without the loss of small organic molecules, such as carbon dioxide.

The final state-of-cure is an ill-defined term referring to the acceptability of the product rather than a measure of the extent to which any of the above mechanisms have proceeded. In this investigation it was observed that the surface layers of cured lacquers contain a relatively increased concentration of oxygen. Analytical methods capable of determining the relative concentrations of carbon to oxygen should therefore be applicable in determining the state-of-cure.

In this investigation Rutherford backscattering of accelerated alpha particles has been used to analyze surface layers of cured lacquers.

The energy of the alpha particles used in this investigation was chosen so that their range in the lacquer film did not exceed the film thickness. As far as the bombarding beam was concerned, the analyzed sample was thus 'infinitely' thick. The effects observed with higher energies of alpha particles have been discussed elsewhere.⁸

When a monoenergetic beam of charged particles with energy E and mass M_1 is scattered from the surface atoms of a target material through an angle θ , the energy of the backscattered particles is determined by the mass of the surface atoms (M_2) and is given by E' where

$$\frac{E'}{E} = k = \left(\frac{M_1 \cos \theta + M_2 \cos \alpha}{M_1 + M_2} \right)^2 \quad (1)$$

and the parameter α is obtained from:

$$\sin \alpha = \frac{M_1 \sin \theta}{M_2} \quad (2)$$

In the case of a lacquer the surface atoms are primarily hydrogen, carbon, and oxygen. The values of k for alpha particles scattered through 135° for carbon and oxygen are:

$$k(\text{carbon}) = 0.30480$$

$$k(\text{oxygen}) = 0.41728$$

From equation (1) it follows that:

$$\Delta E' = E(\Delta k) \quad (3)$$

where Δ refers to the difference between the corresponding parameters for carbon and oxygen. Hence $\Delta E = 0.11248E$. Surface barrier detectors used to measure the energy of the backscattered particles typically have a resolution of a few tens of keV. It is therefore possible to use these detectors to distinguish particles scattered from surface carbon and surface oxygen atoms when the bombarding energy is 0.6 MeV or greater.

When Rutherford scattering occurs from sub-surface atoms, the bombarding beam undergoes energy loss along its path through the lacquer to the scattering site, and again after scatter. These scatter events will result in the measurement of particles having energy less than kE for the corresponding element. Accordingly the energy spectrum of the scattered particles will consist of a series of plateaus terminating in steps, the energy of which are given by the respective values of kE . The height of each step will be determined by the surface concentration of the corresponding element.

The probability of scatter is given by σ where:

$$\sigma = \text{Cosec}^4 \left(\frac{\theta + \alpha}{2} \right) \left[\frac{Z_1 Z_2 e^4}{4E} \cdot \frac{M_1 + M_2}{M_2} \right]^2 \cdot f(M, \theta) \quad (4)$$

where

$$f(M, \theta) = \frac{k}{\cos \alpha} \left(\frac{M_1 + M_2}{M_2} \right)^2$$

and Z_1 and Z_2 are the atomic numbers of the bom-

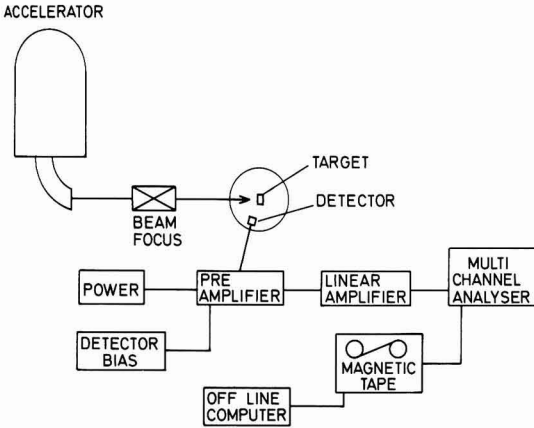


Figure 1—Block diagram of the experimental and electronic equipment

barding particle and target atom respectively, with the electronic charge given by e .

For the conditions defined above, in units of e^4/E^2

$$\sigma(\text{carbon}) = 10.383$$

$$\sigma(\text{oxygen}) = 19.980$$

Thus surfaces containing a unit atomic concentration ratio of carbon to oxygen will give a count ratio of 0.5197. Conversely the count ratio from an analyzed surface will be a measure of the atomic composition of the surface layer. Changes in the count ratio can thus be used to follow changes in the elemental composition of the surface, without necessarily expressing these changes in absolute atomic ratios. By correlating count ratios to the various stoving parameters during curing, the method can be used to determine state-of-cure.

EXPERIMENTAL

Alpha particles (as $^4\text{He}^+$ ions) were accelerated to 2MeV using the 6MV Van de Graaff accelerator of the Southern Universities Nuclear Institute. The bombarding beam was collimated to a diameter of 3.5 mm and directed onto lacquered tinplate specimens of about 16 mm square or strips 16 mm wide, mounted normal to the beam in a vacuum scattering chamber operating at pressures below about 8×10^{-5} Torr. Beam currents ranged between 15 and 70 nA and were measured by integrating over the period of bombardment in the insulated chamber.

The scattered particles were detected by a surface barrier silicon detector having an area of 100 mm², but the acceptance area was restricted to 12.5 mm² by a circular collimator 4 mm in diameter. The detector had a sensitive thickness of 300 μm which was sufficient to stop alpha particles below 24 MeV. The energy resolution as measured with the alpha particles from a thin source of ^{241}Am was 21 keV.

The detector was mounted 20-30 mm from the target, at a direction of $135^\circ \pm 4^\circ$ to the direction of incidence of the bombarding beam.

Pulses from the detector were amplified and stored in the memory of a multichannel analyzer, as is shown diagrammatically in Figure 1. The data were processed offline by computer.

Backscatter Spectrum

A typical energy spectrum of backscattered alpha particles is shown in Figure 2. The two steps in the spectrum refer to carbon and oxygen. A third step, falling effectively to zero, was observed, corresponding to iron present as iron naphthenate dryer in the lacquer, but this is not included in Figure 2. The regions marked in the figure were used to establish the integrated plateau heights c carbon, o oxygen, and b background. The background region

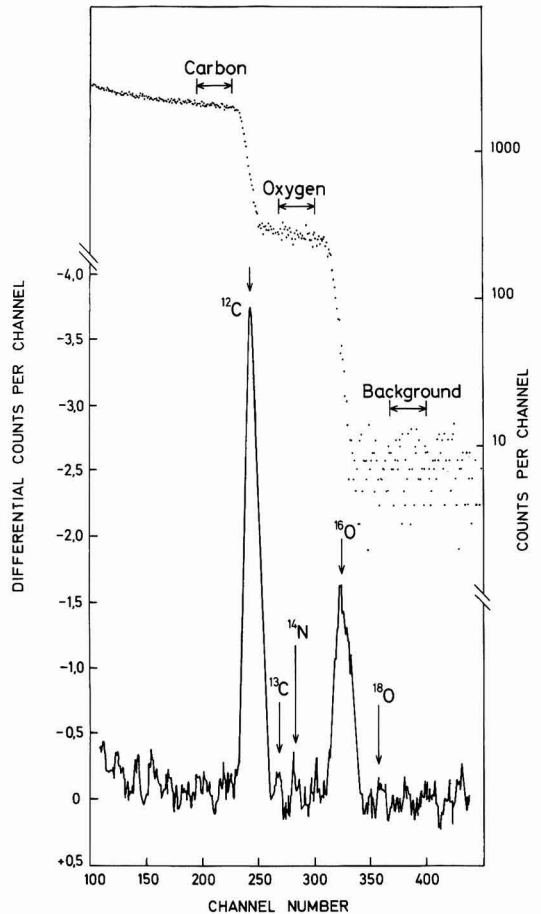


Figure 2—Upper curve: typical energy spectrum of backscattered alpha particles showing the regions of integration used in determining count ratios; lower curve: the differential spectrum; calculated peak positions are arrowed for carbon and oxygen isotopes and nitrogen-14 (see text)

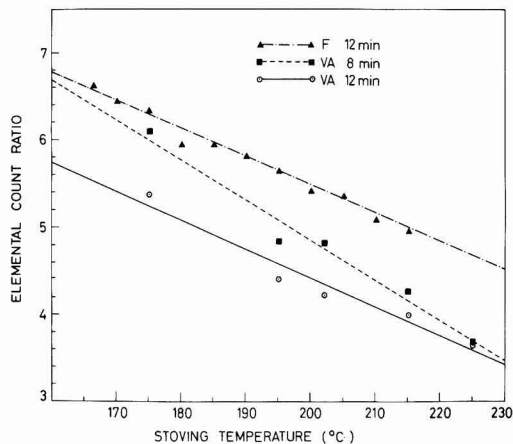


Figure 3—The variation of carbon to oxygen count ratio with stoving temperature for F-type and VA-type oleoresinous lacquers

represented counts due to iron which were of no interest in the present study.

The required carbon to oxygen count ratio was given by R where:

$$R = \frac{n_c}{n_o} = \frac{c_{\text{carbon}} - c_{\text{oxygen}}}{c_{\text{oxygen}} - c_{\text{background}}} \quad (5)$$

where n_c , n_o represents the net integrated counts corresponding to carbon and oxygen, respectively, and the numerical value of R, is influenced by the experimental conditions of measurement, so that recalibration is necessary if measuring conditions are changed.

The energy axis of the backscattered alpha particles was calibrated from data collected from targets of gold, silver, iron, alumina (aluminum and oxygen), and graphite (carbon).

By differentiating the spectrum,⁹ the inflection points of the steps in the energy spectrum are converted to peaks, the channel numbers of which can then be accurately determined. The lower spectrum in Figure 2 shows a plot of the differentiated spectrum in which the two prominent peaks refer to carbon-12 and oxygen-16. Also shown in the figure are small peaks due to carbon-13, oxygen-18 and nitrogen-14. The arrowed positions in the figure are the calculated positions corresponding to the indicated isotopes. The presence of nitrogen is due to diphenylamine which is found in the lacquer at a concentration of about 0.5% by weight.

When spectra are recorded under different experimental conditions at relatively long intervals, the peak positions for the two major components (carbon-12 and oxygen-16) can be used for accurate energy calibrations in order to normalize the energy axes of the different spectra for intercomparison.

Precision of Measurement

It is well known that measurements based on nuclear processes such as radioactive decay, nuclear reaction yields, and backscattering proceed by rates which are determined by random statistics; accordingly it may be accepted that the precision with which a count rate can be determined will depend on the number of counts recorded. From random statistics it can be shown that the standard deviation of n counts is given by \sqrt{n} , hence the precision with which the plateaus' heights can be determined will depend on the count rate and the bombarding time.

The main purpose of the analysis is to determine the count ratio of carbon to oxygen, as given by the ratio of the plateaus' heights corresponding to these two elements. Since each is subject to random statistics, and $\sigma = \sqrt{n}$, the precision of the count ratio R is given by

$$\frac{\sigma_R}{R} = \left(\frac{c_{\text{carbon}} + c_{\text{oxygen}}}{n_c^2} + \frac{c_{\text{oxygen}} + c_{\text{background}}}{n_o^2} \right)^{1/2} \quad (6)$$

where σ_R is the standard deviation of R and the left hand side of the equation represents the relative standard deviation. If the integrated counts n_c and n_o are accumulated in time t it can be shown that the relative standard deviation of R is proportional to \sqrt{t} . It thus follows that by increasing the number of counts recorded for each element, the relative precision of the measurement is improved ($\frac{\sigma_R}{R}$ becomes smaller).

To test the precision of the analyses, 40 repeat and replicate analyses of ten different samples of the same material were analyzed using 5 min for each bombardment. Under these conditions the measured relative standard error was $\pm 1.8\%$. This precision was considered to be sufficient for the present investigation. If results better than $\pm 1\%$ are required, bombardments lasting 20 min should be used.

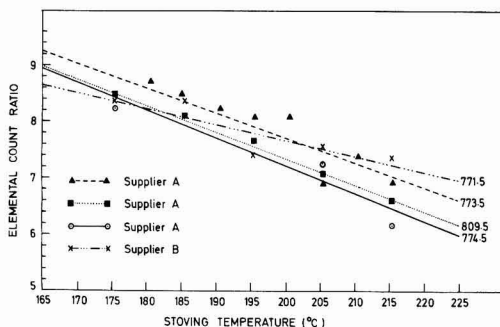


Figure 4—Comparison of the behavior of lacquer batches, from the same and different suppliers, as a function of stoving temperature. (The values given at the right hand side of the curves refer to the film weight of the lacquer expressed in μg per sq cm)

Effect of Curing Temperature

The F-type oleoresinous lacquer (chinawood oil and resin based) is normally cured by stoving for 12 min at 205°C. On the production line, problems of undercuring arise more often than those of overcuring; accordingly the curing of F lacquer was studied as a function of curing temperature from 165°C to 215°C.

Values of the carbon to oxygen count ratios are shown in *Figure 3* as a function of curing time. In this figure and in *Figure 4* a linear relationship between the count ratio and stoving temperature has been fitted by the method of least squares, weighted according to the number of observations made at each temperature, and is sufficiently accurate to represent the results within the precision of the measurement.

This linearity cannot validly be extrapolated beyond the temperature range studied. The higher count ratio observed after 8 min stoving compared with that after 12 min reflects the decreased extent of oxidation that occurred over the shorter period. The decreasing ratio indicates increased oxidation during stoving. For comparison, a VA-type oleoresinous lacquer (VA-type contains a higher resin to oil ratio than the F-type and is applied at a lower film thickness) was similarly treated using stoving times of 8 and 12 min. The results of these are also shown in *Figure 3*. The temperatures were rigidly controlled during the tests so that the errors shown arise solely from backscattering measurements.

Since each count ratio can be determined with a relative precision of better than 2% it is possible to deduce the stoving temperature of the sample within $\pm 3.5^\circ\text{C}$. This temperature uncertainty is satisfactory for routine control.

Effect of Stoving Time

Similarly, samples were stoved at 195°C and 205°C for periods ranging from 8 to 15 min. It was found that the carbon to oxygen count ratios decreased with stoving time at a rate of approximately 0.9% per min. This effect is much smaller than that due to stoving temperature.

Batch Consistency

Batches of presumably the same lacquer from the same and different suppliers were compared by measuring the variation of carbon to oxygen count ratio as a function of stoving temperature. The results are shown in *Figure 4*. Although there exists some variation between the compared batches, this variation is relatively small. However, the results emphasize the need for separate calibration for each batch.

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SUMMARY

Alpha particle backscattering provides an accurate method for determining the relative atomic concentrations of carbon and oxygen in the surface layers of oleoresinous lacquers on tinplate.

Since these lacquers are cured by oxidation, the elemental ratio may be used to indicate the curing process. Effects of stoving temperature and stoving duration have been described and differences in batches can be pinpointed. The method is sufficiently rapid to allow for offline process control and about 60 samples can readily be handled in an average eight-hour shift. It could prove particularly useful for monitoring process development. □

References

- (1) Paolini, A., *Mod. Lithography* 38, 55 (1970).
- (2) Anderson, J. L., Root, D. E., Jr. and Green, G., *JOURNAL OF PAINT TECHNOLOGY*, 40, No. 523, 320 (1968).
Rossi, A. G. and Paolini, A. Jr., *JOURNAL OF PAINT TECHNOLOGY*, 40, No. 523, 328 (1968).
- (3) See for example:
Helwig, A. J., *JOURNAL OF PAINT TECHNOLOGY*, 42, No. 546, 385 (1970); Stromberg, S. E., *Ibid.* 42, No. 546, 398 (1970); Sanders, C. I., *Ibid.* 42, No. 546, 405 (1970).
- (4) Fink, H., *Plaste Kautschuk*, 18, 771 (1971).
- (5) For example:
Hartman, J., *Farbe Lack*, 68, 595 (1962); Marshal, P., Centre de Recherches du Fer Blanc report (Dec. 1970).
- (6) Ahlers, N. H. E. and O'Neill, L. A., *J. Oil Colour Chemists' Assoc.* 37, 533 (1954). Chicago Society for Paint Technology, "Infrared Spectroscopy," *Official Digest*, March Pt 2 (1961).
- (7) Maercks, O., *Wiederhold Lackfabriken*, Hilden, Germany, Private communication (Feb. 1971).
- (8) Peisach, M., Wilson, V. W. and Szecsei, Z., *J. Radioanal. Chem.*, 29, 343 (1976).
- (9) Peisach, M., *Thin Solid Films*, 19, 297 (1973).

Reactions of UV Curable Resin Formulations And Neat Multifunctional Acrylics

I. Apparatus and Procedure

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Celanese Research Company*

Using a leaf shutter, a device was constructed for the controlled exposure of UV curable resins and monomers to ultraviolet radiation on standard laboratory UV curing units. The sample is held between two NaCl flats in the cavity formed by a metal spacer of specified thickness. The course of the photoinitiated polymerization is monitored by changes in the IR spectra.

KEY WORDS: Ultraviolet (UV); Infrared (IR); Exposure time; Photoinitiated polymerization; Trimethylolpropane triacrylate (TMPTA); Benzoin isobutyl ether (BIBE).

INTRODUCTION

Analysis of the kinetics of photoinitiated polymerization of UV curable resins and multifunctional acrylates has suffered in the past by being very subjective. Usually terms such as "cure rate" and/or "cure response" are used to describe the kinetic profile of these systems; however, rarely is it clearly understood how these terms relate to the actual consumption of unsaturation in the system under study. Some techniques such as unreacted monomer extraction and dilatometry are useful in the evaluation of the kinetics of the initial percentages during conversion of UV resins and multifunctional acrylates. They are limited, however, in the monitoring of more extensive reaction beyond the initial conversion.

The use of infrared, IR, spectroscopy for quantitative analysis is fairly general,¹ and has been specifically applied to polymerizations initiated by ionizing radiation.² In this article a device and procedure for analysis of data are presented which allow for the quantitative description of loss of acrylic unsat-

uration for UV curable resin formulations and neat multifunctional acrylates. This approach is applicable over the full range of conversion from 0 to 100%.

APPARATUS

The device developed for this application consists of two basic components. The first is the sample holder illustrated in *Figure 1*. This holder is constructed of two standard 25.4 mm diameter \times 5 mm NaCl salt windows through which two holes are drilled on a drill press with a number 44 drill. These two holes should be situated on opposing sides on the outer edge of the disks. Between the salt disks a spacer is employed to hold the sample path length at a constant value. The spacer used in our work was 0.5 mil copper shim stock cut to the appropriate configuration.

The cell is assembled by placing a UV curable sample in the space between the NaCl windows and securing them with two small brass machined screws and nuts which are inserted in the previously drilled holes. Care should be taken to avoid any bubbles that might be formed and trapped in the sample volume during assembly.

Once the cell is assembled, it is used in conjunction with the second component which is a shutter device illustrated in *Figure 2* that allows for control of exposure from 1/500 sec to 1 sec. Longer exposures are possible using the shutter in the time exposure mode. As *Figure 2* shows, the apparatus is a Copal No. 0 shutter mounted on an aluminum housing. The assembled cell is placed on an aluminum base plate beneath the leaves of the shutter.

In use, the shutter is fitted with a 3 ft cable release. The shutter housing containing the assembled

* Summit, N. J. 07901.

scanned and then used to evaluate the loss in acrylic unsaturation. After the spectrum is obtained, the cell can be replaced in the shutter for the next exposure. The exposure-IR spectrum cycle can be repeated as many times as desired.

DATA TREATMENT

Figure 3 shows the IR spectrum of trimethylolpropane triacrylate (TMPTA) at three stages of cure, viz., (a) with no cure; (b) partially cured; and (c) extensively cured. The points of interest are the large decreases of absorption at 1630 cm^{-1} and at 800 cm^{-1} due to C=C stretch and $\text{CH}_2=\text{CH}$ out of plane vibrations, respectively. Other changes occur, but as these absorptions are due to fundamental vibrational modes, they are the most reliable criteria of the unsaturation content.

The 1630 cm^{-1} absorption was chosen as it is in a region clear of other sources of absorption, making background estimates more reliable. This is evidenced by an IR spectrum of extensively cured samples approaching zero absorption at 1630 cm^{-1} with the residual absorption showing bands characteristic of acrylates with no detectable distortion due to non-acrylate absorptions.

Acrylates also show a 810 cm^{-1} acrylate absorption. This absorption is less attractive as a criterion of residual unsaturation because (1) non-related ab-

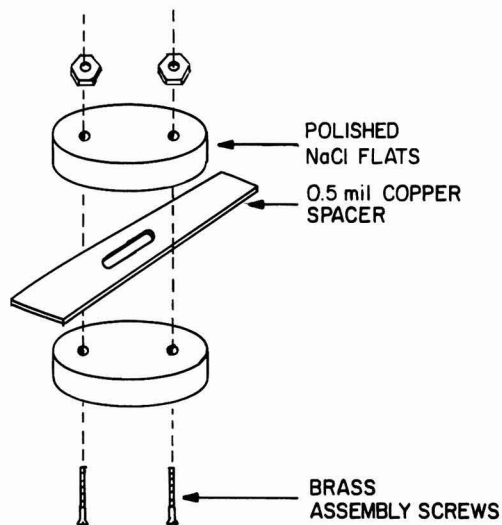


Figure 1—Exploded view of NaCl sample cell

cell is placed on the conveyor belt of a Hanovia Laboratory UV Curing Unit or similar UV equipment, and passed under the UV lamp. The cable is indexed so that the shutter can be released at the precise moment the shutter is in optimum position under the lamp for exposure. After the shutter has been released and the sample exposed, the assembly is passed on the conveyor belt to the exit port.

The NaCl cell containing the exposed sample is removed from the shutter housing and is placed in a standard IR cell holder. The IR spectrum is

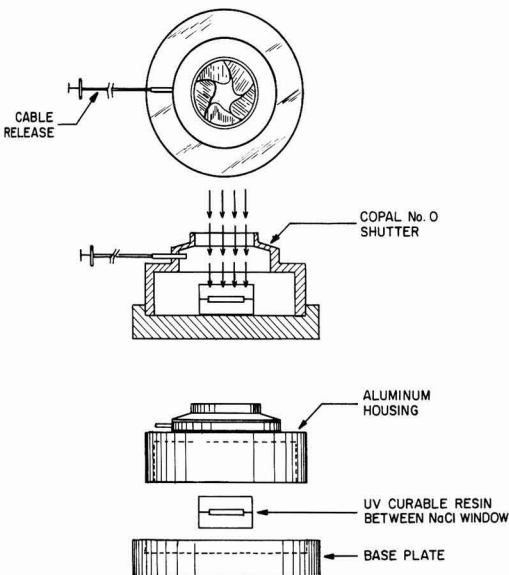


Figure 2—Shutter device for controlled exposure to UV radiation

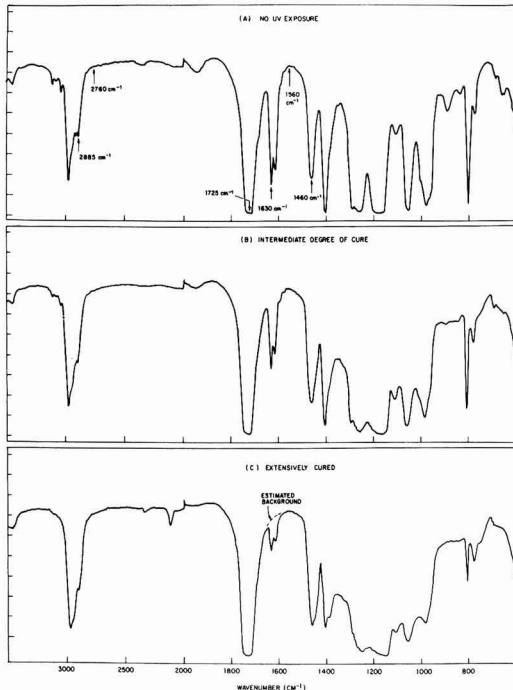


Figure 3—IR spectra of neat TMPTA with 3% w/w benzoin isobutyl ether added (a) unexposed, (b) partially cured, (c) extensively cured

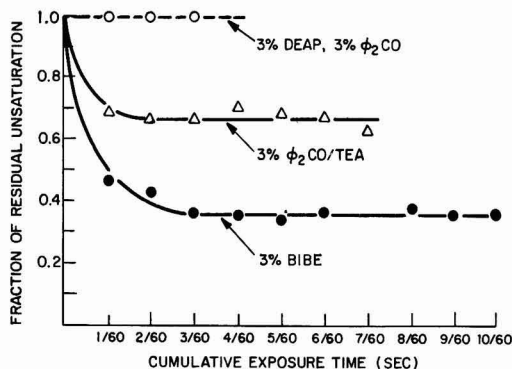


Figure 4—Rate profile of neat TMPTA with various photoinitiators: O—diethoxy acetophenone, DEAP; benzophenone, $\phi_2\text{CO}$; Δ —benzophenone-triethanol amine mixture, $\phi_2\text{CO}/\text{TEA}$; O—benzoin isobutyl ether, BIBE

sorption often appears in this region; (2) TiO_2 pigment starts cutting off at 850 cm^{-1} and imposes a strongly sloping background at 810 cm^{-1} ; and (3) the stronger 810 cm^{-1} absorption would require a 0.3 mil spacer which is, at best, more difficult to achieve than the 0.5 mil spacer used for the 1630 cm^{-1} absorption.

A procedure has been developed to calculate residual unsaturation after various sequential UV exposures. The calculation is executed by a computer program.

The calculation uses six % transmission inputs for each stage of the polymerization. Conversion of % transmission to absorbance is carried out by the program. The inputs are, for TMPTA:

- %T at 1630 cm^{-1} , unsaturation;
- %T at 1560 cm^{-1} , background for 1630 cm^{-1} and 1460 cm^{-1} ;
- %T at 1725 cm^{-1} , 0% T correction;
- %T at 1460 cm^{-1} , thickness, T_1 ;
- %T at 2885 cm^{-1} , thickness, T_2 ;
- %T at 2760 cm^{-1} , background for 2885 cm^{-1} .

Although a demountable cell is used with a fixed spacer, the apparent thickness of the sample will increase due to shrinkage and the accompanying increase in density as the polymerization proceeds. The thickness criteria at 1460 cm^{-1} and 2885 cm^{-1} (for TMPTA) are used to compensate for the shrinkage. This shrinkage can also cause void formation around the periphery of the spacer. If this void is in the instrument beam it will have the effect of linearly offsetting all transmission data. The 1725 cm^{-1} carbonyl stretching vibration, which completely absorbs incident radiation at a thickness of 0.5 mil, can be used as a criterion of the amount of incident energy passing through the void area. This energy, in % transmission units, is subtracted from all the other %T data in that set to adjust the baseline to 0% transmission.

Table 1—Neat 1,6-Hexanediol Diacrylate/5% Benzoin Isobutyl Ether

Exposure (1/60 sec)	(T_1/T_2)	(T_1+T_2)	Uncorrected Unsaturation (%)	Corrected Unsaturation (%)
0	0.79	0.76	100.00	100.00
1	0.80	0.75	97.47	98.97
2	0.78	0.73	93.41	96.37
3	0.80	0.73	95.27	99.02
4	0.80	0.73	95.01	98.93
5	0.80	0.73	87.02	90.43
6	0.80	0.75	72.37	73.00
7	0.85	0.79	57.76	55.65
8	0.89	0.82	49.52	45.94
9	0.95	0.84	38.08	34.40
10	0.96	0.86	32.00	28.09
11	0.99	0.88	27.54	23.70
12	1.02	0.89	26.17	22.34

The calculation sets the % unsaturation of the unexposed sample to 100 (Figure 3a), and the % unsaturation of a completely reacted sample to 0. As a completely reacted sample cannot be achieved on this time scale, the sample is subjected to an extended exposure, typically 30 sec, and the estimated background, as shown in Figure 3c, is drawn in the 1630 cm^{-1} region. The other absorptions used in the calculation should not change significantly in going from the extensively polymerized to the fully reacted state.

The calculation used is;

$$\% \text{ Unsaturation} = \frac{100}{M-Q+P} \times (S-T+P), \text{ where}$$

$$M = \log_{10} (100/(A_0-C_0))$$

$$Q = \log_{10} (100/(B_0-C_0))$$

$$P = \log_{10} (100/(B_\infty-C_\infty) - \log_{10} (100/A_\infty-C_\infty))$$

$$S = \log_{10} (100/(A_s-C_s)), \text{ and}$$

$$T = \log_{10} (100/(B_s-C_s)), \text{ where}$$

A = % Transmission at 1630 cm^{-1} ,
 B = % Transmission at 1560 cm^{-1} , and
 C = % Transmission at 1725 cm^{-1} , where the subscripts refer to unexposed (o), fully reacted (∞), and sample (s).

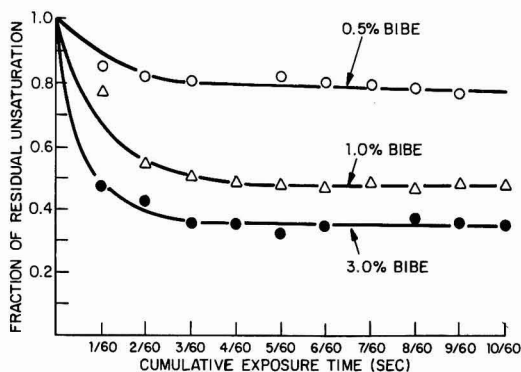


Figure 5—Rate profile of neat TMPTA with various levels of BIBE: O—0.5% BIBE; Δ —1% BIBE; O—3% BIBE

The % unsaturation results as calculated above do not incorporate a correction for apparent thickness increase due to shrinkage during polymerization. Two thickness criteria are calculated, for each stage of the polymerization as follows:

$$T_1 = \log_{10} (100/(D_s - C_s)) - \log_{10} (100/(B_s - C_s)), \text{ and}$$

$$T_2 = \log_{10} (100/(E_s - C_s)) - \log_{10} (100/(F_s - C_s)), \text{ where}$$

$$B_s = \% \text{ Transmission at } 1560 \text{ cm}^{-1}$$

$$C_s = \% \text{ Transmission at } 1725 \text{ cm}^{-1}$$

$$D_s = \% \text{ Transmission at } 1460 \text{ cm}^{-1}$$

$$E_s = \% \text{ Transmission at } 2885 \text{ cm}^{-1}$$

$$F_s = \% \text{ Transmission at } 2760 \text{ cm}^{-1}, \text{ and}$$

the subscript refers to the stage of UV exposure.

The T_1 and T_2 are averaged ($K_s = (T_1 + T_2)/2$), and the thickness corrected % unsaturation is calculated by:

$$\% \text{ Unsaturation (corr.)} = \% \text{ Unsat.} \times \frac{K_1}{K_s}, \text{ where}$$

K_1 is the averaged thickness of the unexposed sample.

The two criteria of thickness, 1460 cm^{-1} and 2885 cm^{-1} for TMPTA, are selected from unexposed and extensively exposed samples, using the general appearance of the spectrum as a guide. The only constraints on the selection are that the T_1 absorption must be reasonably close to the background at 1560 cm^{-1} , and both T_1 and T_2 transmissions must be in a good transmission range, preferably 20 to 50 %T. For a system which has not been previously examined, we have no prior evidence of the validity of the thickness correction.

The program (1) prints both uncorrected and corrected data; and (2) applies a test for the correction. As T_1/T_2 will be a constant when T_1 and T_2 are both functions of thickness, a plot of T_1/T_2 vs. $T_1 + T_2$ will have, ideally, slope = 0. The computer program calculates, for each exposure, T_1/T_2 and $T_1 + T_2$, and for all exposures, the least squares slope. A slope of -1.0 to $+1.0$, indicating application of the thickness correction, improves the results. This technique is particularly useful in evaluating new compositions.

RESULTS

A representative example of data with thickness corrections is given in *Table 1* for neat 1,6-hexanediol diacrylate containing 5% by weight benzoin isobutyl ether (BIBE). After the data have been calculated, the results can be plotted with time in seconds on the abscissa and the fraction of residual unsaturation on the ordinate.

Figure 4 depicts the results obtained from the incremental exposure at 1/60 sec of TMPTA con-

taining various photoinitiators. From this depiction it can be seen that the photoinitiators chosen for this series of experiments, BIBE appears to be the most effective in producing a rapid initial reaction and more extensive consumption of acrylic unsaturation. In *Figure 5* the rate profiles of various levels of BIBE are depicted. There is a significant increase in the initial rate and extent of reaction when the BIBE concentration is increased twofold from 0.5%, by weight, to 1.0%. There is, however, much less of an increase when the BIBE is increased threefold from 1.0% to 3.0%.

The residual unsaturation that remains after UV exposure as depicted in the figures appears to be a consequence of the nature of the network that is formed from neat TMPTA rather than an intrinsic property of the monomer. In formulations of the multifunctional acrylates with other monomeric and polymeric moieties, the network that results is usually quite different in its nature and normally results in lower residual unsaturation.

This technique can be applied to any of the multifunctional acrylates to those in *Figures 4* and *5*. Future articles will deal with the analysis of the rate and mechanisms of photoinitiated reactions of various UV curable resins and multifunctional acrylates.

SUMMARY

A technique has been developed which allows the reaction of ultraviolet curable monomers and resin formulations to be monitored as a function of exposure time. Principally, the technique involves placing a sample between two NaCl disks and exposing the sample, in a shutter device, to the UV radiation. The consumption of unsaturation that occurs as a consequence of polymerization is followed by monitoring characteristic absorptions in the infrared spectrum of the sample.

ACKNOWLEDGMENTS

The authors acknowledge the aid of William V. Garruto and Jean Vieira in the development and refinement of this technique. □

References

- (1) Calthup, N.B., Daly, L. H. and Wiberley, S. E., *Introduction to Infrared and Raman Spectroscopy*, p 71, Academic Press, New York (1964).
- (2) Labana, S. S., *J. Poly. Sci., A-1*, p 3283 (1968).

Two Approaches To High Solids Coatings For Metal And Non-Metal Substrates

L. GOTT

Eastman Chemical Products, Incorporated*

Neopentyl glycol and trimethylpentanediol were used to synthesize low viscosity polyester resins. These resins were formulated into high solids/melamine or high solids/polyisocyanate enamels which were hot and cold spray applied. Evaluation of the one-component high solids/melamine enamels indicated these coatings have excellent properties for appliance and coil coating applications. The two-component high solids/polyisocyanate enamels were found to cure at low baking temperatures and to have film properties which pass many automotive topcoat requirements. Flexible enamels were also prepared with neopentyl glycol and trimethylpentanediol which have excellent low temperature film properties for coating elastoplastic substrates.

KEY WORDS: Trimethylpentanediol; Neopentyl glycol; Polyester resins; Cook logs; Melamine; Polyol; Polyisocyanate; Urethane.

INTRODUCTION

The rate of change within the coatings industry over the past few years has been the most rapid in recent history. The advent of nationwide anti-pollution legislation was the principle catalyst which accelerated this change. The immediate effect of this legislation on the paint industry was the reformulation of solvent systems to limit the atmospheric emission of photochemically reactive solvents. Recently, it has become necessary to cope with a scarcity of energy and exempt solvents as well as to comply with anti-pollution regulations.

Research on new application techniques, cross-linking mechanisms, and new polymeric resins holds much promise for the future. Some specific exam-

ples of these evolving technologies are powder coatings, and UV and electron beam cure coatings. These new technologies may eventually offer a solution to the coatings industry but further development work and probably the installation of new equipment by the producer will be required before these new technologies gain wide commercial acceptance. In the interim, coatings must be found to reduce or alleviate the previously mentioned problems while utilizing existing application equipment.

Water-borne coatings would appear to be a viable approach in minimizing shortages of exempt solvents and reducing pollution because of the plentiful supply of water as a solvent. Many companies have adopted this approach and are currently successful in applying water-borne coatings. It must, however, be recognized that water-borne enamels can present some difficulties when they are adapted to existing paint lines. Corrosion of the application equipment and strict humidity control in the spray area and drying ovens are two major areas of concern. Additionally, energy requirements for cure, although possibly lower, may not be drastically reduced.

High solids coatings offer an alternate solution to the soaring cost of energy and pollution control without requiring massive capital expenditures for new equipment. Ideally, these coatings should cure at ambient or slightly elevated temperatures and be applied with existing equipment.

Polyester resins based on 2,2,4-trimethyl-1,3-pentanediol (TMPD® Glycol)* and 2,2-dimethyl-1,3-propanediol (NPG® Glycol) have been developed which can be formulated into high solids enamels.

* P. O. Box 431, Kingsport, Tenn. 37662.

* TMPD and NPG are registered trademarks of Eastman Kodak Co.

Table 1—Composition and Physical Constants of Polyester Resins for High Solids and Flexible Coatings

Reactants	High Solids Urethane		Flexible Urethane		High Solids Melamine	
	UP-5-1T	UP-5-1N	UP-18-2T	UP-18-1N	HS-3-1T	HS-3-1N
Trimethylpentanediol	8.73	—	10.18	—	10.80	—
Neopentyl glycol	—	11.96	—	13.63	—	12.83
Trimethylolpropane	5.61	3.17	4.06	2.13	2.10	2.13
Isophthalic acid	5.99	9.66	2.48	3.02	5.12	6.12
Adipic acid	3.99	1.92	7.46	9.04	5.12	6.12
Physical Constants						
Acid number, solids	2 ± 1	3 ± 1	2 ± 1	2 ± 1	10 ± 2	10 ± 2
Hydroxyl number, solids	125	117	144	122	75	98
Molecular weight, VPO	1700	1760	1200	1300	1425	1450
Color, Gardner scale	3-4	1	2-3	<1	2	<1
Viscosity, Gardner	Z ₀	>Z ₀	X	X	>Z ₀	>Z ₀
Nonvolatiles, %	90	90	90	90	90	90

**Table 2—Formula UP-5-1T
Trimethylpentanediol/TMP/IPA/AD**

Reactants	Charge	
	Equivalents	Grams
Trimethylpentanediol	8.73	638
Trimethylolpropane	5.61	251
Isophthalic acid	5.99	498
Adipic acid	3.99	291
		1678
	Calculated water loss	— 178
	Theoretical yield	1500

Conditions

Catalyst: 100 ppm Sn as dibutyltin oxide
 Nitrogen flow: 0.2 liters/min (0.42 cu ft/hr)
 Up-Heat time: 3 hr
 Note: Charge 5% excess trimethylpentanediol and reflux any water insoluble organic distillate.

Cook Log

Pro- cessing Cook Time, Time, hr hr	Reaction Temp. °C	Water, ml	Acid Num- ber	Remarks
0	Room temp	—	—	Up-heat
3	215	50	—	Cook temperature
9	215	160	—	—
11	215	172	9	—
16	215	178	4	Heat off. Dilute with solvent (See Table 11).

Properties of Resin

Final acid number	2 ± 1
Hydroxyl number, neat resin	125
Gardner viscosity, 23°C, 90% NV	Z ₀
Color, Gardner	3-4
Molecular weight, VPO	1700
Nonvolatile, %	90

**Table 3—Formula UP-5-1N
Neopentyl Glycol/TMP/IPA/AD**

Reactants	Charge	
	Equivalents	Grams
Neopentyl glycol	11.96	623
Trimethylolpropane	3.17	142
Isophthalic acid	9.66	803
Adipic acid	1.92	140
		1708
	Calculated water loss	— 208
	Theoretical yield	1500

Conditions

Catalyst: 100 ppm Sn as dibutyltin oxide
 Nitrogen flow: 0.2 liters/min
 Up-Heat time: 3 hr

Cook Log

Pro- cessing Time, hr	Reaction Temp, °C	Water, ml	Acid Num- ber	Remarks
0	Room temp	—	—	Up-heat
3	230	175	—	Cook temperature
7	230	200	7	—
8.5	230	208	4	Heat off. Dilute to 90% NV with solvent (See Table 11).

Properties of Resin

Final acid number	3 ± 1
Hydroxyl number, neat resin	117
Gardner viscosity, 23°C, 90% NV	>Z ₀
Color, Gardner	1
Molecular weight, VPO	1760
Nonvolatile, %	90

The crosslinking resin can be either a polyisocyanate or a melamine resin. Eastman does not supply finished polyester resins, but only supplies raw material for their preparation such as TMPD and NPG glycol.

Two-component polyisocyanate enamels can be formulated for many industrial applications. Major applications include: (1) automotive topcoats; (2) coatings for rubber, vinyl, plastic, and other flexible substrates; (3) aircraft coatings; and (4) any other coating application which requires superior properties combined with low energy curing requirements.

One-component high solids conventional cure melamine enamels can also be formulated to meet a multitude of industrial uses such as: (1) coil coating topcoats; (2) appliance coatings; (3) beverage and can coatings; and (4) any other coating application which requires excellent physical properties combined with overall low cost.

Table 4—Formula UP-18-2T
Trimethylpentanediol/TMP/IPA/AD

Charge		
Reactants	Equivalents	Grams
Trimethylpentanediol	10.18	746
Trimethylolpropane	4.06	183
Isophthalic acid	2.48	207
Adipic acid	7.46	545
		1681
	Calculated water loss	— 181
	Theoretical yield	1500

Conditions

Catalyst: 100 ppm Sn as dibutyltin oxide

Nitrogen flow: 0.2 liters/min

Up-Heat time: 3 hr

Note: Charge 5% excess trimethylpentanediol and reflux any water insoluble organic distillate.

Cook Log

Pro- cessing Cook Time, hr	Time, hr	Reaction Temp, °C	Water, ml	Acid Num- ber	Remarks
0	—	Room temp	—	—	Heat on
3	—	215	125	—	Cook temperature
6	3	215	175	8	—
9.5	6.5	215	181	3.5	Heat off

Properties of Resin

Final acid number	2.2
Determined OH number	144
Determined molecular weight	1190
Gardner color	2-3
Gardner viscosity	X
Wt % nonvolatiles	90
Aromatic/aliphatic ratio	1/3
Hydroxyl excess, %	43.5

RESIN SYNTHESIS

High solids polyester resins based on trimethylpentanediol and on neopentyl glycol were synthesized in conventional laboratory processing equipment using a one-stage fusion cook procedure. A minimum of three hr up-heat time was employed to reach a maximum cook temperature of 215°C for the trimethylpentanediol based resins and 230°C for the resins utilizing neopentyl glycol. The resins used for high solids and flexible urethane enamels were processed to an acid number of less than three using 100 ppm tin metal (dibutyltin oxide) as the esterification catalyst. The resins used to prepare high solids melamine enamels were processed to an acid value of 10 ± 2 . A catalyst, 1,000 ppm tin, was used to process the resins based on trimethylpentanediol. Upon reaching the desired acid value, the resins were reduced to 90% nonvolatiles with an exempt solvent blend (Table 11). The trimethylpentanediol

Table 5—Formula UP-18-1N
Neopentyl Glycol/TMP/IPA/AD

Charge		
Reactants	Equivalents	Grams
Neopentyl glycol	13.63	709
Trimethylolpropane	2.13	95
Isophthalic acid	3.02	250
Adipic acid	9.04	661
		1715
	Calculated water loss	— 215
	Theoretical yield	1500

Conditions

Catalyst: 100 ppm Sn as dibutyltin oxide

Nitrogen flow: 0.2 liters/min

Up-Heat time: 2 hr

Cook Log

Pro- cessing Cook Time, hr	Time, hr	Reaction Temp, °C	Water, ml	Acid Num- ber	Remarks
0	—	Room temp	—	—	Heat on
2	—	230	125	—	Cook temperature
4.5	2.5	230	200	9	—
7	5	230	215	1.8	Heat off

Properties of Resin

Final acid number	1.4
Determined OH number	122
Determined molecular weight	1320
Gardner color	<1
Gardner viscosity	X
Wt % nonvolatiles	90
Aromatic/aliphatic acid ratio	1/3
Hydroxyl excess, %	30.5

based polyester resins for high solids urethane enamels were designated UP-5-1T and UP-18-2T.

The neopentyl glycol based polyester resins for high solids urethane enamels were designated UP-5-1N and UP-18-1N. The resins for high solids melamine coatings were designated HS-3-1T and HS-3-1N. The composition and physical constants of these resins are shown in *Table 1*; resin formulations and cook logs are given in *Tables 2-7*.

ENAMEL PREPARATION

High Solids and Flexible Urethane

The high solids urethane coatings were prepared as two-component enamels. Component I, the polyol portion, contained the polyester resin, pigments, reactive diluents, and enough solvent to obtain a viscosity suitable for pigment dispersion. This mixture

was dispersed in an attritor until a Hegeman grind fineness of 7.5-8.0 was obtained. Additional solvent was added to adjust the formulations to the calculated percent nonvolatiles. The Component I (polyol) and Component II (polyisocyanate) were mixed just prior to spray application. Flow control additives evaluated in the high solids urethane enamel formulations included FC430*, L-5310†, and cellulose acetate butyrate (CAB-551-0.1)**. A catalyst, tetraisopropyl titanate††, was used to control pot life and cure of the two-component enamels.

High-Solids Melamine

The high solids single package melamine enamels were similar to conventional lower solids solvent based enamels. The polyester resin, pigment, cross-

**Table 6—Formulation HS-3-1T
Trimethylpentanediol/TMP/IPA/AD**

Reactants	Charge	
	Equivalents	Grams
Trimethylpentanediol	10.80	791
Trimethylolpropane	2.10	94
Isophthalic acid	5.12	425
Adipic acid	5.12	374
	Calculated water loss	— 184
	Theoretical yield	1500

Conditions

Catalyst: 1,000 ppm Sn as dibutyltin oxide

Nitrogen flow: 0.2 liters/min

Up-Heat time: 3 hr

Note: Charge 5% excess trimethylpentanediol and reflux any water insoluble organic distillate.

Cook Log

Pro- cessing Cook Time, hr	Time, hr	Reaction Temp, °C	Water, ml	Acid Num- ber	Remarks
0	—	Room temp	—	—	Heat on
3	—	215	110	—	Cook temperature
5	2	215	165	—	—
6	3	215	175	10	Heat off
6.5	3.5	150	180	8	Dilute to 90% NV with exempt solvent (See Table 11)

Properties of Resin

Final acid value	6
Determined hydroxyl value	63
Determined molecular weight	1425
Gardner color, 90% NV	2
Gardner viscosity, 90% NV	>Z ₆
Mole percent polyol	11.5
Aromatic/aliphatic acid ratios	1/1
Hydroxyl excess, %	26.2

**Table 7—Formulation HS-3-1N
Neopentyl Glycol/TMP/IPA/AD**

Reactants	Charge	
	Equivalents	Grams
Neopentyl glycol	12.83	668
Trimethylolpropane	2.13	96
Isophthalic acid	6.12	509
Adipic acid	6.12	448
	Calculated water loss	— 1721
	Theoretical	— 221

Conditions

Catalyst: None

Nitrogen flow: 0.2 liters/min

Up-Heat time: 3 hr

Cook Log

Pro- cessing Cook Time, hr	Time, hr	Reaction Temp, °C	Water, ml	Acid Num- ber	Remarks
0	—	Room temp	—	—	Heat on
3	—	230	105	—	Cook temperature
5	2	230	195	—	—
7	4	230	200	10	Heat off
7.5	4.5	150	205	—	Dilute to 90% NV with exempt solvent

Properties of Resin

Final acid value	9
Determined hydroxyl value	88
Determined molecular weight	1470
Gardner color, 90% NV	<1
Gardner viscosity, 90% NV	>Z ₆
Mole percent polyol	10
Aromatic/aliphatic acid ratios	1/1
Hydroxyl excess, %	22.0

linker, catalyst and enough solvent to obtain a suitable grind viscosity were premixed. After dispersion to a Hegeman grind fineness of 7.5-8.0, additional solvent was added to obtain the calculated percent solids.

ENAMEL EVALUATION

The high solids urethane enamels were spray applied on zinc phosphate pretreated cold rolled steel panels and cured for 20 min at 180°F (82°C).

The controls for this evaluation were enamels based on a commercially available acrylic oligomer and a commercial polyester resin. All of the enamels were reduced to a sprayable viscosity by the addition of an exempt solvent.

Of the three polyester polyols evaluated, only the trimethylpentanediol based enamel could be spray applied at 72 weight percent nonvolatiles. The acrylic oligomer based enamel had a slightly lower viscosity at equal percent nonvolatiles than the polyester based enamels (See *Table 8*). However, the low equivalent weight of the acrylic oligomer required more isocyanate resin for crosslinking than did the polyester resins. This would no doubt lead to an overall higher enamel cost. All four enamels were

tested using standard automotive procedures (See *Tables 9-12*).

All of the coatings evaluated had excellent impact resistance; the urethane enamel based on trimethylpentanediol had 160 in./lb (185 cm-kg) direct and reverse impact. The initial 60° and 20° gloss of all the enamels was greater than the current automotive industry standard. The xylene wipe test resulted in a slight color change on all of the enamels except the one based on trimethylpentanediol. After 24 hr, all the coatings recovered their original color. Excellent crosshatch adhesion to the phosphatized metal was obtained both before and after 24-hr water immersion with the four coatings. The enamels based on resin UP-5-1T and UP-5-1N provided the best humidity resistance as indicated by 60° and 20° gloss retention. The acrylic oligomer based coating exhibited the least humidity resistance. Tukon hardness of all the coatings was measured 3, 24, and 120 hr after curing. The best film hardness build-up and an ultimate hardness (13.4 knoop units) was obtained with the enamel utilizing neopentyl glycol.

Five-hundred hour salt spray resistance was determined. Percent gloss retention, creepage from the scribe, and crosshatch adhesion were used to measure corrosion resistance of the coating. Ex-

Table 8—Formulation and Physical Constants of High Solids Urethane Enamels

Ingredients	UP5-14S-1T1			UP5-14S-1N1			Commercial Polyester Polyol			Commercial Acrylic Oligomer		
	Weight	Solids	Equiv.	Weight	Solids	Equiv.	Weight	Solids	Equiv.	Weight	Solids	Equiv.
Component I												
UP-5-1T (90% NV) ^a	38.21	34.40	0.077	—	—	—	—	—	—	—	—	—
UP-5-1N (90% NV) ^b	—	—	—	38.66	34.79	0.073	—	—	—	—	—	—
Commercial polyester polyol (75% NV)	—	—	—	—	—	—	40.97	30.73	0.080	—	—	—
Commercial acrylic oligomer (100% NV)	—	—	—	—	—	—	—	—	—	32.07	32.07	0.092
2-Ethyl-1,3-hexanediol	1.84	1.84	0.025	1.83	1.83	0.025	1.60	1.60	0.022	1.70	1.70	0.023
TiO ₂ pigment, R-900 ^c	15.84	15.84	—	12.35	12.35	—	14.75	14.75	—	15.84	15.84	—
Solvent (see <i>Table 11</i>)	17.94	—	—	20.73	—	—	15.05	—	—	19.24	—	—
Component II												
Desmodur® N polyisocyanate ^d	26.17	19.89	0.102	26.43	19.03	0.086	27.63	19.89	0.102	31.15	22.43	0.115
	100.00	71.97	—	100.00	59.93	—	100.00	66.97	—	100.00	72.04	—
Physical Constants												
NCO/OH ratio	1/1			1/1			1/1			1/1		
Pigment/vehicle wt ratio	22/78			18/82			22/78			22/78		
Resin/diol wt ratio	95/5			95/5			95/5			95/5		
Resin/diol/Desmodur N wt ratio	61.3/3.3/35.4			62.5/3.3/34.2			58.8/3.1/38.1			57.1/3.0/39.9		
Nonvolatile, wt %	72			68			67			72		
Viscosity, No. 4 Ford Cup, sec	38			40			39			31		
Pot life, cP — initial	120			100			—			—		
4 hr	290			205			—			—		
8 hr	600			480			—			—		

(a) See *Table 2* for resin composition.

(b) See *Table 3* for resin composition.

(c) Product of E. I. du Pont de Nemours & Co., Inc.

(d) Product of Mobay Chemical Co.

Table 9—Formulation and Physical Constants of Flexible Urethane Enamels

Ingredients	UP18-14F-2T			UP18-14F-1N			Commercial Polyester		
	Weight	Solids	Equiv.	Weight	Solids	Equiv.	Weight	Solids	Equiv.
Component I									
UP-18-2T ^a (90% NV)	23.50	21.20	0.054	—	—	—	—	—	—
UP-18-1N ^b (90% NV)	—	—	—	24.90	22.40	0.049	—	—	—
Commercial polyester polyol (100% NV)	—	—	—	—	—	—	21.70	21.70	0.054
TiO ₂ pigment, R-900 [®]	17.20	17.20	—	17.20	17.20	—	16.70	16.70	—
Solvent (See Table 11)	43.80	—	—	44.00	—	—	46.10	—	—
Component II									
Desmodur N Polyisocyanate	15.50	11.60	0.060	13.90	10.40	0.054	15.50	11.60	0.059
	100.00	50.00	—	100.00	50.00	—	100.00	50.00	—
Physical Constants									
NCO/OH ratio		1.1/1			1.1/1			1.1/1	
Pigment/vehicle wt ratio		34.4/65.6			34.4/65.6			34.4/65.6	
Polyester/polyisocyanate wt ratio		64.6/35.4			68.3/31.7			65.2/34.8	
Nonvolatiles, wt %		50			50			50	
Viscosity, No. 4 Ford Cup, sec		11			11			11.5	

(a) See Table 4 for resin composition.

(b) See Table 5 for resin composition.

cellent gloss retention and minimum creepage from the scribe were obtained with all the enamels. The adhesion of the high solids coatings based on trimethylpentanediol and neopentyl glycol was rated good to excellent, the commercial polyester fair, and the acrylic oligomer fair to poor. The scribed adhesion test was run twice; immediately upon removing the panels from the test apparatus and 24 hr after the initial test (See Table 13).

One year Florida Black Box weathering has been completed on these enamels (See Table 14). The best overall gloss retention was obtained with the neopentyl glycol based enamel. The enamel prepared with the commercial polyester resin had fair gloss retention and a yellowness value equal to the experimental enamel based on neopentyl glycol. The enamel utilizing trimethylpentanediol also had excellent gloss and the least color change exceeding the 20° gloss retention required by the automotive industry. The acrylic oligomer based enamel had extremely poor gloss retention and high dirt accumulation after one year's exposure. The experimental polyester based enamels had low dirt accumulation after exposure.

Flexible Urethane Enamels

The flexible enamels were spray applied on a thermoplastic urethane substrate (TPU). The coatings were cured and then allowed to air dry an additional 24 hr before any evaluation of the physical properties was begun.

The controls for this evaluation were an enamel based on a commercially available polyester resin and a commercially available one-package flexible enamel. The experimental two-component enamels

Table 10—Formulations and Physical Constants Of High Solids Polyester Melamine Enamels

Ingredients	HS3-12S-1T		HS3-12S-1N	
	Weight	Solids	Weight	Solids
HS-3-1T ^a (90% NV)	42.79	38.51	—	—
HS-3-1N ^b (90% NV)	—	—	39.98	35.98
TiO ₂ pigment, R-900	30.28	30.28	30.08	30.08
Hexamethoxymethyl melamine	6.91	6.91	9.14	9.14
Solvent (see Table 11)	20.02	—	20.80	—
	100.00	75.70	100.00	75.20
Physical Constants				
Vehicle				
Polyester resin		85		80
Crosslinker		15		20
Vehicle/Pigment, wt %		60/40		60/40
Nonvolatiles, wt %		75.7		75.2
Viscosity, No. 4 Ford Cup, Sec		41		39

(a) See Table 6 for resin composition.

(b) See Table 7 for resin composition.

Table 11—Solvent Blend for High Solids and Flexible Enamels^a

Solvent	Wt. %	Vol. %
Toluene	19.6	20.0
n-Butyl acetate	34.8	34.9
Cyclohexanone	10.8	10.1
Ethylene glycol monethyl ether acetate	16.6	15.0
Methyl ethyl ketone	18.2	20.0
	100.0	100.0

(a) This solvent blend was formulated to comply with "Rule 66." Each manufacturer should be certain that this solvent blend conforms to the Air Pollution Control Regulations governing his production area.

Table 12—Physical Properties of High Solids Urethane Enamels

Property	UP5-14S-1T1	UP-14S-1N1	Commercial Polyester Polyol	Commercial Acrylic Oligomer
Impact resistance, in-lb (cm-kg)				
Direct	160 (185)	130 (150)	110 (127)	120 (139)
Reverse	160 (185)	90 (104)	80 (92)	110 (127)
Gloss				
60°	95	95	95	95
20°	72	75	85	85
Xylene wipe test				
1 min exposure	10	9 (Slight color change)	9 (Slight color change)	9 (Slight color change)
After 24 hr	—	10 (Recovered)	10 (Recovered)	10 (Recovered)
Crosshatch adhesion				
Before immersion	10	10	10	10
After immersion	10	10	10	10
Cleveland Cabinet				
Initial gloss				
60°	95	95	95	95
20°	73	75	85	85
Final gloss				
60°	92	94	94	90
20°	73	75	75	62
% Gloss retention				
60°	97	99	99	95
20°	100	100	88	73
Tukon hardness, hr				
3	2.64	5.11	4.58	1.70
24	4.83	9.33	6.31	3.20
120	8.53	13.40	7.77	8.78

were spray applied at 50 weight percent nonvolatile and cured at 180°F (82°C) for 20 min. The percent nonvolatiles of the commercial enamel was reported to be 17-20% and the suggested cure schedule was 250°F (121°C) for 30 min.

The coatings were subjected to standard automotive test procedures plus additional testing at

Table 13—Salt Spray Corrosion Resistance Of High Solids Urethane Enamels

	UP5-14S-1T1	UP5-14S-1N1	Commercial Polyester Polyol	Commercial Acrylic Oligomer
Salt spray, after 500 hr				
Initial, 60°	92	92	88	90
20°	54	80	70	76
Final, 60°	81	92	89	86
20°	51	78	68	74
% Gloss retention				
60°	88	100	100+	96
20°	94	98	97	97
Undercreepage, in.	1/32	<1/32	1/32	<1/32
Adhesion, crosshatch				
Initial	Good	Excellent	Fair	Fair
After 24 hr	Good	Good	Fair	Poor

Table 14—Weatherability of High Solids Urethane Enamels

	UP5-14S-1T1	UP5-14S-1N1	Commercial Polyester Polyol	Commercial Acrylic Oligomer
Florida Black Box exposure				
Initial gloss 60°	94	96	95	91
20°	70	70	69	68
Gloss after 1 year				
60°	80	84	79	9
20°	55	53	35	2
% Retention, after 1 year				
60°	85	88	83	10
20°	79	76	59	3
"Δb", after 1 year ^a	0.8	1.3	1.1	2.8
Dirt accumulation, after 1 year ^b				
Unwashed	6	7	6	1
Washed	8	9	9	3

(a) Δb is a measurement of the change in yellowness from the original value (0.2 Δb units are detectable visually; a change of 1.0 or less units is normally considered excellent). b values are measured on a Gardner Color Difference Meter (Gardner Laboratories, Inc.) according to the following scheme.

(yellow) + --- b --- (blue)
(red) + --- a --- (green)

(b) Rated 0-10 according to ASTM D3274-73T - 0 = Very Poor, 10 = Excellent.

Table 15—Physical Properties of Flexible Urethane Enamels

Property	UP18-14F-2T	UP18-14F-1N	Com-mercial Polyester Polyol	Com-mercial Flexible Enamel
Gloss				
60°	89	89	91	80
20°	82	75	82	75
Xylene wipe test				
1 min exposure	5	8	10	5
After 24 hr	9	9	10	8
Tukon hardness, 120 hr	2.9	3.8	3.1	2.7
Cleveland Cabinet				
Initial gloss				
60°	90	90	93	80
20°	81	75	76	75
Final gloss				
60°	90	90	93	80
20°	81	75	76	75
% Gloss retention				
60°	100	100	100	100
20°	100	100	100	100
Properties Determined at -20°F				
Impact resistance in-lb (cm-kg)				
Direct	160 (185)	160 (185)	160 (185)	160 (185)
Reverse	50 (58)	160 (185)	50 (58)	160 (185)
Conical mandrel flexibility, 1/8 in.				
% Pass	100	100	100	100

-20°F (-4°C). All the coatings tested had excellent initial 60° and 20° gloss. The humidity resistance of the enamels was excellent with 100% 60° and 20° gloss retention after 24 hr Cleveland Cabinet exposure. The xylene wipe test was rated on a scale of 0-10, where 0 is poor and 10 is excellent or no change. Immediately following xylene exposure the commercial enamel and the trimethylpentanediol based enamel had a rating of 5. The enamels based on the commercial polyester resin and the resin based on neopentyl glycol were rated 10 and 8, respectively. After 24 hr recovery time, all the enamels recovered to a 9 or better rating, with the exception of the commercial enamel which had an 8 rating (See Table 15). The best film hardness was obtained with the neopentyl glycol based enamels. The lowest hardness was obtained with the commercial enamel.

The -20°F (-4°C) flexibility test was run by conditioning the coated panels and testing apparatus for four hours in a walk-in freezer at -20°F prior to determining conical mandrel flexibility and impact resistance. Excellent 1/8 in. conical mandrel flexibility was obtained with all enamels. The enamels based on trimethylpentanediol and the commercial polyester resin had equal low temperature impact resistance of 160 in./lb (185 cm-kg) direct and 50

Table 16—Accelerated Durability of Flexible Urethane Enamels

	UP18-14F-2T	UP18-14F-1N	Com-mercial Polyester Polyol	Com-mercial Flexible Enamel
QUV exposure, 500 hr				
Initial gloss				
60°	86	90	93	80
20°	85	78	89	75
% Retention after 500 hr				
60°	100+	82	77	91
20°	61	33	35	44
"Ab" after 500 hr	0.5	0.3	1.7	0.9

Table 17—Physical Properties Of High Solids Polyester Melamine Enamels

Property	HS3-12S-1T	HS3-12S-1N
Gloss		
60°	86	92
20°	77	82
Impact resistance, in-lb (cm-kg)		
Direct	110 (127)	110 (127)
Reverse	80 (92)	80 (92)
Pencil hardness	H	3H
MEK solvent resistance (double rubs)	200+	200+
Scribed adhesion, % pass	100	100
Conical mandrel flexibility, 1/8 in., % pass	100	90

Table 18—Stain and Detergent Resistance Of High Solids Polyester-Melamine Enamels

Stain Resistance After 24-Hour Exposure		
Staining Agent ^a	HS3-12S-1T	HS3-12S-1N
Iodine		
5 min	9-10	5
30 min	9	4
Mustard	10	10
Tomato juice	10	10
Grape juice	10	10
Ink	10	10
Shoe polish	10	10
Grease	10	10
Detergent Resistance After 240 Hours at 165°F		
Initial gloss		
60°	88	94
20°	75	88
% Gloss retention		
60°	97	95
20°	93	91
Blisters		
% Area	<5	10
Size	#8	#4 and #8

(a) Rated 0 - 10 according to ASTM D-3274-73T - 0 = Extreme, 10 = Excellent or no change.

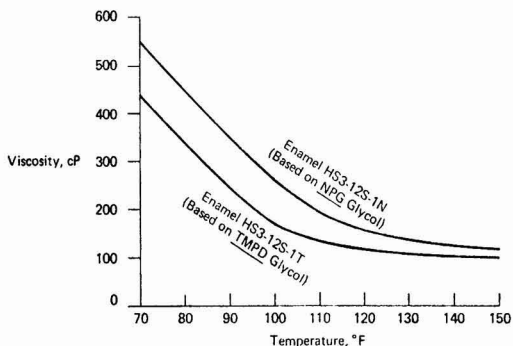


Figure 1—Viscosity of high solids polyester/melamine enamels based on TMPD and NPG glycols at various temperatures (85 wt % NV)

in./lb (58 cm-kg) reverse. The enamel based on neopentyl glycol and the commercial enamel had impact resistance of 160 in./lb both direct and reverse. (See *Table 15*). (For accelerated test results see *Table 16*.)

High Solids Melamine Enamels

Two polyester resins were developed for use in high solids melamine crosslinked enamels. These resins are designated HS-3-1T based on trimethylpentanediol and HS-3-1N based on neopentyl glycol. The enamel prepared with resin HS-3-1T was room temperature spray applied at 76 weight percent nonvolatiles. The enamel prepared with the resin based on neopentyl glycol was applied at 75 weight percent. These enamels were also hot spray applied (120-130°F; 49-54°C) at 80 volume percent nonvolatiles. This temperature reduced the Brookfield viscosity to 100-150 cP (See *Figure 1*). A nonvolatile of 85 weight percent was required to obtain approximately 80% volume solids. The Brookfield viscosity of 100-150 cP approximates a No. 4 Ford Cup viscosity of 35-40 sec. Control enamels were not included due to the unavailability of commercial resins for high solids melamine coatings when this work was initiated.

The fully formulated enamels were tested for shelf stability by storage for 30 days at 120°F (49°C). The viscosity of the enamels was measured initially and at 10-day intervals. The enamels based on neopentyl glycol resulted in the least viscosity increase after 30 days storage at 120°F (49°C) (See *Figure 2*).

The enamels were spray applied at room temperature on cold rolled steel panels having a zinc phosphate pretreatment and cured for 20-30 min at 325-350°F (163-177°C). The coated panels were aged one week before testing for physical properties.

The coated panels were tested according to standard appliance testing procedures. The film thickness of the enamels was controlled between 1.3 and 1.5 mils (33 and 38 μ). Both enamels had excellent initial 60° and 20° gloss. The enamel which

contained trimethylpentanediol had H pencil hardness with 110 in./lbs (127 cm-kg) direct and 80 in./lbs (92 cm-kg) reverse impact resistance. The enamel which utilized neopentyl glycol had 3H pencil hardness and impact resistance equal to the trimethylpentanediol based enamel.

Solvent resistance was determined by rub resistance of the enamels to a methyl ethyl ketone (MEK) saturated cloth. The enamels based on trimethylpentanediol and neopentyl glycol withstood more than 200 MEK double rubs. Both coatings exhibited excellent adhesion to phosphatized steel substrates. The enamel based on trimethylpentanediol passed the 1/8 in. conical mandrel bend (ambient) with no cracking of the coating. The neopentyl glycol based enamel was slightly less flexible due to the greater hardness (See *Physical Properties, Table 17*).

The coated panels were evaluated for resistance to common household stains. The coating based on trimethylpentanediol exhibited the best stain resistance, being stained only slightly by iodine. The enamel based on neopentyl glycol was more heavily iodine stained but was unaffected by the other staining agents (See *Table 18*). A detergent resistance test was conducted for 240 hr at 165°F (74°C) using 1 1/2% standard AATCC detergent*. Both enamels had excellent 60° and 20° gloss retention after exposure. The enamel utilizing trimethylpentanediol

* American Association of Textile Chemists and Colorists — Standard detergent without optical brightener.

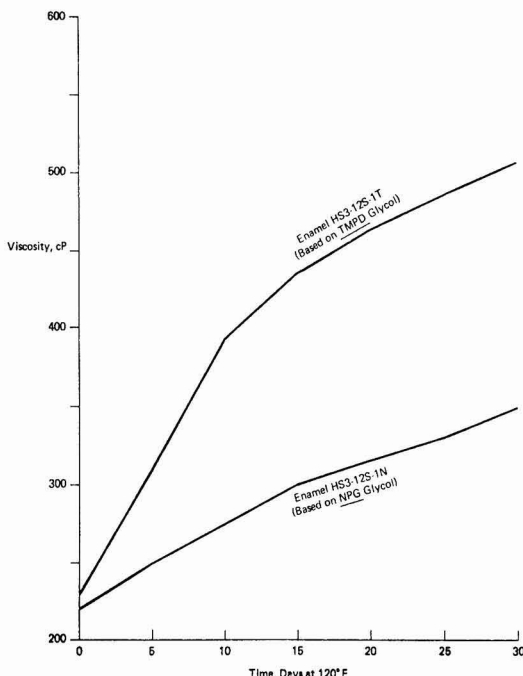


Figure 2—Accelerated shelf stability of high solids polyester/melamine enamels based on TMPD and NPG glycols

**Table 19—Weatherability and Salt Spray
Corrosion Resistance of High Solids
Polyester-Melamine Enamels**

	HS3-12S-1T	HS3-12S-1N
Carbon arc exposure, 500 hr		
Initial gloss		
60°	93	93
20°	80	80
% Gloss retention		
After 500 hr		
60°	89	84
20°	66	41
Δb After 500 hr	1.6	2.4
Salt spray, 500 hr		
Initial gloss		
60°	91	90
% Retention		
60°	98	100+
Creepage from scribe	<1/32	1/32
Blister area, %	0	0

had a few pencil point size blisters and the coating containing neopentyl glycol had a medium number of No. 4 and No. 8 blisters (See Table 18).

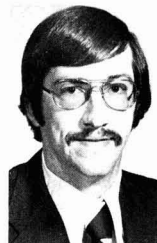
Accelerated weathering was determined on each of the enamels. After 500 hr carbon arc exposure, the enamels based on trimethylpentanediol had the best gloss retention and the least amount of film yellowing. The coating utilizing neopentyl glycol retained 90% of its original 60° gloss and had slightly more film yellowing than the enamel containing trimethylpentanediol (See Table 19).

Both enamels had excellent resistance to corrosion as indicated by 500 hr salt spray resistance. The 60° gloss retention was 98-100% with 1/32 in. or less creepage from the scribe. No blisters could be detected on either of the coatings (See Table 19).

SUMMARY

Polyester resins based on trimethylpentanediol and on neopentyl glycol have been synthesized and used to formulate high solids urethane and melamine modified enamels. Trimethylpentanediol has been shown to impart low viscosity to these resins allowing high solids enamels to be spray applied. The trimethylpentanediol enamels exhibited excellent gloss, impact resistance, solvent resistance, humidity resistance, good weatherability and inter-

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mediate film hardness. Polyester enamels based on neopentyl glycol had good impact resistance, adhesion, corrosion resistance, and excellent film hardness and weatherability.

It has been shown that excellent flexible urethane enamels can be formulated with neopentyl glycol and trimethylpentanediol having nonvolatiles much higher than a commercially acceptable enamel. Also, the urethane enamels, utilizing resins based on neopentyl glycol and trimethylpentanediol, cured with lower energy requirements than the commercial urethane enamel.

Lower cost urethane enamels are possible with polyester resins synthesized with trimethylpentanediol and neopentyl glycol. This is because the higher equivalent weights of the resins require less polyisocyanate resin for crosslinking. Additionally, excellent physical properties were obtained with these polyester urethane enamels.

High solids polyester-melamine enamels having properties comparable to conventional solvent based baking enamels can be formulated with trimethylpentanediol and neopentyl glycol. These coatings exhibit an excellent combination of substrate adhesion, solvent and stain resistance, hardness, flexibility, durability, and detergent resistance.

The objective of this work was to develop initial coating formulations based on trimethylpentanediol and neopentyl glycol which would be helpful to the coating formulator. This objective has hopefully been met and the information will be useful as a building block upon which the coatings formulator can evolve his own proprietary formulations. Also, this technology may serve as a valuable tool in the conservation of energy and scarce raw materials, and the reduction of air pollution. □

Continuing Study Of Non-Mercurial Mildewcides In Alkyd and Acrylic House Paints

LOUISVILLE SOCIETY FOR COATINGS TECHNOLOGY
Technical Committee

The use of mercury derived compounds as mildewcides is under close review by Federal and State agencies. Because of this, non-mercurial mildewcides have become a matter of intense interest, prompting a continuing exposure study of some of the non-mercurial mildewcides currently on the market. This study utilized long oil alkyd and acrylic latex house paint systems. The long oil alkyd vehicle system was used because of the recent escalating cost of linseed oil and zinc oxide, rendering that combination uneconomical for house paints.

The non-mercurial mildewcides were compared to mercurials and zinc oxide and exposed under various climatic conditions. A cost comparison of the systems under study was made.

KEY WORDS: Non-Mercurials; Mercurials; Mildewcides; Zinc oxide; Alkyd house paints; Exterior acrylics; Costs of various mildewcide systems; mildew resistant coatings.

INTRODUCTION

This paper will be in four sections as follows:

ALKYD HOUSE PAINT STUDY: This is the first report on a continuing alkyd house paint study. The alkyd system was used because the high cost of linseed oil and zinc oxide made the typical oil/zinc oxide base house paints impractical. Primed free-chalking and non-chalking series of white coatings were exposed north and south vertical in Jefferson-town, Ky. during June 1971. The non-chalking top-coat was also used as a tint base with phthalocyanine blue and green colorants (GP-8800 Series, Cal/Ink), and was exposed south vertical at the same time. The condition of the panels at 11 months, 24 months, 38 months and four years was reviewed.

Presented by John C. Ballard at the 53rd Annual Meeting of the Federation of Societies for Coatings Technology in Los Angeles, Calif., October 30, 1975.

The following mildewcides were studied:
Busan® 11-M1 — modified barium metaborate;
Fungitrol®-11 — N-(trichloro methyl thio)phthalimide;

ZnO AZO® 22 — zinc oxide — acicular;
Metasol® TK100 — 2-(4-thiazolyl)-benzimidazole;
Vancide® PA — trans-1, 2 bis (n-propyl sulfonyl) ethene;

Dowicil® S-13 — 2, 3, 5, 6 tetra-chloro-4 (methyl sulfonyl pyridine); and

P.M.O.®-10 — phenyl mercury oleate 30%.

ACRYLIC LATEX HOUSE PAINT STUDY: Panels exposed north and south vertical, on Aug. 29, 1972 at Glen St. Mary's, Fla. The following mildewcides were studied:

Amical® 77 — p-chloro phenyl diiodo methyl sulfone;

Sanibond® 200LG — tetradecyl dimethylbenzyl ammonium chloride dihydrate;

zinc undecylenate;

Skane® M8 — 2-n-octyl-4-isothiazolin-3-one; and

Super Ad-It® — di (phenyl mercury) dodeceny succinate.

ACRYLIC HOUSE PAINT STUDY: Panels exposed north vertical, Wilmington, Del. on June 28, 1972. The same paints and mildewcides as in the Fla. exposure were studied.

PANELS: Prepared and exposed north vertical at Jeffersontown, Ky. The paints were four proprietary acrylic exterior paints, and six paints containing non-mercurial mildewcides. These panels were exposed on Nov. 4, 1974.

EXPERIMENTAL

Alkyd House Paint

A basic long oil alkyd exterior undercoat formula was used containing the test mildewcides as the primers for this series. The same PVC was main-

Table 1—Free Chalking White House Paint Series^a

Series No.	Primer (Entire Panel)	Left Section	Center Section	Right Section
(1)	150 lb Busan 11-M1	150 lb Busan 11-M1	8.8 lb P.M.O.-10	100 lb Busan 11-M1
(2)	150 lb Busan 11-M1	100 lb ZnO	8.8 lb P.M.O.-10	150 lb zinc oxide
(3)	10 lb Fungitrol-11	10 lb Fungitrol-11	8.8 lb P.M.O.-10	5 lb Fungitrol-11 100 lb ZnO
(4)	2 lb Metasol TK100	2 lb Metasol TK100	8.8 lb P.M.O.-10	1 lb Metasol TK100 100 lb ZnO
(5)	15 lb Dowcil S-13	15 lb Dowcil S-13	8.8 lb P.M.O.-10	8 lb Dowcil S-13 100 lb zinc oxide
(6)	10 lb Vancide PA	10 lb Vancide PA	8.8 lb P.M.O.-10	5 lb Vancide PA 100 lb zinc oxide
(7)	12 lb P.M.O.-10	8.8 lb P.M.O.-10 100 lb zinc oxide	8.8 lb P.M.O.-10	150 lb zinc oxide

(a) All amounts of mildewcide lb/100g paint.

tained by adjusting the extenders in all cases. (See Appendix *Formula 1*).

The topcoats were made in the same manner using an exterior white house paint formula (See Appendix, *Formula 2*).

The primer and topcoat systems were applied to redwood lap siding (6 in. × 42 in.) and yellow pine tongue and groove siding (6 in. × 42 in.). On each panel the entire surface was primed with the test primer. Each panel was then divided into three equal sections and different topcoats were applied to each section. The left section employed the mildewcide at the manufacturer's suggested level. The center section was the control of 8.8 lbs of P.M.O.-10 per 100 gal of paint, and the right section represented half the suggested amount of mildewcide, plus 100 lbs of zinc oxide. Then, each system was applied to two redwood panels and two yellow pine panels for north and south vertical exposure. The various finishing systems are outlined in *Table 1*.

A further study was made on a tint base formulation tinted with 8 oz/gal Cal/Ink phthalocyanine green and blue, respectively. (See Appendix, *Formula 3*) The same mildewcides were tested as in the preceding alkyd series. Only redwood siding exposed south vertical was tested in this series. As in the former, the entire panel was primed with the same

primer as in the white series. The primed panels were then divided in three sections and different topcoats were applied to each section. The center section in all cases was topcoated with the paint containing 8.8 lb/100 gal P.M.O. The left section was topcoated with the paint containing the level of mildewcide suggested by the manufacturer. The right section was topcoated with half the level of mildewcide, and 100 lbs of zinc oxide.

These finishing systems are listed in *Table 2*.

Acrylic House Paint

A white acrylic house paint formula was used in this study (See *Formula 4*, Appendix). The test mildewcide was used in place of the Super Ad-It.

The mildewcides and amounts for 100 gal are listed below by test paint No.:

- (1) Super Ad-It — 10.2 lb/100 gal
- (2) Amical 77 — 9 lb/100 gal
- (3) Amical 77 — 6 lb/100 gal
- (4) Sannibond 200 LG — 1½ lb/100 gal
- (5) zinc undecylenate — 2.35 lb/100 gal
- (6) Skane M-8 — 2 lb Skane M-8/100 gal and 50 lb ZnO/100 gal

These paints were applied to white pine lap siding primed with an alkyd exterior primer (see Ap-

Table 2—Tint Base Series^a

Series No.	Primer Over Entire Panel	Left Section	Center Section	Right Section
(1)	150 lb Busan 11-M1	150 lb Busan 11-M1	8.8 lb P.M.O.-10	100 lb Busan 11-M1
(2)	150 lb Busan 11-M1	100 lb zinc oxide	8.8 lb P.M.O.-10	150 lb zinc oxide
(3)	10 lb Fungitrol-11	10 lb Fungitrol-11	8.8 lb P.M.O.-10	5 lb Fungitrol-11 100 lb zinc oxide
(4)	2 lb Metasol TK100	2 lb Metasol TK100	8.8 lb P.M.O.-10	1 lb Metasol TK100 100 lb zinc oxide
(5)	15 lb Dowcil S-13	15 lb Dowcil S-13	8.8 lb P.M.O.-10	8 lb Dowcil S-13 100 lb zinc oxide
(6)	10 lb Vancide PA	10 lb Vancide P.A.	8.8 lb P.M.O.-10	5 lb Vancide PA 100 lb zinc oxide
(7)	12 lb P.M.O.-10	12 lb P.M.O.-10	8.8 lb P.M.O.-10	150 lb zinc oxide

(a) All amounts of mildewcide are lb/100 g paint.

Table 3—Condition of Panels and Dates Observed^a

Series No.	Section of Panel	5-5-72	6-5-73	8-19-74	4-4-75
		Mildew Growth	Mildew Growth	Mildew Growth	Mildew Growth
(1)	Left	Slight	Slight	Medium	Medium
	Center	Slight	Slight	Slight	Medium
	Right	Slight	Slight	Medium	Medium
(2)	Left	Slight	Slight	Slight	Slight
	Center	Medium	Slight	Slight	Medium
	Right	Slight	Slight	Slight	Slight
(3)	Left	None	Medium	Severe	Severe
	Center	None	Medium	Medium	Severe
	Right	None	Slight	Severe	Severe
(4)	Left	Slight	Severe	Severe	Medium
	Center	Slight	Medium	Slight	Slight
	Right	Severe	Severe	Severe	Medium
(5)	Left	None	Slight	Medium	Slight
	Center	None	Medium	Slight	Severe
	Right	None	Medium	Medium	None
(6)	Left	None	Medium	Medium	Slight
	Center	None	Medium	Slight	Medium
	Right	None	Medium	Medium	Slight
(7)	Left	None	Slight	Slight	Slight
	Center	None	Slight	Slight	Slight
	Right	None	Medium	Slight	Medium

(a) Redwood series tests started 6/4/71 test fences Jeffersontown, Ky. north vertical exposure.

pendix, *Formula 1*) similar to the one used in the alkyd house paint study, with 2 lb Vancide P.A. per/100 gal, and to Masonite X-90 primed siding and exposed for 15 months north and south vertical at Glen St. Mary's, Fla.

The same paints as in the previous study were applied to cedar primed with the same exterior alkyd primer. These panels were exposed for 31 months north vertical in Wilmington, Del.

Ten test paints were brushed on 42 in. × 5½ in. X-90 primed siding. One-half was second coated with the same paint. The panels were coated as follows:

- (1) Second line acrylic house paint containing 1.85 lb Super Ad-It/100 gal.
- (2) First line acrylic house paint containing 10.11 lb Super Ad-It/100 gal.
- (3) First line acrylic house paint containing 7.85 lb Dowicil A40/100 gal.
- (4) First line gloss acrylic exterior enamel containing 1.96 lb Skane M-8, 6.13 lb ZnO/100 gal.

The other six panels were coated with test paints submitted by Merck Chemical Products, Development Service Laboratories.

COST STUDY

The cost tables were compiled in October 1975. (See Appendix).

These tables show the cost/gal of the mildewcide in both the primer and the topcoat. The system is the cost per gal of the mildewcide involved if the primer and topcoat are both used. The amounts of mildewcide used in this study were

based on the manufacturer's recommendation at the time this project was initiated. These amounts may not be the current recommendations.

RESULTS

Alkyd Series

The results obtained in the alkyd house paint series confirm the fact that all mildew studies must be observed over the entire period of exposure. Individual members of a series can change drastically in performance after various periods of exposure.

Through the first two years of exposure the paints containing N-(trichloro methyl thio) phthalimide showed excellent mildew control, being superior to those containing mercury. Second in performance during this period were the paints containing *trans*-1, 2 bis (n-propyl sulfonyl) ethene. (See *Table 3*).

At the two and one half year exposure point many of the panels in the series began to change in performance. After a full three years of exposure the paints containing the N-(trichloro methyl thio) phthalimide were no longer providing any appreciable resistance to mildew growth. At this point in time the paints containing mercury were showing the most effective mildew control. Second, and not far behind, were those paints containing *trans*-1, 2-bis (n-propyl sulfonyl) ethene.

When considering performance of non-mercurial mildewcides over the full three years exposure, the *trans*-1, 2-bis (n-propyl sulfonyl) ethene mildewcide

Table 4—Acrylic Series^{a,b}

Paint Id.	North Vertical				South Vertical			
	Primed		Masonite		Primed		Masonite	
	White Pine Gen.	Spotty Gen.	White Pine Gen.	Spotty Gen.	White Pine Gen.	Spotty Gen.	White Pine Gen.	Spotty Gen.
(1)	6.0	7.0	9.0	10.0	8.0	7.0	10.0	8.0
(2)	8.0	8.0	9.0	10.0	8.0	5.0	10.0	9.7
(3)	7.0	6.0	9.0	10.0	8.0	6.0	10.0	10.0
(4)	5.0	9.0	9.0	10.0	8.0	5.0	10.0	10.0
(5)	6.0	8.0	9.0	10.0	8.0	3.0	10.0	9.7
(6)	9.0	6.0	9.0	10.0	8.0	9.0	10.0	10.0

(a) Eleven months.

General and Spotty Mildew (3/25/76)

	North Vertical				South Vertical			
	Primed		Masonite		Primed		Masonite	
	White Pine Gen.	Spotty Gen.	White Pine Gen.	Spotty Gen.	White Pine Gen.	Spotty Gen.	White Pine Gen.	Spotty Gen.
(1)	4.7	7.0	9.7	9.3	7.3	8.3	9.3	9.3
(2)	5.0	5.0	9.0	9.3	6.7	8.0	9.0	8.0
(3)	5.0	7.3	9.3	9.7	6.3	7.0	9.3	9.0
(4)	4.3	8.0	8.7	10.0	6.0	6.3	9.0	9.7
(5)	4.3	8.0	9.7	4.7	6.7	8.0	10.0	9.7
(6)	7.0	9.0	9.7	9.7	9.0	9.0	10.0	9.7

(b) Fifteen months.

LOUISVILLE SOCIETY'S TECHNICAL COMMITTEE

Frederic A. Fairbrother, Jr., Chairman	Kurfees Coatings, Inc.
John C. Ballard	Kurfees Coatings, Inc.
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Richard G. Fortener	Celanese Coatings, Inc.
Herbert Wilson	Celanese Coatings, Inc.

is definitely the most effective of those evaluated in this series. It is easy to see why mercury has been an overwhelming choice as a mildewcide in the past and why many paint manufacturers are planning to continue to use it as long as it is available.

The contribution of the primer coat to mildew control is quite apparent in this series. A rather wide variation in performance is found when using the same topcoat over various primers containing various mildewcides. (See *Tables 1, 2 and 3*)

Use of zinc oxide in combination with the various mildewcides is beneficial. This can be used only in the topcoat as the use of zinc oxide in alkyd films next to the wood will increase peeling tendencies under adverse moisture conditions.

Since the results on the yellow pine and on the blue and green tint series correlated well with the white house paint series, only the results for the free-chalking series on redwood siding are shown. (See *Table 3*).

Acrylic Series

GLEN ST. MARYS EXPOSURE: The 11 and 15 month ratings observed at the site by Rohm and Haas personnel are shown in *Table 4*.

From these evaluations, it can be concluded that the white pine panels with alkyd primer were the most severe substrate, and that north vertical, for the primed white pine, was the most severe exposure.

Paint number 6, containing 2 lb Skane M-8 and 50 lb Zinc Oxide, had the best mildew resistance.

WILMINGTON, DEL. EXPOSURE: The Cedar Siding primed with alkyd primer and exposed for 31 months north vertical was the most severe substrate and exposure.

In this series, having twice the exposure time as in the previous test, the ratings given at the site are shown in *Table 5*.

In this exposure, paint number 1, containing 10.2 lb Super Ad-It, a mercurial mildewcide, had the best resistance.

At 10, 19 and 24 months, paint number 1 and 6 had identical ratings. From 25 to 31 months paint number 6 began to support mildew growth at a faster rate.

It would appear from the acrylic series that the

Table 5—Cedar Siding Alkyd Primer Exposure

Paint No.	10 Months	19 Months	24 Months	31 Months
1	9	6	6	6
2	7	6	5	5
3	8	6	5	5
4	8	6	6	5
5	8	6	6	5
6	9	6	6	5

mercurial mildewcides are effective over a longer period of time than any of the non-mercurials tested.

SUMMARY

An exposure study of alkyd house paint and exterior acrylic coatings was undertaken comparing mercurial mildewcide with several non-mercurials available in 1971 when this project was initiated.

In all these tests the mercurials were the most effective from a performance-cost standpoint, however, the non-mercurials have several serious candidates from a performance standpoint.

In the alkyd study the choice of primer is of considerable importance in the performance of the topcoat.

The acrylics were applied over factory primed siding of the Masonite X-90 type, which is extensively used in the Midwest and South, and both cedar and white pine lap siding primed with an exterior alkyd primer.

FUTURE WORK

The panels in the 1971 alkyd house paint series and the 1974 acrylic series are still on exposure and will continue to be observed.

Based on the results of earlier acrylic latex exposures, we are planning a new series utilizing new and current offerings in non-mercurial mildewcides, using recommendations of amounts and methods of incorporation by existing suppliers in both gloss and flat latex paints.

ACKNOWLEDGMENT

The Committee is indebted to the E. I. duPont de Nemours Co. and Rohm and Haas Co. for exposing the panels for the acrylic study. We especially wish to thank the Celanese Coatings Co. for the use of their panels and data on the alkyd house paint series.

We wish to thank Gerald Terry and Helen Kellerman of Kurfees Coatings, Inc.; Mr. Terry for his help in preparing the test paint and panels, and Mrs. Kellerman for preparing the manuscript for publication. □

Trademark References

Busan 11-M1 Buckman Laboratories, Inc.
 Fungitrol-11, P.M.O.-10,
 Super Ad-It, and Cal/Ink Thalo
 Blue E Tenneco Chemicals, Inc.
 Zinc oxide AZO 22 ASARCO, Inc.
 Metasol TK100 Merck & Co.
 Vancide PA, and Nyal 300 R. T. Vanderbilt Co., Inc.
 Dowicil S-13 Dow Chemical Co.
 Amical 77 Abbott Laboratories
 Sannibond 200 LG Hilton-Davis Chemical Co.

Skane M-8, Tamol 731, Triton CF-10, and
 Rhoplex AC-35 Rohm and Haas Co.
 Celite 281 Johns-Manville Products Corp.
 Bentone 34 NL Industries
 Syntex 3490, 2964, and RL80 Celanese Resins Corp.
 Duramite Whittaker, Clark & Daniels, Inc.
 Multiflex M.M. Diamond Shamrock Chemical Corp.
 Cellosize QP 4400 Union Carbide Corp.
 Calwhite Georgia Marble Co.
 Surfnyl TG Air Products & Chemicals, Inc.
 Colloid 677 Colloids of Carolina

APPENDIX

FORMULA 1 EXTERIOR UNDERCOAT		
	Lb	G
Titanium dioxide, non-chalking type III	125.0	3.57
Nyal® 300 magnesium silicate	255.0	9.50
Celite® 281 diatomaceous silica	50.0	2.61
Litharge	4.0	.05
Bentone® 34 gellant	6.0	.47
Syntex® 3490 long oil linseed alkyd	299.0	36.50
140 Solvent	119.0	18.00
Grind, drain and rinse		
140 Solvent	64.0	9.72
Add with agitation		
Syntex 3490 long oil alkyd	57.0	7.00
Syntex 2964 thixotropic long oil alkyd	65.8	9.00
Manganese naph. 6%	1.2	.15
Zirconium octoate 6%	8.8	1.19
Anti-skinning agent	1.0	.13
Test mildewcide		
Methyl alcohol	2.4	.36
Add		
Syntex RL-80 flow control agent	1.8	.25
10.42 lb/gal	1042.0	100.00
N. V. wgt — 73.5 0/0		
Vehicle N.V. — 58.4 0/0		
PVC — 27.3 0/0		

FORMULA 2 EXTERIOR WHITE HOUSE PAINT		
	Lb	G
Titanium dioxide, non-chalking type III	150.0	4.28
Anatase titanium dioxide	50.0	1.54
Litharge	4.0	.05
Nyal 300 magesium silicate	255.0	9.50
Bentone 34 gellant	6.0	.47
Syntex 3490 long oil linseed alkyd	200.00	36.50
140 Solvent	119.0	18.00
Grind, drain and rinse		
140 Solvent	35.0	5.47
Add with agitation		
Syntex 3490 long oil linseed alkyd	97.0	12.00
Syntex 2964 thixotropic long oil alkyd	65.8	9.00
Manganese naph. 6%	1.3	.16
Zirconium octoate 6%	9.7	1.31
Anti-skinning agent	1.0	.13
Methyl alcohol	2.4	.36
Test mildewcide		
Add		
Syntex RL-80 flow control agent	1.0	.13
10.75 lb/gal	1075.0	100.00
N. V. wgt — 77.2 0/0		
Vehicle N.V. — 63.0 0/0		
PVC* — 25.0 0/0		

(a) The PVC of all the test paints was maintained the same by adjusting the extenders.

COST OF ADDED MILDEWCIDES ACRYLIC HOUSE PAINT SERIES

Panel No.	Primer		Topcoat		Cost/gal Of System
	Lb/gal	Mildewcide	Lb/gal	Mildewcide	
(1)	0.04 lb	Vancide P.A.	0.102 lb	Super Ad-It	0.3825
(2)	0.04 lb	Vancide P.A.	0.09 lb	Amical 77	0.8835
(3)	0.04 lb	Vancide P.A.	0.06 lb	Amical 77	0.6570
(4)	0.04 lb	Vancide P.A.	0.015 lb	Sannibond 200 LG	0.2565
(5)	0.04 lb	Vancide P.A.	0.0235 lb	zinc undecylenate	0.2863
(6)	0.04 lb	Vancide P.A.	0.02 lb	Skane M-8	0.1450
			0.5 lb	Zinc oxide	0.3550

STUDY OF NON-MERCURIAL MILDEWCIDES IN HOUSE PAINTS

FORMULA 3
HOUSE PAINT TINT BASE

	Lb	G
Titanium dioxide, non-chalking type III	200.0	5.73
Litharge	4.0	.05
Duramite® w. g. calcium carbonate	150.0	6.67
Multifex® M.M. precip. calcium carbonate	75.0	3.36
Bentone 34 gellant	6.0	.40
Syntex 3490 long oil linseed alkyd	254.00	31.00
140 Solvent	92.4	14.00
Grind, drain and rinse		
140 Solvent	34.6	5.27
Add with agitation		
Syntex 3490 long oil linseed alkyd	155.0	19.00
Syntex 2964 thixotropic long oil alkyd	80.5	11.00
Manganese naph. 6%	1.4	.17
Zirconium octoate 6%	10.2	1.38
Anti-skinning agent	1.0	.13
Test mildewcide		
Methyl alcohol	2.4	.36
Add		
Syntex RL-80 flow control agent	2.8	.38
10.78 lb/gal	1078.1	100.00
N. V. wgt — 79.1 0/0		
Vehicle N.V. — 66.3 0/0		
PVC — 24.5 0/0		

FORMULA 4
ACRYLIC HOUSE PAINT

	Lb	G
Water	163.0	19.57
Colloid 6/7	2.0	.27
Ethylene glycol	25.0	2.68
Cellosize® QP4400 cellulosic thickner	2.5	.22
Tamol® 731	10.0	1.16
Triton® CF-10	2.5	.28
Titanium R-966 type III	300.0	8.99
Nytral 300 magnesium silicate	50.0	2.10
Calwhite® w. g. calcium carbonate	100.0	4.43
5-6 NS before thinning		
Water	10.5	1.25
Test mildewcide		
Surfynol® TG	2.1	.25
Ammonium hydroxide	2.1	.25
Rhoplex® AC-35 acrylic latex	500.0	56.54
Pine oil	5.7	.75
Cal/Ink® thalo blue E	.1	.01
11.86 lb/gal	1185.5	100.00
N. V. wgt — 57.92 0/0		
N. V. vol — 40.95 0/0		
PVC — 37.90 0/0		

(a) Two colors of the above formula were tinted with 8 oz/gal Cal/Ink thalo green and blue respectively. The PVC of all the test paint was maintained the same by adjusting the extenders.

COST OF ADDED MILDEWCIDE ALKYD HOUSE PAINT SERIES

System No.	Primer Lb/gal	Mildewcide	Cost/gal	Topcoat Lb/gal	Mildewcide	Cost/gal	Cost/gal Of System
1.	1.50#	Busan 11M1	\$.60	1.50#	Busan 11M1	\$.60	\$1.20
2.	1.50#	Busan 11M1	.60	.088#	P.M.O.-10	.154	.754
3.	1.5#	Busan 11M1	.60	1.0#	Busan 11M1	.40	1.00
4.	1.5#	Busan 11M1	.60	1.0#	Zinc oxide	.42	1.02
5.	1.5#	Busan 11M1	.60	1.5#	Zinc oxide	.63	1.23
6.	.10#	Fungitrol-11	.199	.10#	Fungitrol-11	.199	.398
7.	.10#	Fungitrol-11	.199	.100#	P.M.O.-10	.154	.3530
8.	.10#	Fungitrol-11	.199	.05#	Fungitrol-11	.0995	
				1.0#	Zinc oxide	.42	.7185
9.	.02#	Metasol TK100	.34	.02#	Metasol TK100	.34	.68
10.	.02#	Metasol TK100	.34	.088#	P.M.O.-10	.154	.494
11.	.02#	Metasol TK100	.34	.01#	Metasol TK100	.17	
				1.00#	Zinc oxide	.42	.93
12.	.15#	Dowicil S-13	.6075	.15#	Dowicil S-13	.6075	1.215
13.	.15#	Dowicil S-13	.6075	.088#	P.M.O.-10	.154	.7615
14.	.15#	Dowicil S-13	.6075	.08#	Dowicil S-13	.3240	
				1.0#	Zinc oxide	.42	1.3515
15.	.10#	Vancide P.A.	.51	.05#	Vancide P.A.	.255	
				1.0#	Zinc oxide	.42	1.185
16.	.10#	Vancide P.A.	.51	.088#	P.M.O.-10	.154	.664
17.	.10#	Vancide P.A.	.51	.10#	Vancide P.A.		1.020
18.	.12#	P.M.O.-10	.21	.088#	P.M.O.-10	.154	
				1.0#	Zinc oxide		.7640
19.	.12#	P.M.O.-10	.21	.088#	P.M.O.-10	.154	.3640
20.	.12#	P.M.O.-10	.21	1.5#	Zinc oxide	.60	.81

On the Crystallography Of Chrome Orange

SIDNEY POLLACK
Pittsburgh Energy Research Center, ERDA*
and
ROBERT L. FELLER
Carnegie-Mellon Institute of Research†

This work is derived from studies on the characterization of artists' pigments sponsored by the National Gallery of Art, aided by grants from the National Endowment for the Arts, the David L. Kreeger Foundation and the CIBA-GEIGY Foundation.

Two points of misinformation about the pigment chrome orange persist in the literature. One concerns its composition and the other, its crystal system. Recent publications usually describe the composition accurately as, $\text{PbO} \cdot \text{PbCrO}_4$. Many older reports, on the other hand, give the composition as $\text{Pb}(\text{OH})_2 \cdot \text{PbCrO}_4$, and this is the formula that appears in the Powder Diffraction File.¹ Infrared absorption, however, provides convincing evidence of the absence of hydroxyl: the spectra show no sharp bands at about 3650 cm^{-1} , although weak broad bands may occasionally be observed in this region owing to the presence of moisture.

Chrome orange has a monoclinic unit cell with $a = 14.00$, $b = 5.68$, and $c = 7.14 \text{ \AA}$; beta is 115.5° .¹ In 1935, the crystal system of chrome orange was indexed erroneously by Wagner and Schirmer as having a tetragonal cell with $a = b = 5.95$ and $c = 6.71$.² As a consequence, we find authoritative sources such as Kittel³ and the 1966 *Paint Technology Manual*⁴ citing the structure as tetragonal.

* 4800 Forbes Avenue, Pittsburgh, Pa. 15213.
† National Gallery of Art Research Project, Pittsburgh, Pa. 15213.

Table 1—Powder Diffraction Data for Chrome Orange

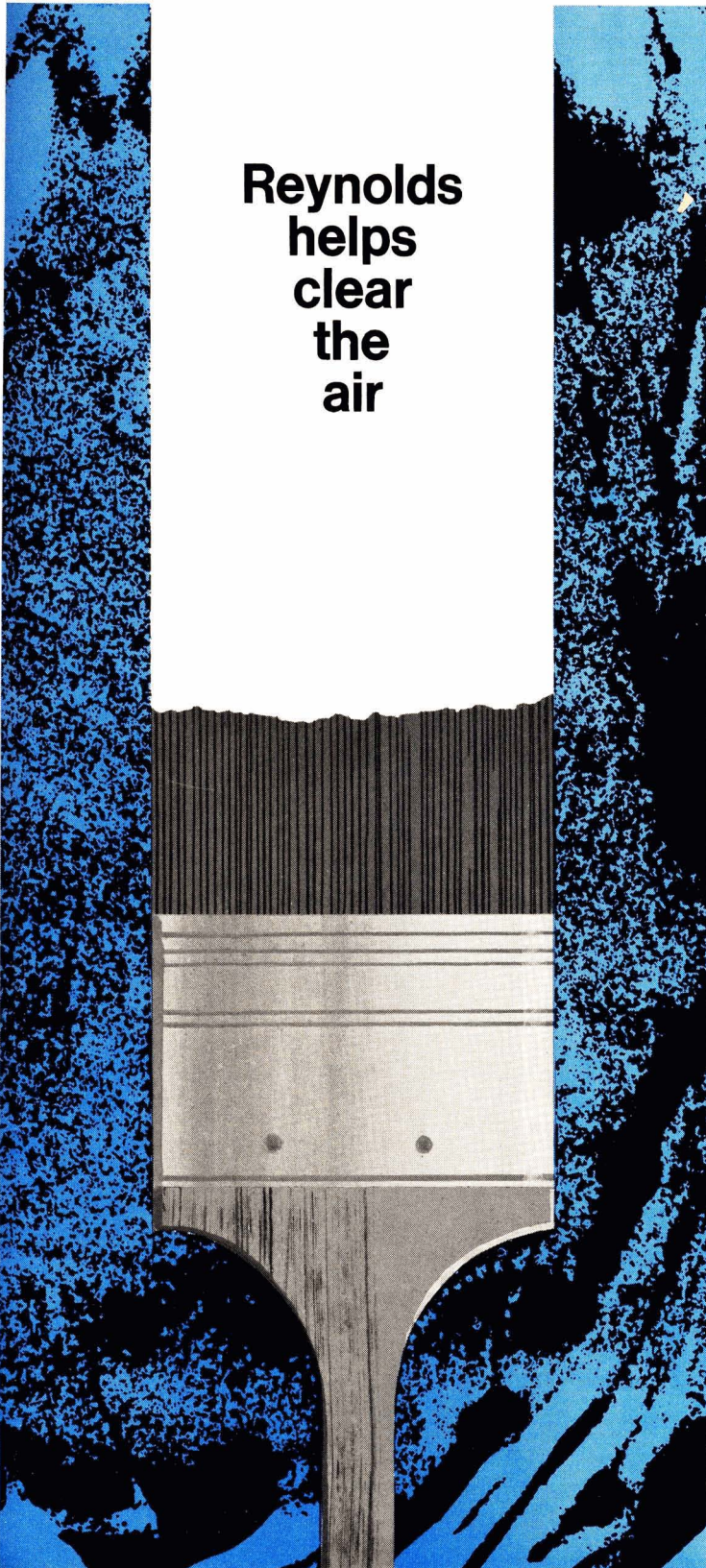
$\sin^2 \theta$ Cu K α	Wagner and Schirmer, 1935		Card No. 8-437, DeWolff	
	d	Intensity ^a	d	Intensity
0.0515	3.39		6.45	14
			6.32	16
			5.96	10
			4.44	14
			3.39	100
0.0666	2.98		3.23	12
			2.986	80
			2.882	20
			2.840	35
0.0955	2.49		(2.511)	12
			(2.479)	14
0.1197	2.22		2.269	16
			2.114	10
0.1408	2.05		2.058	18
			1.867	18
0.1603	1.92		1.726	12
			1.52	plus 17 unlisted lines to 1.419
0.2576	1.52			
0.4045	1.21			

(a) No intensities given.

Comparison of the data of Wagner and Schirmer with that of DeWolff on Card #8-437 in the Powder Diffraction File suggests that they had the same compound as DeWolff but that their camera and technique prevented them from acquiring satisfactory data. In Table 1, the lines reported by Wagner and Schirmer are compared with those of intensity greater than 10 listed on Card #8-437. No weak lines larger than 3.39 \AA were reported in the 1935 work, implying that the sample was too thick, with the result that these weak, low angle lines were absent owing to x-ray absorption. □

References

- (1) DeWolff, P., Powder Diffraction File, Joint Committee on Powder Diffraction Standards, Swarthmore, Pa. (1975). Inorganic Card No. 8-437.
- (2) Wagner, H. and Schirmer, H., "Baschisches Bleichromat und seine Umwandlung," *Z. Anorg. Allg. Chem.*, 222, 245 (1935).
- (3) Kittel, H., "Pigmente," *Wiss. Verlagsgesellschaft*, Stuttgart 1960, 287.
- (4) Taylor, W. A. and Marks, S. (editors), "Pigments, Dyestuffs and Lakes," *Paint Technology Manuals*, Part 6, Reinhold, New York, 1966, 160.



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Twenty-ninth Technical Exhibition 1977

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The motif for 1977 designed in red, yellow and green, by Robert Hamblin, uses inward pointing arrows to symbolize how exhibitors and visitors are drawn from all points of the compass to the Exhibition. The heads of these arrows form white arrows in the opposite direction, showing the subsequent spreading of knowledge of technical advancements from this unique annual focal point for the surface coatings industries.

ALEXANDRA PALACE, LONDON N.22, ENGLAND

Tuesday	22 March	09.30 — 17.30 hrs
Wednesday	23 March	09.30 — 17.30 hrs
Thursday	24 March	09.30 — 17.30 hrs
Friday	25 March	09.30 — 16.00 hrs

CLOSING DATE FOR APPLICATIONS TO EXHIBIT 1 OCTOBER 1976

FOR APPLICATION TO EXHIBIT CONTACT:

**The Director & Secretary,
OIL & COLOUR CHEMISTS' ASSOCIATION
Priory House, 967 Harrow Road, Wembley, Mddx, HAO 2SF, England
(Telephone 01 908-1086 Telex 922670 (OCCA Wembley))**

Society Meetings

Birmingham April 29

During this additional meeting, organized by the Club's Technical Committee, a forum was held on "MEASUREMENT OF VISCOSITY, DENSITY AND SPECIFIC GRAVITY."

Viscosity and the methods used for its measurement were described by A. Naughton, while B. J. Addenbrooke followed with a similar treatment of density and specific gravity with particular emphasis on the effects of temperature.

A general discussion then followed, covering such subjects as the need for testing viscosity, measurement of settling, and tighter controls specified by major customers.

BRIAN GILLIAM, *Publicity Officer*

Birmingham May 6

D. W. Brooker, of Arthur Holden & Sons Ltd. and G. Fahey, of Thorn Electrical, spoke on "POWDER COATINGS."

Mr. Brooker outlined the methods used for the manufacture of powder coatings by either extrusion, or alternatively first making a paint, and then spray drying to get a powder with regular spherical particles. He discussed the resin systems suitable for use with powders, such as epoxies, acrylics, and polyesters.

Mr. Fahey discussed the advantages of powders, and listed them as: cleanliness; requiring less space; a maximum of only 5% rejects; requiring no thinning viscosity; having little objection from environmentalists; and, although material costs are 50% higher than two coat wet paint, indirect costs are less.

Q. Forecasts were made that powders would have 2% of the market by the 1980's. Were these estimates overly optimistic?

A. Whereas a few years ago powder was considered the panacea for all industrial problems, we now tend to underestimate its potential. The percent which powders will capture the market depends on the automotive industry.

Q. What do you do with rejects?

A. Rub them down and recoat.



Past-Presidents in attendance at the May meeting of the Cleveland Society for Coatings Technology. Seated (left-to-right): M. W. Malaga (1956-57), of Glidden-Durkee Div., SCM Corp.; G. H. Mutersbaugh (1940-41); E. Schulte (1938-39); G. Selden (1957-58), of UPCO Co.; and C. H. Leopold (1950-51). Standing: E. F. Sickels (1970-71), of Body Bros., Inc.; K. C. Waldo, Jr. (1965-66), of Sherwin-Williams Co.; W. M. Tomc (1953-54), of Glidden-Durkee Div., SCM Corp.; V. G. Sandorf (1967-68), of Harshaw Chemical Co.; E. P. Bell (1969-70), of Harrison Paint Corp.; J. P. Sleeman (1971-72), of Midland Div., Dexter Corp.; F. H. Hollenberg (1958-60), of Sprayon Products, Inc.; and D. H. Fordyce (1974-75), of Body Bros., Inc.

Q. Are any other resin systems likely to be used?

A. Epoxies hold 90% of the market. Polyester or polyurethanes for external use require the use of a caprolactam blocked isocyanate hardener which gives a weight loss on stoving.

BRIAN GILLIAM, *Publicity Officer*

C-D-I-C May 10

A Production Panel composed of James Keller, of Hanna Chemical Coatings Co.; James Stokes, of Lilly Industrial Coatings, Inc.; and Jack Spiek, of Lowe Bros. Div., Sherwin-Williams Co., discussed "PAINT MANUFACTURING FROM A TREASURER'S POINT OF VIEW."

Q. Does using FIFO (First in First Out) or LIFO (Last in First Out) have any bearing on how you deplete your inventory?

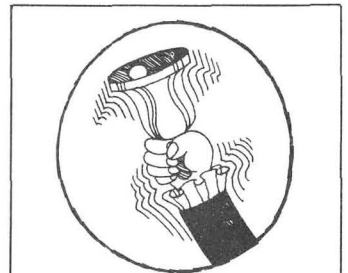
A. It doesn't have any bearing on a particular item which you are buying on a regular basis; it's always wise to use older raw materials than those that have just arrived. What FIFO or LIFO does do is control the price of that item since you are using the latest cost of that raw material to figure your price for the marketing of that product. By figuring the inventory on the lowest price

paid for an item you can increase your cash flow. Using LIFO takes the inflation trend into consideration in dealing with the financial aspects of your company.

Q. With business fluctuating as it has over the past several years, can you predict the balance of finished goods or raw materials inventory for the rest of this year?

A. That is very difficult to answer; however, from what we see, with slight variations in some areas, balance of inventory should remain static for the rest of the year.

RAY SCHOMAKER, *Secretary*



HEAR YE! HEAR YE! THY FEDERATION'S 54TH ANNUAL MEETING AND 41ST PAINT SHOW SHALT OCCUR IN WASHINGTON, D.C., OCTOBER 27 THRU 29

Cleveland May 6

This meeting was designated Past-President's, Awards, and Annual Meeting Night.

A moment of silence was observed in memory of H. J. L. Cotton, Past-President of the Society (1939-40), who died recently.

In recognition of many years of service to the Society and Federation, Earle Sickels, Awards Committee Chairman, presented 25-year pins to: E. P. Bell, of Harrison Paint Corp., R. L. Cooper, of Stewart Bros. Paint Co.; C. E. Dwors, of Lubrizol Corp., H. J. Kiefer, of Glidden-Dur-

kee Div., SCM Corp.; M. L. Levy, of Crobaugh Laboratories; and J. G. Martyn, of Grow Chemical Coatings Corp.

It was also announced that Dr. David M. Gans has received the Cleveland Technical Societies Council's 1976 Distinguished Service Award.

The following slate of officers was elected for the year 1976-77: President—Fred G. Schwab, of Coatings Research Group, Inc.; President-Elect—Helen Skowronska, of Sherwin-Williams Co.; Secretary—Charles K. Beck, of Addressograph Multigraph Corp.; and Treasurer—

Paul J. Houck, of Morgan Adhesives Co.

Michael Fahey, of General Electric Co., spoke on "NEW DEVELOPMENTS IN SILICONE."

After a brief discussion of the basic chemical structure of silicones, Mr. Fahey listed their many uses, such as mold release agents, anti-foams, and polishes. He said that the major coatings application for silicones are in heat-resistant paints and weather-resistant coatings. Low viscosity of silicone resins frequently cause formulators to use excessive amounts of pigments in silicone paints—with resulting bad effects. In order to avoid such problems, the silicone manufacturer's recommendations regarding choice and amount of pigment should be followed.

HELEN SKOWRONSKA, *Secretary*

Golden Gate May 17

John G. Delker, Jr. and Robert W. Porter, of E. I. du Pont de Nemours, Inc., spoke on "TITANIUM DIOXIDE SLURRIES IN COATINGS DESIGN OF SYSTEMS."

Q. Are slurries of TiO_2 more compatible with non-ionic or anionic surfactants?

A. There are no problems with either surfactants.

Q. Do slurries have different surfactants with a gloss and a semigloss latex paint?

A. Phosphates have a tendency to hydrolyze, therefore, these should be avoided.

Q. Is color development affected by a surfactant?

A. We have not seen this, but all facets have not been researched.

Q. How do you bring back a paint from shock?

A. It has to be ground into a satisfactory liquid.

KEN G. PROBST, *Secretary*

Kansas City May 13

A moment of silence was observed in memory of C. R. McIntyre, of Cook Paint & Varnish Co., who died recently.

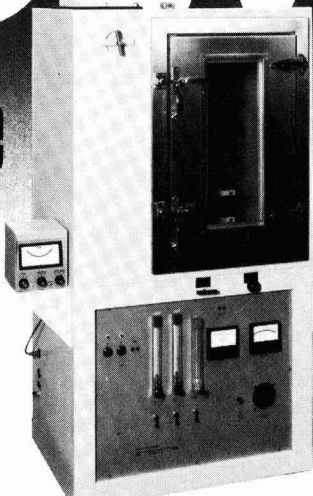
The following slate of officers was elected for the year 1976-77: President—Ray D. Lawson, of Southwest Grease & Oil Co., Inc.; Vice-President

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by paint and coating materials

quantitatively



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The unit measures the attenuation of a vertical light beam by the suspended particulate matter generated from materials under both pyrolytic decomposition and flaming combustion within a closed chamber. The procedure for fire retardant paint measures both the smoke evolved under both modes of test and the ability of the coating to protect a flammable substrate against charring.

FOR FURTHER INFORMATION,
WRITE FOR BULLETIN 2429.

- The Aminco Smoke Density Chamber is a commercial version of a chamber developed by the Fire Test Group at the National Bureau of Standards and reported by them at the ASTM Symposium of Fire Test Methods—Restraint and Smoke 1966 A.S.T.M. STP-422.



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COMPANY

DIVISION OF TRAVENOL LABORATORIES, INC. Silver Spring, Maryland 20910

—James N. Edwards, of Conchemco, Inc.; Secretary—Hugo R. Manco, of Farmland Industries, Inc.; Treasurer—William Fitzpatrick, of Cook Paint & Varnish Co. Terry F. Johnson, of Cook Paint & Varnish Co. will remain as Council Representative.

William A. Smith, Educational Committee Chairman of the Society presented the audio/visual lesson on "PAINT LEVELING" from the Federation Training Series on Test Methods — Volume One.

RAY D. LAWSON, *Secretary*

Los Angeles June 9

Robert Buhl, of Union Oil Co., spoke on "THOUGH MUSIC SOOTHETH, NOISE ABUSETH."

Mr. Buhl discussed noise pollution and its effect on human hearing. He outlined the government rules to control noise and demonstrated several ways to reduce noise. His presentation was followed by a question and answer period.

FRED CROAD, *Secretary*

Pacific Northwest May 11

Michael Griffin, of Reichhold Chemicals Ltd., was elected to the positions of Member-at-Large and Secretary to the Society. Mr. Griffin replaces Fred Grimmet who resigned for health reasons.

Frank X. Dunbar, of Rohm and Haas Co., spoke on "AIR DRY FINISHES FOR MAINTENANCE, MARINE, AND TRANSPORTATION."

In emphasizing acrylic finishes, Mr. Dunbar discussed both the solvent-high solids type, and the water-base type. He said that the development of the urethane acrylic resulted in an extremely durable cross-linked finish. In comparison with the standard air dry industrial finishes, the acrylic latex paints were equal in performance under adverse conditions; however, they had the merits of easier application and better overall economics, he said.

A short question and answer period followed the presentation.

M. GRIFFIN, *Secretary*

Piedmont April 21

Charles Rhodes, of Union Oil Co., spoke on "THE DIVESTITURE ISSUE IN THE OIL COMPANIES."

JAMES A. MARTZ, *Secretary*



Officers of the New York Society for Coatings Technology for 1976-77. Front row (left to right): President—William Singer, of Troy Chemical Corp.; and Secretary—Saul Spindel, of David Litter Laboratories, Inc. Rear row (left to right): Vice-President—George J. Dippold, of Whittaker, Clark, & Daniels, Inc.; Council Representative—S. Leonard Davidson, of NL Industries; and Treasurer—Sidney J. Rubin, of Greenpoint Paint & Varnish Corp.

Piedmont May 19

Honored guests attending the meeting included Federation Treasurer John Oates, and Executive Vice-President Frank Borrelle. Mr. Oates discussed the proposed reorganization of the Federation, and Mr. Borrelle presented a slide program depicting Federation activities.

Alex Siegel, of Silberline Mfg. Co., spoke on, "THE USE AND MISUSE OF ALUMINUM PIGMENTS IN SURFACE COATINGS."

JAMES A. MARTZ, *Secretary*

Rocky Mountain May 10

The following slate of officers was elected for the year 1976-77: President—Edward G. Trousil, of Kohler-McLester Paint Co.; Vice-President—John S. Baker, of Johns-Manville Corp.; Secretary—Jim Peterson, of Peterson Paint Co.; Treasurer—Glenn A. Sorensen, of Bennett's; and Council Representative—J. D. Mullen, of J. D. Mullen Co.

Ted Davelis, of the Colorado Bureau of Investigation, spoke on "COATINGS IN INVESTIGATIONS."

Mr. Davelis, a chemist with the Bureau, described paint comparison analysis in connection with hit and run burglary cases. Important phases of the investigation involve microscopic analyses of color sequence and the thickness of multiple coats. Also compared are the physical matches of the chipped edges of paint on the car and loose chips found at the scene of the accident.

Additional tests include solubility and IR analyses; however, the latter are not conclusive unless backed up

by other tests. The more parameters which match, the more conclusive the evidence, he said.

Q. How do you determine if accelerants, such as solvents, are used in a fire?

A. Water tends to trap solvents in material. As soon as possible, the material is put into a sealed can. Samples of vapor are then removed by a syringe and tested. There are problems with alcohol and ether because of their high volatility, and gasoline can lose its pattern from the evaporation of more volatile fractions.

JOHN S. BAKER, *Secretary*

St. Louis May 18

A moment of silence was observed in memory of Ed Sheppard, Honorary Member and Past-President of the Society, who died recently.

The following slate of officers was elected for the year 1976-77: President—James J. Koenig, of Aluminum Co. of America; Vice-President—Bernard M. Brill, of P.D. George Co.; Secretary—Morris Gilliam, of Lanson Chemical Co.; and Treasurer—John W. Folkerts, of Plaschem Coatings.

Howard Jerome, of Vane-Calvert Paint Co., was presented with a 25-year pin in recognition of his many years of service to the Society and the paint industry.

Robert Stege, of the Terminal Railroad, spoke on "GENERAL FIRST AID AND ITS USE IN THE MANUFACTURING PLANT."

BERNARD M. BRILL, *Secretary*

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). WALTER J. KRASON, JR., Enterprise Paint Mfg. Co., 2841 S. Ashland Ave., Chicago, Ill. 60608.

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—Sabella's Restaurant, San Francisco). KEN G. PROBST, San Jose Regional Vocational Center, 760 Hillsdale Ave., San Jose, Calif. 95123.

HOUSTON (Second Tuesday—Sonny Look's Sir-Loin Inn). THOMAS RULAND, Cook Paint & Varnish Co., P.O. Box 3088, Houston, Tex. 77001.

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). NICK LANNING, Reliance Universal, Inc., 4730 Crittenden Dr., Louisville, Ky. 40221.

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. FANLOW, 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). J. H. DAHL, J. H. Matthews Co., 1315 W. Liberty Ave., Pittsburgh, Pa. 15226.

ROCKY MOUNTAIN (Monday prior to second Wednesday—Gasthaus Ridgeview, Wheatridge, Colo.). JOHN S. BAKER, Johns-Manville Corp., Research and Development Center, Denver, Colo. 80217.

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.). LEONARD H. GIELINSKI, Spencer-Kellogg Div., Textron, Inc., P. O. Box 210, Buffalo, N. Y. 14225.

Toronto May 10

The evening was the occasion of a joint meeting with the recently formed Ontario Section of the Oil and Colour Chemists' Association.

Dr. G. Thornton, of the University of Toronto, spoke on "PSYCHOLOGY OF COLOUR."

Dr. Thornton's talk focused on the reaction of people to color stimuli, and its measurement. He illustrated his talk with examples of work being carried out by the University of Toronto.

PAUL D. F. COOPER, *Secretary*

Western New York May 11

The following slate of officers was elected for the year 1976-77: President—Joan K. Helm, of Spencer-Kellogg Div., Textron, Inc.; Vice-President—Paul R. Guevin, Jr., of Hughson Chemical Corp.; Secretary—Leonard H. Gielinski, of Spencer-Kellogg Div., Textron Corp.; and Treasurer—Thomas E. Popovec, of National Gypsum Co. Eugene G. LeVe, of Pratt & Lambert, Inc., was elected to another term for Council Representative.

John A. Gordon, Jr., of Polymer Technical Services, AMSCO Div., Union Oil Co., spoke on "ANOTHER ENDANGERED SPECIES — ORGANIC SOLVENTS."

Mr. Gordon related some of the pitfalls originally taken to prepare replacements for restrictive products using exempt solvents. He indicated that there could be no universally acceptable substitutes for distinct chemical compounds such as mineral spirits.

He also indicated that the Federation could provide technical information while the National Paint and Coatings Association gives legal advice regarding input of information to legislators who are concerned about pollution control. Various societies and associations must maintain a system of political alertness at all times, he said.

As a case in point, Mr. Gordon related the problems that the Singer Co., Climate Control Div., Auburn, N. Y. had regarding the EPA. He pointed out how they resolved the problem with an annual savings of \$104,000. (See May JCT—Ed.)

In conclusion, he suggested that the most logical plan is to switch to some system that does not employ large quantities of reactive solvents. These include powder coatings, high solids, and water-based coatings.

PAUL R. GUEVIN, *Secretary*

Elections

BALTIMORE

Active

BAIRD, DAVID W. — Farboil Paint Co., Baltimore, Md.
SANDLER, MELVIN H. — Lenmar Lacquers, Inc., Baltimore.
VANBENTHUYSEN, DANIEL J. — O'Brien Corp., Baltimore.

Associate

DEBELAK, DONALD S. — Amoco Chemicals, New York, N.Y.
HANSEN, ROBERT L. — Kerr-McGee Chemical Corp., Parsippany, N.J.
POWERS, MICHAEL D. — Dow Chemical U. S. A., Moorestown, N. J.

CLEVELAND

Active

BERG, CHARLES J. — Sherwin-Williams Co., Cleveland, Ohio
GALVATI, ROSS — Eastern Spec. Varnish Co., Burton, Ohio
MARCY, ROLAND J., JR. — Ferro Chemical Corp., Bedford, Ohio
MARTIN, RICHARD A. — Glidden-Durkee Div., SCM Corp., Strongsville, Ohio
ROLIK, MILAN A. — General Tire & Rubber Co., Akron, Ohio
SEMROC, CHARLES V. — PPG Industries, Inc., Cleveland.
SOUTHWICK, JAMES E. — Glidden-Durkee Div., SCM Corp., Strongsville.

Associate

AUNGST, JAMES H. — Ferro Chemical Corp., Bedford.
BALDRIDGE, WILLIAM J. — Eagle-Picher Industries, Inc., North Olmstead, Ohio
BENSON, PETER — Anderson & Co., Inc., Akron.
CHANDLER, GEORGE N. — Cleveland Steel Container Corp., Cleveland.
DENISON, DONALD C., JR. — Chem-Materials Co., Inc., Cleveland.
MCGROARTY, JOHN T. — New Jersey Zinc Co., Akron.

MONTREAL

Active

BUCHANAN, IAN — Dept. of National Defence, Ottawa, Ont.
MARCHETTI, ALVARO — Nacan Ltd., Boucherville, Que.
THOMAS, MARIO — Tioxide du Canada Ltd., Sorel, Que.
VANGENNEP, MARINUS — Hoechst Chemicals Ltd., Montreal, Que.

Associate

DOYLE, RONALD E. — Monsanto Canada, Ltd. LaSalle, Que.
LANE, DAVID C. — Drew Chemicals Co., Longueuil, Que.
LOANE, GREG A. — Loane Assoc. Ltd., Hudson, Que.

NORTHWESTERN

Active

KOKES, JAMES E. — Diamond-Vogel Paint Co., Minneapolis, Minn.
LARSON, DONALD R. — Ti-Kromatic Paints, St. Paul, Minn.
PEARSON, PAUL D. — Valspar, Inc., Minneapolis.
THOMSEN, DONALD — Tennant Co., Minneapolis.
WARREN, CAROLINE L. — Magnetic Peripherals, Inc., Minneapolis.

Associate

FAXVOY, THOMAS A. — Sun Chemical Corp., Cincinnati, Ohio

Educator/Student

ESLINGER, DELANO R. — North Dakota State University, Fargo, N.D.

PHILADELPHIA

Active

PYEWELL, RICHARD B. — E. I. du Pont de Nemours & Co., Wilmington, Del.

Associate

ARNOLD, MARVIN L. — Alco Chemical Corp., Phila., Pa.
MARKS, JEFFREY L. — Camden Container Co., Camden, N. J.

ROCKY MOUNTAIN

Associate

MARKLAND, ROBERT L. — Dresser Minerals, Houston, Tex.

ST. LOUIS

Active

SEBASTIAN, ROBERT H. — Sterling Lacquer Mfg. Co., St. Louis, Mo.

TORONTO

Active

TOBIN, THOMAS W. — Servair, Ltd., Weston, Ont.

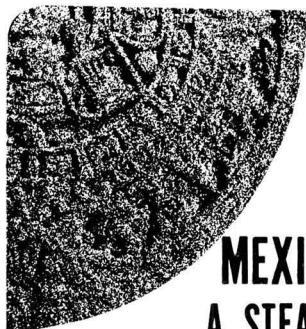
Associate

BOBKER, RONALD V. — Allcolour Paint & Chem. Co. Ltd., Oakville, Ont.
STEVENSON, ROBERT H. — Cal/Ink Chemical Co. of Can., Bramalea, Ont.

WESTERN NEW YORK

Active

EARING, MASON H. — Spencer Kellogg Div., Textron, Inc., Buffalo, N.Y.



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Technical Articles in Other Publications

Compiled by the Technical Information Systems Committee — H. Skowronska, Chairman

DEFAZET DEUTSCH FARBEN-ZEITSCHRIFT (in German)

Published by Wissenschaftliche Verlagsgesellschaft MBH,
7000 Stuttgart 1, Postfach 40, Germany

Vol. 30 No. 4 April 1976

Ridder, H.—“Subject of the Month: High Pressure and Airless Spraying. Eight Short Papers about Airless Spray;” 150-167.

DOUBLE LIAISON — CHIMIE DES PEINTURES (in French)

Published by Les Presses Continentales, Rue du Cherche-Midi,
F-75006, Paris, France

Vol. 23 No. 248 April 1976

Pepin, B.—“About Zinc Pigments in Rust Protection;” 21-33.
Sebban, G.—“Problems Set by Gloss Paints Based on Aqueous Dispersions of Synthetic Polymers;” 35-42.

Robinson, F. D.—“Five Years Experience in Europe with the Chloride Process for Manufacturing Titanium Dioxide;” 49-54.

Nicolars, G.—“Electrostatic Spraying; Possibilities of Automation;” 63-66.

FARBE und LACK (in German)

Published by Curt R. Vincentz Verlag, 3 Hannover, Postfach
6247, Schiffgraben 43, Germany

Vol. 82 No. 5 May 1976

Dübbbers, H.—“Sensible Analysis is Starting-Point of Stabilization;” 379-382.

Zimmerman, R.—“Paint Vehicles: Present State and Future Possibilities;” 383-393.

Hafner, O. and Herbst, W.—“Studies of the Pigmentation of Modern Paint Systems;” 394-411.

Langkau, B.—“Emission Protection Factor;” 412-413.

Schwegmann, B.—“Suggestions for Fire Protection in Paint Factories;” 413-418.

Brushwell, W.—“Environment Protection and Paint Industry” (Literature Review); 419-421.

JOURNAL of the OIL AND COLOUR CHEMISTS' ASSOCIATION

Published by Oil and Colour Chemists' Association, Priory
House, 967 Harrow Road, Wembley, Middlesex,
England HAO 2S

Vol. 59 No. 4 April 1976

Dormon, J. D., and Stewart, M. D.—“High Shear Rheology of Architectural Paints — Its Effect on Rolling and Brushing;” 115-126.

Hansen, W.—“Interfacial Phenomena in Inks;” 127-140.

Lott, A. D.—“Application of UV-Curing Materials and Technology to Packaging;” 141-145.

Vol. 59 No. 5 May 1976

Ledwith, A.—“Photoinitiation by Aromatic Carbonyl Compounds;” 157-165.

Pryce, A.—“Technological Literature Relating to Polymerization Photoinitiators;” 166-170.

deSchryver, F. C. and Boens, N.—“Photopolymerization: the Kinetics of A-Type Photopolymerization;” 171-176.

La RIVISTA del COLORE — VERNICIATURA INDUSTRIALE (in Italian)

Published by La Rivista del Colore S.R.I., Via Imbriani 10,
20158 Milan, Italy

Vol. 9 No. 94 February 1976

Molinari, N.—“Characteristics and Problems with Surface Coating of Cars;” 43-48.

Rinaldi, F.—“Rationalizing Traditional Coating Lines: Advantages with Automatic Electrostatic Spray-Line Using Water-Soluble Paint;” 49-55.

Vol. 9 No. 95 March 1976

Ferraris, E.—“Plaforizzazione, a New Method of Phosphatizing; Economic Considerations;” 79-81.

Shoemaker, R.—“Paint Stripping of Hooks in Oxidizing Salt Melts;” 83-86.

Verniciatura Industriale — “The ‘Electrogas-Dynamic’ System for Application of Powder Coatings;” 89-91.

PAINT MANUFACTURE

Published by Wheatland Journals Ltd., 157 Hagden Lane,
Watford WD1 8LW, England

Vol. 46 No. 1 January/February 1976

Shirsalker, M. M., Mulay, V. N., and Sivasamban—“Critical Pigment Volume Concentration: Its Determination by the Use of the Dielectric Constant;” 18-29.

Scotland, N. J.—“Micaceous Iron Oxide — Today's Best Safeguard for the Future;” 22-23.

Vol. 46 No. 2 March 1976

Ellinger, M.—“Research and Development Report: Anti-Corrosion and Marine Paints;” 22-28.

PIGMENT & RESIN TECHNOLOGY

Published by Sawell Publications, Ltd., 127 Stanstead Road
London SE 23 1 JE, England

Vol. 5 No. 4 April 1976

Rackham, J. M.—“Dispersion of Titanium Dioxide in Non-Aqueous Media;” 5-8.

Americus—“Coatings Update: Pollution and the Paint Industry” (Literature review); 10-14.

SKANDINAVISK TIDSKRIFT for FARG och LACK

Published by Dansk Bladforlag K/S, Holbergsgade 20,
1057 Copenhagen, Denmark

Vol. 22 No. 2 February 1976

Rogers, B., and Hansen, W.—“Printability of Plastfilms;” 40-52.

Vol. 22 No. 3 March 1976

Eikers, E.—“Conservation of Drilling Constructions — Off-shore and Onshore;” 74-88.

Vol. 22 No. 4 April 1976

Wallgren, P. A.—“The Paint Consumer's Wishes to the Paint Vehicles' Producer;” 116-118 (in Danish).

Committee Activities

LIAISON

XIIIth Congress Marks FATIPEC's 25th Anniversary

The XIIIth Congress of FATIPEC was held May 2-7 at Juan-les-Pins, on the French Riviera.

This year marks the 25th anniversary of the inauguration of this important scientific association in Continental Europe, and the Federation of Societies for Coatings Technology is proud to be counted among the overseas affiliated societies with liaison status. The Committee duly conveyed the compliments of the FSCT to Mr. Roire, President of this bi-annual congress.

It may be superficial, but one evidence of accelerating advances is the weight (12 lb) and the thickness (2 1/4 in.) of the proceedings of plenary and short papers. A deluxe edition was presented, containing 100 full-length accounts, under the title, "New Results in the Fields of Paints, Inks and Pigments." The publisher: EREC, 68 rue Jean-Javres, 92800 Puteaux, France.

The formal discussions during five days ranged the spectrum of customary diversity: polymers, pigments and interaction, structural influences, durability, formulations, rheological effects, stabilization, corrosion, analytical techniques, characterization, emulsions, powders. A novel feature was the scheduling of three simultaneous colloquia on subjects such as physical chemical properties, theories of curing, color effects, printing inks, trade and industrial paints.

To isolate any individual papers for special recognition is to express an unintended bias. "The Theoretical Aspects of UV Curing" (Toussaint) dominates its class. "Potential Health Hazard of TiO₂" (Wilska) is an extraordinary title with some common sense answers. The least-well previously publicized "E-Caprolactam as Reactive Thinner in Water-based Enamels" (Partheiger, et al) is replete with new ideas. In the physical chemical sector the "Properties of Coatings (Karyakina, et al) is a scholarly account of non-homogeneity and supermolecular structure as prelude to future deliberate control of new coatings properties. "The Chemistry of Japanese Lacquer" cojoins the art of this unique 1500-year old product with today's analytical techniques which interpret composition and behavior.

The Plenary, representing the USA Federation, was given by Dr. Werner Zimmt of E. I. du Pont de Nemours & Co.'s Marshall Laboratory, on the

subject of "Regulations Regarding Solvent Emissions." No other author could be as competent on this subject.

With respect to international liaison activity, the four members (FATIPEC, OCCA, SLF and FSCT) of the Permanent Liaison Committee, formed in 1947, met at Juan-les-Pins on May 4. The major item for discussion was the proposal by the FATIPEC Board to constitute a confederated working group of one member from each Federation. The motion to meet at Helsinki in September was passed affirmatively. It was further requested that the

FSCT prepare a proposal for a "pacquet" suggestion which can become the first example of coordinated international activity. It will perforce be an objective free of competitive aspects and potentially benefitting the common weal. President William Dunn will represent the Federation.

Reflections from Cote d'Azur: Only five paint manufacturers contributed to the presentation of papers at this congress. Attendance by English-speaking coatings chemists was even below the level of former years. As I proposed on all previous occasions, the "FATIPEC Book" belongs in every technical library devoted to coatings technology.

Messrs. Fred Daniel, Milton Glaser and I participated in the event.

H. L. GERHART, *Chairman*

METRIC SYSTEM

CPMA Elects to Take Soft Conversion Route

The Canadian Paint Manufacturers Association has decided to take the soft conversion route to the metric system. The decision was based on the present uncertainty of the height and diameter of the 4-liter can. This size is slated for eventual use in the U. S., and CPMA is anxious to have continent-wide uniformity in metric packaging. The height in particular has considerable importance in converting certain intermix machines, and to avoid the additional expense in a possible double conversion, CPMA decided to await a uniform resolution.

The soft conversion is, however, regarded as an interim step. Eventually, hard conversion will take place, probably in the early 1980's. It is unlikely that consumer groups and even government departments will tolerate soft conversion for long.

The federal government announced in late March that it intends to introduce an omnibus bill in each of the next four years to facilitate conversion to metrics. This involves amending any legislation which would stand in the way of implementation.

Hard conversion with rationalization is one of the aims. For example, milk presently must be sold in Imperial units, and in these units only. The new bill will not only remove this stipulation, but will also see that no soft conversion occurs (i.e., 1 Imperial qt. = 1.14 l, so that milk will be sold in a rational series of packages (e.g., 200 ml, 300 ml, 1 l, 2 l, 3 l, and 4 l containers). In general, however, the omnibus bill will

permit the use of both measurement systems for a limited period.

Meanwhile, the tentative date for milk conversion in British Columbia is this month. A major grocery chain has issued its metric policy. It assures consumers that the unit price of goods sold will remain the same after conversion, and that the chain will do its utmost to make the changeover as simple and as easy to understand as possible.

And in the petroleum industry, Syncrude Canada will start up and operate its Mildred Lake plant on a metric basis.

In the U. S., the Kansas state legislature recently passed a law, signed by the governor, requiring the use of the metric system on highway signs and markers — the first state to do so.

Kalamazoo, Mich. will be the first U. S. city to sell water in metric units; and metric water meters are being installed there.

The Ohio Department of Transportation has published a study report on highway metrification. The authors of the report feel a need for an early selection of metric units for all aspects of material procurement and for construction. Early conversion of specifications and standards is considered important, and national coordination is a necessity. Total costs cannot be pinpointed, but they will be nowhere as high as some have predicted. A rapid changeover will reduce costs. A copy of the report is available from the National Technical Information Service, Springfield, Va. 22161.

E. L. HUMBERGER, *Chairman*

British Paint Research Association

This is another in a series being published on a regular basis to acquaint readers of JCT with the activities of the British Paint Research Association. More complete data may be obtained by writing to the Paint Research Association, Waldegrave Road, Teddington, Middlesex TW11 8LD, England. Address inquiries to individual listed at end of item of interest.

GOLDEN JUBILEE (1926-1976)

Founded in September 1926, the Paint Research Association dates back to World War I, when amid the stresses, shortages, and weakness in the industrial structure, the idea of a cooperative movement in industrial research with government assistance first took shape. Today, the Association is an international organization with members in many countries. They include manufacturers of paints, polymers, pigments, printing inks, papers, and pharmaceuticals, as well as shipbuilders and other major users of coatings.

To mark the Association's 50 years of service, an International Conference will be held September 21-23 at the Excelsior Hotel (London Airport). The Conference, "Paint in the Service of the Community," will feature four sessions: Paint World — State of the Art: Protection (Technology and Economics); Paint and the Community; and Next Fifty Years. Ample scope will be provided for technical discussions on matters of national and international importance.

The following presentations will be featured:

PAINT WORLD—STATE OF THE ART

North America—Dr. H. J. Kiefer and I. Pratt, of Glidden-Durkee Div., SCM Corp., U. S. A.

United Kingdom, and the European Economic Community—S. Coppins, of Paints Group, European Committee of Paint, Printing Ink, and Artists Colours Manufacturers Association.

Scandinavia—K. Christensen, of Sadolin & Holmblad Ltd., Denmark.

The Third World—Lecturer from India.

Japan—M. Shibata and M. Goto, of Kansai Paint Co. Ltd., Japan.

PROTECTION (TECHNOLOGY AND ECONOMICS)

Buildings—R. T. Kelly, of the Greater London Council.

Marine—J. Jackson, of Shell International Marine Ltd.

Bridges and Structures—A. Watson, of Berger Paints (Protection Div.).

Transport—W. F. Dabbs, of British Leyland UK Ltd.

PAINT AND THE COMMUNITY

Environmental Pollution and the Paint Industry—D. J. T. Howe, of the Paintmakers Association.

Paint and the Quality of Life—E. H. Buckmaster, of Crown Decorative Products Ltd.

Selling Paint to the Community—A. G. Cameron, of Camrex (Holdings) Ltd.

Health and Safety—G. L. Holbrow and L. A. O'Neill, of the Paint Research Association.

THE NEXT FIFTY YEARS

Raw Materials and the Future—G. Willison, of BTP Tioxide Ltd.

North Sea Oil and Chemical Based Industries—D. G. Jones, of Corporate Laboratory, I.C.I. Ltd.

European Network on Information and Documentation—J. C. Gray, of the British Library.

Is This the End of the Road for Research?—G. de W. Anderson, Director, Paint Research Association.

Extended Abstracts of papers will be issued in advance. Each paper will be followed by a full discussion, and there will be an "Open Forum" at the end of each session. Early booking is recommended in view of the anticipated demand for places at the Conference. Conference Proceedings will be published by the PRA.

Registration fees are £40 for PRA members, and £50 for non-members. Fees include Extended Abstracts of papers, a copy of the PRA Bulletin "The First Half Century," and a copy of the Conference Proceedings.

An Exhibition will run concurrently with the conference, depicting the Association's work and its future aims.

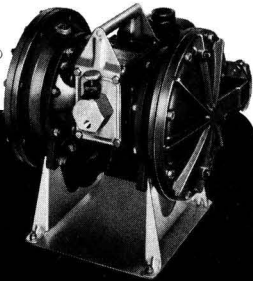
A Jubilee Dinner will be held September 22, and will be highlighted by the presence of distinguished guests.

The Association will publish a booklet in commemoration of its 50-year milestone, and will circulate it to industry throughout the world. (D. Dasgupta, Head of Information Department)

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SLF Congress in Helsinki on Sept. 29-Oct. 1 To Feature Presentation of Behalf of FSCT

Dr. Harvey Winters, of Fairleigh Dickinson University, will present "Non-Enzymatic Oxidative Degradation of Latex Paints," during the 8th Congress of the Federation of Scandinavian Paint and Varnish Technologists, in Helsinki, Finland, Sept. 28 through Oct. 1. Dr. Winters will deliver his paper on behalf of the Federation of Societies for Coatings Technology on the opening-day of the event.

Federation President William Dunn, accompanied by Mrs. Dunn, will attend the Congress and officially represent the Federation.

Also featured on the program will be Federation Past-President Jean P. Teas (1971-72), of The Flood Co., who will present "Coatings of the Future — What is the Future of Coatings?"

The following presentations will also be featured at the Congress:

"Gelation Point of Alkyd Resin—Introducing the Concept of Chain-stopping Effect of Monofunctional Components" — Dr. T. Yoshida, of the Institute of Vocational Training, Tokyo, Japan.

Southern Society Donates \$10,000 To U of Southern Mississippi

The Southern Society for Coatings Technology recently became a "partner in progress" at the University of Southern Mississippi. This is a program in which persons, companies, or businesses give or pledge \$10,000 to the USM Foundation. Such funds may be given at one time or donated in lesser amounts on a yearly basis.

The Southern Society is the first partner in progress from the coatings industry, as funds considered in this category are only those donated to the university for program improvement. The Society funds have been employed by the Department of Polymer Science for scholarships for undergraduate students, recruiting, and purchasing equipment and audio visual aids.

USM's Department of Polymer Science has graduated six seniors this academic year, with one going on to graduate school and the other five going into the coatings industry. To date, over 90% of the program's graduates have gone into the coatings industry.

"Internal Stresses in Paint Films" — E. Nilsson, of the Scandinavian Paint and Printing Ink Research Institute.

"New Reactive Polymeric Filler Materials for Organic Coatings" — W. Funke, (FATIPEC presentation), of Forschungsinstitut für Pigmente und Lacke.

"Atmospheric Pollution from Industrial Stoving Paints" — Dr. L. A. O'Neill, of the British Paint Research Association (OCCA presentation).

"Emulsion Polymerization" — J. Ugelstad, of the Norwegian Institute of Technology.

"Drag Reducing Coatings for Ship Hulls" — S. Johnsen, of Hempel's Marine Paints A/S.

"Titanium Dioxide Pigments in Thermosetting Acrylic Finishes" — S. Wilska, of Kemira Oy, Vuorikemia Plants.

"From Coatings Chemistry to Petrochemistry" — A. Kjellin, of Berol Kemi AB.

The Printing Inks program will feature the following presentations:

"Printing Inks for Offset Newspapers" — S. Karttunen, of the Technical Research Center of Finland.

"UV Technology" — R. J. Pierce, of Fishburn Printing Ink Co. Ltd.

"Dispersing Technology" — P. Sorensen, of Koge Chemical Works Ltd.

"The Alkyd Resins Cost from the Raw Material to the Final Product" — Dr. M. F. Gioliani (FATIPEC, lecture).

For additional information write 8. SLF-kongressen, Box 52, 01301 Vanda 30, Finland.

San Francisco to be Site Of ACS Meeting in August

The American Chemical Society will hold the largest meeting in its history in San Francisco, Aug. 29 to Sept. 3. More than 12,000 chemists and chemical engineers are expected to attend the sessions to be held in the Civic Auditorium and 10 city hotels.

The national meeting will focus on research results, as well as celebrating the Society's centennial and the Calif. section's diamond jubilee.

Exhibits and displays will also be presented on energy and the history of chemistry.

AFP/SME Will Host "Powder Coating 4" in Sept.

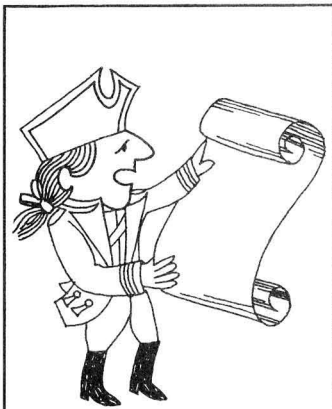
The Association for Finishing Processes and the Society of Manufacturing Engineers (AFP/SME) will hold their "Powder Coating 4" Conference and Exposition Sept. 14-16, at the Cincinnati Convention Center.

With more than 3,000 industrial finishers, and manufacturing and design engineers expected to attend, eight sessions will focus on end-use experiences in major industries such as the appliance, electrical, transportation, construction materials, and custom coating fields.

The Exposition will feature demonstrations of new equipment and materials, and will exhibit application and process equipment, accessories, materials, and material handling equipment.

Conference sessions and topics for discussion include: overview and state-of-the-art; metal furniture and fabrication parts; precoated metal products for construction markets; appliance applications; electrical applications; transportation; custom coaters; specialized applications; and panel discussion on materials and equipment.

For complete details concerning the program, exhibitors, and registration and housing information, write to AFP/SME, 20501 Ford Rd., P. O. Box 930, Dearborn, Mich. 48128.



IN ORDER TO FORM A MORE PERFECT FEDERATION WE HEREBY PROCLAIM THE 54th ANNUAL MEETING AND 41ST PAINT SHOW, WASHINGTON, D.C., OCT. 27

People

Robert W. Ross has been appointed Sales Manager of the Paint and Paper Dept. of R. T. Vanderbilt Co. Mr. Ross will succeed **Harry W. Howard** who is retiring after serving the coatings industry for more than 40 years. Mr. Howard has been with Vanderbilt for 16 years and is a member of ASTM, NPCA, and the FSCT. In retirement he will continue to act as a consultant to the industry.

Anne Probizanski has been appointed Manager of Equipment at E. T. Horn Co.

The O'Brien Corp. has named **Ralph M. Levine** to the new position of Corporate Technical Director. He previously held the same position at the company's Fuller-O'Brien Div.

In reorganizing its operations, Cities Service Co. has announced the following appointments: **R. B. Thomas** — Vice-President, Wholesale Marketing and Refining; **J. B. Fontenot** — Vice-President, Refining; **J. E. Williams** — Vice-President, Supply and Transportation; **J. H. Dewell** — Vice-President, Retail Marketing; **J. H. Oltmann** — Vice-President, Lubricants and Specialty Products; **H. R. Slack** — Manager of Planning, Refined Products Div.; and **W. G. Swartz, Jr.** — Vice-President, Administration.

Hans Roest, formerly West Coast Regional Manager, has been appointed Director of Commercial Development for Hilton-Davis Chemical Co. **Evans Angelos** was named Sales Representative — Pigments Div. for northern Illinois and southern Wisconsin.

Lawrence Okun has been appointed Director of Marketing and **Ronald Neugold** has been named Director of Operations for the Coatings and Colorants Staff of Tenneco Chemicals, Inc., Organics Div.

Philip E. Robinson has been elected President, and **Jerome F. Smith**, elected Vice-President, of the Lead Industries Assoc., Inc., and the Zinc Institute, Inc. at their annual meeting in Houston. Mr. Robinson had been Executive Vice-President for the past four years and Mr. Smith had been Secretary and General Manager of the two associations since 1971.



R. W. Ross



H. W. Howard



A. Probizanski



R. M. Levine

Witco Chemical Corp. has made four appointments to new technical positions in its Sonneborn Div. They are: **Dr. Lawrence B. Nelson**, Div. Vice-President — Technical; **Vincent J. Crease**, Director of Technical Services at the Trainor, Pa. plant; **Dr. Frank B. Marcotte**, Research Director for Products at the Petrolia, Pa. and Gretna, La. plants; and **Dr. John Cayias**, Research Supervisor at Petrolia.

M. Lloyd Davis has been named Manager of Research and Development for the Dampney Co. He was formerly Product Manager — Coatings with USM Corp., Bostik Div.

James Walker has been appointed by Drew Chemical Corp. as its Industry Manager for the Northern Region.

PFD Penn Color has named **Theodore J. Movellan, Jr.** as Sales Manager. Formerly, he was Assistant to the Vice-President of Sales for the company.

Frank J. Russell, Jr. has been named Eastern District Sales Manager for American Hoechst Corp., Chemicals Div.

Kerr-McGee Corp. has made four appointments in its managerial restructuring program. They are: **Frank D. Lyons**, Vice-President — Chemical Manufacturing; **Dr. L. E. Craig**, Director of Manufacturing Services; **William B. Hayes**, Vice-President of Eastern Manufacturing Operations; and **Morgan C. Locke**, Manager of Western Manufacturing Operations.

Robert G. Wallace has been named as Vice-President and General Manager of Conchemco Coatings Eastern Div.; and **C. W. Barnes III** has been appointed General Manager of the company's Western Div.

National Starch and Chemical Corp. has promoted three executives. **S. A. Segal** was elected Senior Vice-President of Administration and Finance; **Robert B. Albert**, Treasurer and Controller, was named Vice-President; and **Herbert J. Baumgarten** was appointed Vice-President and Counsel.

The National Coil Coaters Association elected four Officers and Directors at its annual meeting. The Officers are: President — **Eugene H. Buttle**, of PPG Industries; Vice-Presidents — **Robert C. Parsons**, of Reynolds Metal Co., and **William B. Cosden**, of Egyptian Lacquer Manufacturing Co.; and Treasurer—**John H. Geyer**, of Amchem Products, Inc.

The new Directors are: **S. J. Marcus**, of Republic Steel Corp.; **A. R. McInnes**, of Pre Finish Metals, Inc.; **J. R. Pickering**, of Lilly Industrial Coatings, Inc.; and **M. D. Phelps**, of Technical Coatings Co. All newly-elected Directors will serve three-year terms.

Walter J. Harland, Technical Sales Representative at St. Louis for Rohm and Haas Co., has retired after 35 years of service with the company. Mr. Harland served many years as chairman of the Technical Committee of the St. Louis Society for Coatings Technology, and is a member of the Editorial Review Board of the FSCT.

Obituary

David R. Whiteman, 48, Coatings Specialist in the Houston area for Porter Coatings, Division of Porter Paint Company, died May 11. Mr. Whiteman, a long-time member of the National Association of Corrosion Engineers and the Houston Society for Coatings Technology, had served as a sales representative for the firm since 1974.

CAB Esters

A new booklet describes eight different applications where coatings based on cellulose acetate butyrate (CAB) esters are offering special benefits to manufacturers. When properly formulated, coatings based on CAB esters are reported to be resistant to yellowing, chalking, weather, and plasticizer migration; yet they are durable, flexible, and easy to apply. For a copy of Publication No. E-188, "Discover Butyrate: The Great Improver," write Eastman Chemical Products, Inc., Coatings Chemicals Div., Kingsport, Tenn. 37662.

Water-Soluble Gum

A technical booklet describes Cellulose Gum, purified sodium carboxymethylcellulose, which is an anionic water-soluble polymer derived from cellulose. The booklet features data on the properties of the gum in solutions and films, its compatibility with water-soluble nonionic and anionic polymers and gums, and its spectrum of applications, as well as a bibliography of additional literature. Write Coatings & Specialty Products Dept., Hercules Incorporated, 910 Market St., Wilmington, Del. 19899.

Fill and Finish Coatings

A brochure describing a spray-applied semi-gloss fill and finish coating for various interior and exterior surface materials is now available. Introduced by PPG Industries, Inc., the coating is reported to give one-step priming and fill-and-finish coats on new or previously painted concrete, cinder block, and haydite block construction. It can also be applied by airless spray on interior plaster, drywall, metal and wood surfaces. For further information write A. J. Marino, PPG Industries, Inc., 10 North, One Gateway Center, Pittsburgh, Pa. 15222.

Storage Tanks

The manufacture of custom designed storage tanks is discussed in a brochure from Plas-Tanks Industries, Inc. These filament-wound fiberglass-reinforced plastic tanks are used primarily for storing corrosive liquids and handling corrosive fumes and gases. Details may be obtained by writing the company at 5011 Factory Rd., Fairfield, Ohio 45014.

Computerized Colorimeter

Information has been published concerning a new colorimeter which obtains tristimulus values through a built-in microcomputer. Model XL-23 is designed to rapidly transform basic measurements into any three of six digitally displayed value scales: XYZ, Yxy, Lab (H), Lab (Glasser, et al), Rdab, and GAB. Options include a transmission attachment and a selection of output peripherals. For additional information, contact Fred C. Underhill, Gardner Laboratory, Inc., P. O. Box 5728, 5521 Landy Lane, Bethesda, Md. 20014.

Tank-Cleaning Nozzle

A new, advanced-design, Sprayjet R-4, high-impact, rotating, tank-cleaning spray nozzle has been introduced. The new nozzle has been developed for high spray impingement cleaning of paint, latex, resin, and other types of contaminants from mixing tanks, storage tanks, tank trucks, and other such vessels equipped with a 3-in. opening. The nozzle operates by hydraulic pressure, and uses no external air motors or drive mechanisms. Write Wellco Chemical Co., Dept. RN, P. O. Box 11504, Chicago, Ill. 60611.

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Letters to the Editor

TO THE EDITOR:

The editorial headed "Comment" in the April *JCT* finally caused me to pass over the threshold of irritation at which I would write a letter. It is one of the best examples, or should I say worst examples, of the penchant that technical men in the industry have to oppose any measure which would interfere with their "right" to use any poison they may desire. Just imagine, the author of this article says that the reduction of air pollution by anti-pollution devices and emission regulations has been "ridiculous." Is he not aware that we have an epidemic of cancer in this country and that there is more cancer where auto emissions are the heaviest? Does he believe in cancer?

Of course, having hung his hat on the very unstable peg of the emission regulations, he can proceed to the horrible things we have to do because we are required to put on our labels, poisons or flammables. He says that this causes price increases! How? He complains of

"legalistic" pressures on ingredients and solvents. Does he favor unlimited use of lead? What does he propose to do about smog?

The campaign that upsets me the most is that by the industry in favor of mercury. Why not admit that latex materials can be protected without mercury. While it's a little more difficult and a little more expensive—it's better than mercury in our water. Right now, we in the Cleveland area are afraid to eat fish because of the high mercury levels in our lake. And most certainly mercury does leech out of paint films—there have been many, many studies that have shown that this is the case. After all, mercurials are soluble in water. Furthermore, the mercurials have a very substantial vapor pressure so they do, indeed, get into the air where they are breathed. And the effects of mercury on the mind are insidious and terrible.

I suppose the best example of irresponsibility by industry is that connected with the construction of

the huge Bessie-Davis nuclear power plant being built near Toledo. In this plant, an inspection by the Federal Nuclear Regulatory Agencies disclosed alleged cheating on the safety circuits to the extent of thousands of bad connections. They found this after three commercial inspectors had resigned because they had been instructed by their superiors to overlook the cheating on these connections, and they could not sleep because they were afraid there might be a nuclear holocaust in the Toledo-Cleveland area. There might be! One suspects that Mr. Miranda objects to the Federal inspection of these connections by "bureaucrats" and that he considers laws that regulate nuclear power plants "ridiculous laws" which interfere with "Free Enterprise."

There is a better approach. Recently, an editorial appeared in *Chemical Technology* which asked that, instead of having a knee-jerk reaction to oppose any restrictions imposed upon them by ecological requirements, chemists see this as an opportunity and a challenge—just as they would an economic requirement. I agree heartily. Isn't the health of the public as important as the satisfaction of the customers? After all, the public you save might be yourself.

DR. ROBERT M. EVANS
Vice President—Research &
Development
Mameco International
Cleveland, Ohio

... AND DR. MIRANDA REPLIES

I believe that Dr. Evans has completely missed the theme of the editorial, "Legislate Now — Pay Later." The implication is that industry and government must cooperate to develop reasonable legislation compatible with all concerned.

In the examples he cites, he clearly overlooks the hypocrisy of government in concentrating on mercury and other pollutants, while ignoring alcohol and tobacco; perhaps two of the worst killers in our society today.

THOMAS J. MIRANDA,
Technical Editor

approved accepted

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Coming Events

FEDERATION MEETINGS

(Oct. 26)—Fall Council Meeting. Sheraton Park Hotel, Washington, D. C.

(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

(Sept. 22-23)—Montreal and Toronto Societies Joint Fall Symposium. "Brush-Up on Coatings Toxicology." Montreal—Sept. 22; Toronto—Sept. 23. (Michel P. Montet, 1080 Beaver Hall Hill, Suite 900, Montreal, P.Q. H2Z 1T5).

(Mar. 2-4)—Western Coatings Societies' Symposium and Show. Marriott Hotel, Los Angeles, California. (Romer E. Johnson, Dorsett & Jackson, Inc., 3800 Noakes Tr., Los Angeles, Calif. 90023).

(Mar. 23-26)—Southern Society Annual Meeting. Fairmont Roosevelt Hotel, New Orleans, La. (Thomas E. Marek, Coronado Paint Co., P. O. Box 308, Edgewater, Fla. 32032).

(May 5-7)—Pacific Northwest Society Spring Symposium. Thunderbird Motor Inn, Portland, Ore. (John Hatfield, Reliance Universal, Inc., 1660 Cross St., S. E., Dalem, Ore. 97302).

OTHER ORGANIZATIONS

(Aug. 23-24)—Short Course on Engineering and Training for Plant Start-Up. Lehigh University, Bethlehem, Pa. (Dr. Gary W. Poehlein, Whitaker Lab., Bldg. #5, Lehigh University, Bethlehem, Pa. 18015).

(Aug. 29-Sept. 3)—Engineering Foundation Conference on "The Technology, Management, and Economics of Information Centers and Services." Tidewater Inn, Easton, Md. (Engineering Foundation Conferences, 345 East 47th St., New York, N. Y. 10017).

(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).

(Sept. 13-Oct. 8)—Paint Short Courses at University of Missouri—Rolla. For Maintenance Engineers, Painting Contractors and Specifiers, etc. — Sept. 13-17; Fundamental Course — Sept. 20-24; For Paint Inspectors and Quality Controllers — Sept. 27-Oct. 1; Advanced Chemical Coatings Workshop — Oct. 4-8. (Norma Fleming, Extension Div., University of Missouri—Rolla, 501 W. 11th St., Rolla, Mo. 65401).

(Sept. 14-16)—"Powder Coating 4." Cincinnati, Ohio. (Society of Manufacturing Engineers, 20501 Ford Rd., Dearborn, Mich. 48128).

(Sept. 21-23)—International Conference on "Paint in the Service of the Community." Excelsior Hotel, London, England. (D. Dasgupta, Paint Research Association, Waldegrave Rd., Teddington, Middlesex TW11 8LD, England).

(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 "Non-conventional 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."

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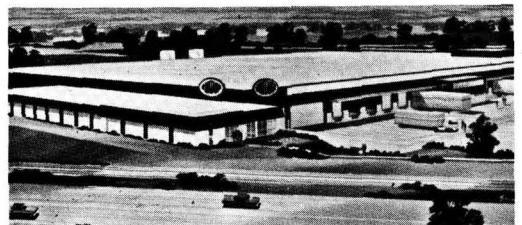
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Coming Events

(Continued)

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).

1977

(Jan. 9-12)—75th Annual Meeting American Society for Testing and Materials, Committee D-1. Philadelphia, Pa. (ASTM, 1916 Race St., Philadelphia, Pa. 19103).

(May 19-20)—1977 International Symposium on Flammability and Fire Retardants. Sheraton-Park Hotel, Washington, D. C. (P. O. Box 1779, Cornwall K6H 5V7, Ontario, Canada).

(Mar. 22-25)—OCCA-29. Oil and Colour Chemists' Association 29th Annual Technical Exhibition. Alexandra Palace, London, England. (The Director & Secretary, Oil and Colour Chemists' Association, Priory House, 967 Harrow Road, Wembley, Middlesex HA0 2SF, England).

(June 16-19)—Oil and Colour Chemists' Biennial Conference. Grand Hotel, Eastbourne, Sussex, England. (The Director & Secretary, Oil and Colour Chemists' Association, Priory House, 967 Harrow Road, Wembley, Middlesex HA0 2SF, England).

(June 26-29)—American Society for Testing and Materials Annual Meeting. Denver, Colo. (ASTM, 1916 Race St., Philadelphia, Pa. 19103).

(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).

(July 14-15)—European Conference on Flammability and Fire Retardants. Sheraton Hotel, Brussels, Belgium. (P. O. Box 1779, Cornwall K6H 5V7, Ontario, Canada).

(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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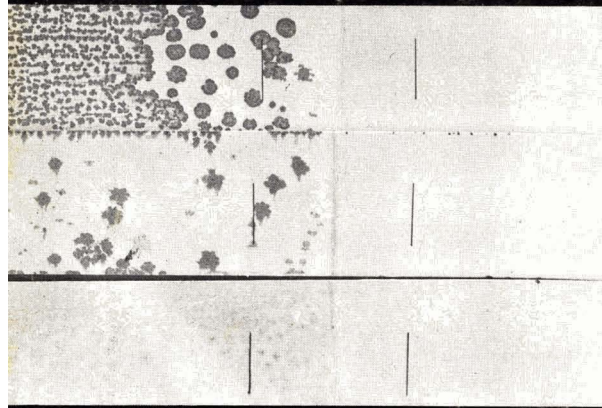


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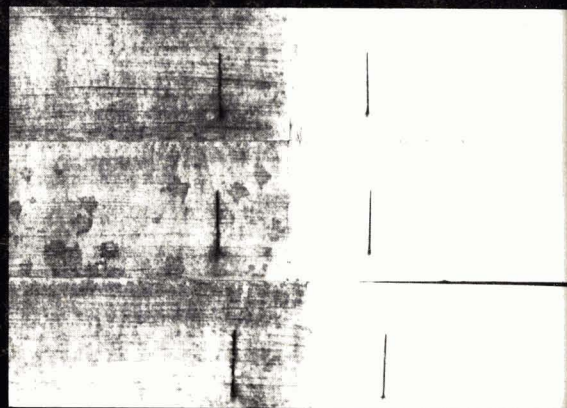
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