



# THE CHESAPEAKE CHEMIST

MARYLAND SECTION  
AMERICAN CHEMICAL SOCIETY

VOL. XXI

APRIL, 1965

NUMBER 4

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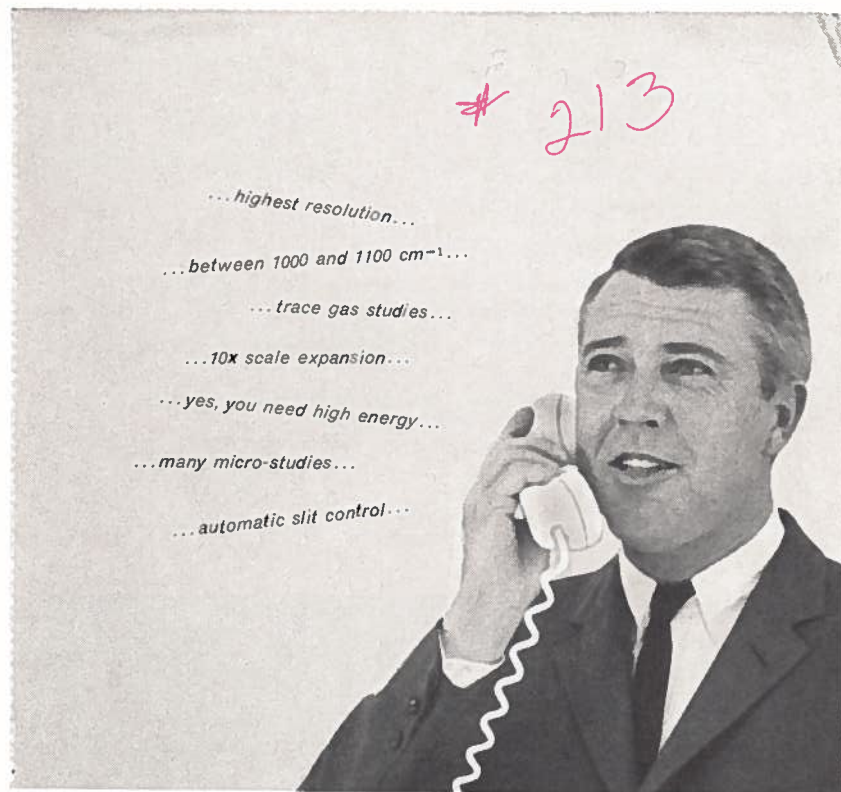
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# THE CHESAPEAKE CHEMIST

VOL. XXI

APRIL, 1965

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# APRIL MEETING

**DATE AND TIME:**

Wednesday, April 21, 1965  
At 8:30 P.M.

**PLACE:**

Eudowood Gardens, Lecture Room,  
Eudowood Plaza, Joppa Road near  
Goucher Blvd.

**SPEAKER:**

DR. EMIL H. WHITE  
Professor of Chemistry  
The Johns Hopkins University

**SUBJECT:**

"Chemiluminescence"  
(See page 13)

**COCKTAILS AND DINNER:**

Eudowood Gardens Dining Room  
Price — \$2.50 per person for cocktails (6:30-7:15) and hot buffet dinner (7:15). Free parking. Reservations must be received no later than April 16. Use reservation form on page 11.

We encourage you to bring your wife and friends to both dinner and meeting. As before, the dining room will remain open during the period of the meeting.

**SOCIAL HOUR:**

There will be a social hour after the meeting. Refreshments will be served. All are welcome.

**DEADLINE**  
Material for publication in May issue of *The Chesapeake Chemist* must reach the Editor by April 19.



**DR. EMIL H. WHITE**

Dr. White was born in Akron, Ohio on August 17, 1926. He received the B.S. degree from the University of Akron in 1947, his M.S. from Purdue University in 1948 and the Ph.D. degree from Purdue University in 1950. He held a post-doctoral fellowship with M. S. Kharasch at the University of Chicago 1950-1951 working on "Chemistry of the Hydroperoxides". In 1951-1952, Dr. White was a post-doctoral fellow at Harvard University working with R. B. Woodward on "Synthesis of DL-Progesterone".

After serving as Instructor at Yale University 1952-1956, he joined the faculty of Johns Hopkins University as Assistant Professor. Dr. White became Associate Professor in 1960, and in 1964 was appointed Professor. He was a Guggenheim Fellow 1958-1959. The special fields of interest of Dr. White include mechanism of reaction in organic chemistry, synthesis, chemiluminescence, bioluminescence, deamination reactions, natural products, and cyclobutadiene chemistry.



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### TRICHLOROETHYLENE

Trichloroethylene is "practically" non-flammable and is considerably less toxic than carbon tetrachloride. Because of these favorable properties, it has become a widely used solvent for cleaning metals, glass and fabrics and in the preparation of liquid soaps, paint removers, rubber cements, shoe polishes, etc. The hazard potential of trichloroethylene is, however, sometimes overlooked, with serious consequences.

**Health Hazard.** — The threshold limit value (TLV) for trichloroethylene has been established at 100 ppm by the American Conference of Governmental Industrial Hygienists. The TLV is the time-weighted average concentration in air to which it is believed nearly all workers may be repeatedly exposed, day after day, without adverse effect. Concentrations of 160 ppm are just detectable by their odor; the absence of the odor cannot, therefore, be taken as a reliable indication that the TLV has not been exceeded. Prolonged exposure or frequent short exposures to concentrations higher than 200 ppm may injure the nervous system and liver.

Concentrations moderately higher than 200 ppm may also cause nausea, dizziness, headache and lethargy, although these symptoms do not necessarily indicate systemic poisoning. Repeated inhalation of trichloroethylene vapors may lead to craving and habituation (e.g. "glue sniffing"). Inhalation of 1,300 ppm for six minutes is said to cause vertigo, pressure in the head, fatigue and irritation of the mucous membranes. Prolonged skin contact may cause formation of blisters and, because of removal of the protective fat layer, may predispose to secondary infection and eczema.

The safe use of trichloroethylene thus requires adequate ventilation to remove harmful concentrations of vapors, and protection against spills and splashes by

the wearing of eye protection and resistant gloves and aprons.

When heated, trichloroethylene can decompose to form hydrogen chloride and phosgene, both hazardous substances. Appropriate precautions to protect personnel from fumes must be taken in fighting fires where trichloroethylene may be present. Care must also be taken to remove all residue in welding or cutting operations on metals which have previously been degreased with trichloroethylene.

**Fire Hazard.** — Although trichloroethylene is considered "practically" non-flammable, some concern was aroused early in 1963 by a preliminary report from the U.S. Bureau of Mines (R.I. 6190) showing the vapors to be flammable in air at temperatures above about 86° F. The lower limit of flammability at 86° F. is about 12.5 percent; the upper limit is at least 90 percent (at 186° F.), possibly 100 percent.

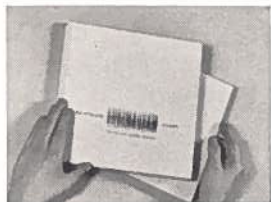
However, these data do not indicate any need for a change in current good industrial practice. It has been pointed out that the container walls in the flammability tests have an important effect on the results (original tests in 1-inch diameter glass; recent tests in 4-inch and 7-inch diameter steel). It would be difficult to reach the lower flammability limit of 12.5 percent (far above the threshold limit value) under normal conditions of use. The Bureau of Mines used an electric arc to achieve ignition, a condition not ordinarily encountered. Also, while the vapors can be ignited under certain conditions, they will not readily support combustion and are extinguished when the heat source is withdrawn. The probability of initiating a trichloroethylene fire under the conditions of good ventilation usually found in industry thus seems low, as is substantiated by the record. Nevertheless, the fire hazard potential should be taken

*(Continued on page 9)*

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## CHEMICAL SAFETY NEWSLETTER

(Continued from page 7)

into account in the design of processes involving trichloroethylene.

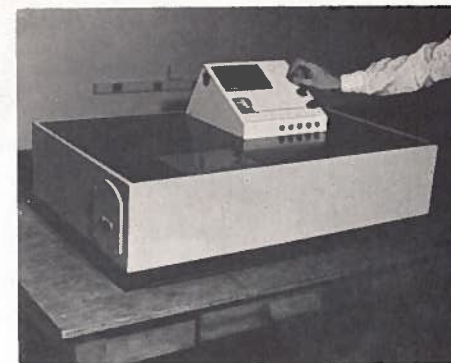
**Reactivity Hazard.** — Freshly exposed (i.e. oxide-free) aluminum surfaces can react with trichloroethylene to form spontaneously flammable aluminum triethyl (H. Vasbinder, *Phar. Weekblad* 87, 861-5, 1962).

Strong alkalis, such as caustic soda, may react with trichloroethylene to form chloroacetylene or acetylene dichloride gas. The reaction which takes place depends on the conditions under which the strong alkali is mixed with the solvent. Stabilizers, added by the manufacturer, act as a catalyst in the reaction. Chloroacetylene is unstable and spontaneously flammable, acetylene dichloride (dichloroethylene) is a flammable liquid with low flash point. In the presence of air (oxygen), the reaction product can form violently explosive peroxides under the proper conditions. Also, trichloroethylene can be hydrolyzed at elevated temperatures to form hydrochloric acid.

Alkaline compounds and solutions should, therefore, be kept away from trichloroethylene. Parts cleaned in strong alkaline solutions should be rinsed and drained dry before being placed in contact with trichloroethylene. Conversely, residual trichloroethylene should be removed before exposure of parts to strong alkali.

**Safety Requirements.** — As is true of all chemicals, trichloroethylene can be safely stored, handled and used if its hazardous properties are fully understood and the necessary precautions are observed, including the use of proper safeguards and personal protective equipment. The simple safety requirements for handling trichloroethylene are described in Chemical Safety Data Sheet SD-14 of the Manufacturing Chemists' Association and in Data Sheet 389 (Revised) of the National Safety Council.

Ernest Levens, Manager,  
Safety Aerojet-General Corp.,  
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## IMPORTANT LETTER

April 21, 1965

SUBJECT: Maryland Section Award, 1965

THRU: Editor, Chesapeake Chemist

TO: All Members, Maryland Section, ACS

1. The subject award was established to recognize and honor meritorious achievement in any field of chemistry by a member of the Maryland Section. There is no time-frame during which this achievement must have been accomplished. It is the duty of each member to support this activity of the Maryland Section by insuring that all qualified candidates are brought to the attention of the Awards Committee.

2. Nominations may be submitted in any format but must include, in addition to the name and present position of the nominee, your specific reasons as to why this Section Member should be so honored.

3. All addressees are requested to submit their nominations for the subject award to the undersigned not later than 28 May 1965.

E. A. METCALF  
Chairman, Awards Committee  
906 Wellington Road  
Baltimore 12, Maryland

### ----- Tear-Out Dinner Reservation Form -----

There is enclosed \$\_\_\_\_\_ (\$2.50 per person)\* for cocktails and dinner at Eudowood Caterers, Eudowood Plaza, on Wednesday, April 21, 1965 for the following persons.\*\*

(Please Print or Typewrite.)

Name

Address


\*Make checks payable to Maryland Section, ACS and mail together with reservation form to Dr. F. Marion Miller, School of Pharmacy, University of Maryland, Lombard and Greene Sts., Baltimore, Md. 21201.

\*\*Return by April 16th. Please be prompt. If required, it is possible to accommodate a few late reservations.

## MEETING-IN-MINIATURE

The Meeting-in-Miniature on May 7 will take place in the Chemistry Building of the University of Maryland at College Park, Md.; map of campus is on opposite page. An information desk will be in the lobby of the Chemistry Building for the convenience of those attending the meeting.

Eight technical sessions have been scheduled. The papers will be presented from 2 P.M. to 5 P.M. and from 8 P.M. to 10 P.M. Details will be published in Chemical and Engineering News. A popular talk will be given at 5 P.M. in the main lecture hall.

Dinner will be served at 6:30 P.M. at the Holy Redeemer Church, 4903 Berwyn Road. The price of the dinner is \$3.00. Cocktails will be available between 5:45 P.M. and 6:30 P.M. through the courtesy and generosity of the Chemical Rubber Co.

For dinner reservations call Dr. F. Marion Miller, University of Maryland in Baltimore, Telephone: 955-7588 or 7417. Reservations should be made not later than May 4.

## THE SKY IS NOT THE LIMIT

The American Institute of Chemists' Lecture on April 22 is "The Sky is Not the Limit", by Dr. M. P. Thekeakara of the Goddard Space Flight Center, N.A.S.A., at Congress Inn, Security Boulevard (Exit 17 Beltway).

The objectives and current achievements of the space studies; the instrumentation, interpretation results of the recordings as well as simulation of space conditions will be discussed. Numerous slides and other visual demonstrations will be provided.

Cocktails at 6:00 P.M.; Dinner 6:30 (\$3.50); Lecture 8:00 P.M.

For reservations please call before April 16, VERNON 7-3030, Extension 203.

Free lecture; the public is invited.

## CHEMILUMINESCENCE IN LIQUID SOLUTIONS

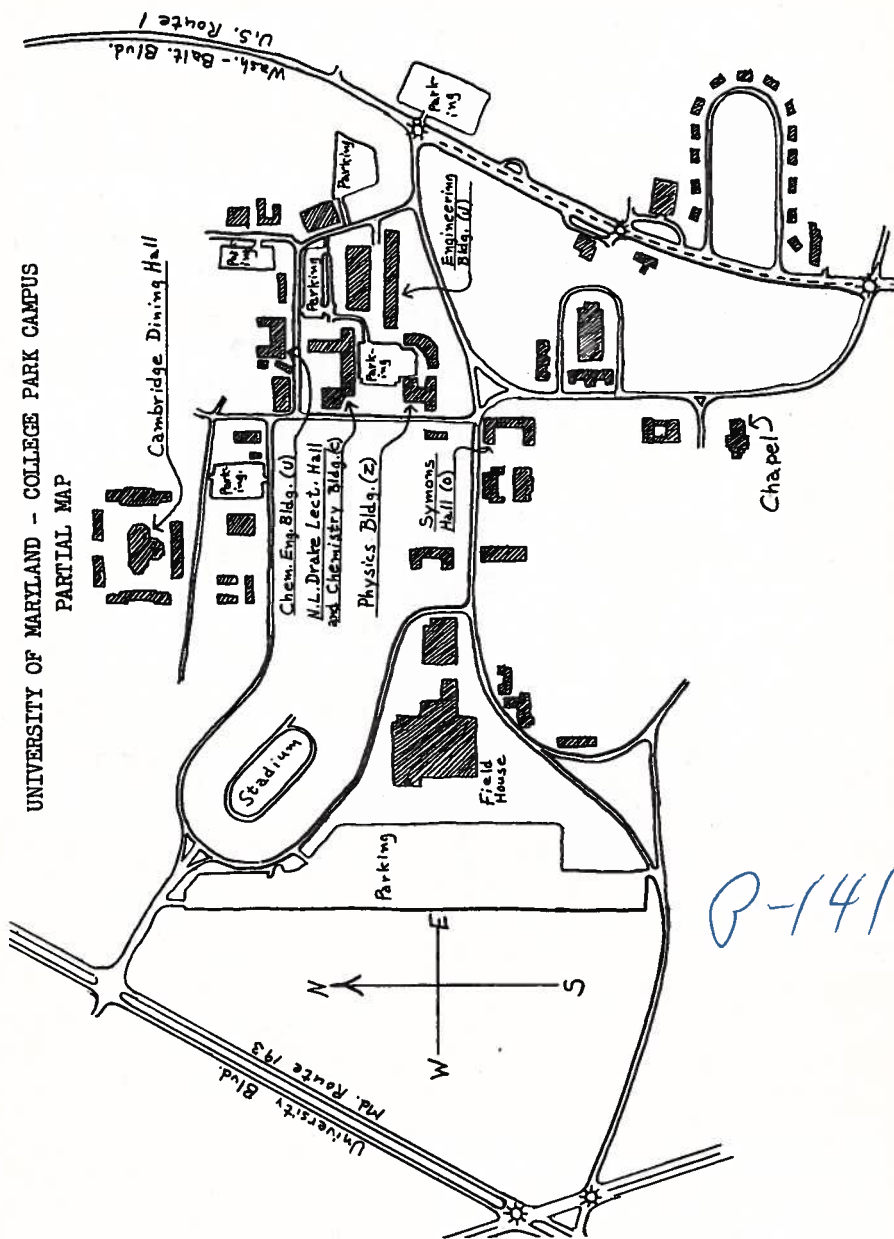
Chemiluminescence has not been a popular field of investigation despite the intrinsic interest in "coldlight" reactions and the fact that the emitted light serves as an additional probe into the mechanism of chemical reactions. Although a very large number of chemiluminescent reactions are known, few are efficient in light production and this fact probably accounts for the relative neglect of this field in the past. In recent years, however, chemiluminescence has begun to receive the attention it deserves — possibly as the result of advances in the field of instrumentation.

An amazingly large fraction of chemiluminescent reactions involve oxygen, either directly or in the form of peroxides (the radical-ion reactions are notable exceptions to this rule). Most of the efficient chemiluminescent reactions known are reactions of organic compounds in solution, and the three best compounds are luminol, lophine, and lucigenin. It should be pointed out, however, that the quantum yields for these compounds are less than 5% even under optimum conditions. Chemiluminescence and bioluminescence are related in that the latter phenomenon is just the occurrence of the former in a living system, as in the firefly and in luminous bacteria.

An introduction to the field of chemiluminescence will be given along with a demonstration or two, and the present state of the problem will be assessed.

## FIFTY-YEAR MEMBERS TO BE HONORED

Having attained the venerable status of being members of the American Chemical Society for fifty years, Mr. Marc Darrin of Baltimore, and Dr. Nolan D. C. Lewis of Frederick will be honored at the dinner meeting of the Maryland Section on April 21 at which time each will receive the Fifty-Year Membership Certificate of the American Chemical Society.



# MARYLAND SECTION NEWS



## GOVERNMENT

### EDGEWOOD ARSENAL

Start of a new three-million-dollar clinical research building at the U.S. Army Edgewood Arsenal Chemical Research and Development Laboratories was announced by Col. William G. Willmann, Laboratory Commander. The new building — designated the General John R. Wood Laboratory — will provide work areas for 240 persons. When completed in July 1966, the new building will give added scope to the Army's capabilities in the increasingly important area of chemical defense. One of the most modern buildings of its type, the new facility is designed for safe and efficient research in clinical investigation, experimental medicine, pathology, psychology and human engineering. Activities supporting the clinical research work will include both basic and applied research in the fields of aerosols, basic and field toxicology, and neuropharmacology. The building will stand as a memorial to Brig. Gen. John Ruxton Wood (1901-1963), the first Director of Medical Research at Edgewood Arsenal.

Dr. E. H. Polley of the U.S. Army Chemical Research and Development Laboratories was honored recently by the Federal Business Association of Maryland for his scientific contributions in the field of neurophysiology and neuropharmacology. Dr. Polley is chief of the Neurology Branch of the Laboratories' Directorate of Medical Research. He was named first runner-up for the title "Federal Civil Servant of the year in Maryland" in the scientific field. First place went to Mr. William G. Fink, an electronics engineer at Fort George G. Meade.



## ACADEMIC

### JOHNS HOPKINS UNIVERSITY

Dr. Alsoph H. Corwin delivered a lecture on "Individual Susceptibility to Food Constituents" at the New York Academy of Sciences, New York City on February 13.

Dr. Emil H. White spoke at the Geigy Chemical Company, Ardsley, New York, on February 27, 1965. The title of his talk was "Organic Synthesis". On March 3, Dr. White spoke at Princeton University, Princeton, New Jersey on "The Deamination of Aliphatic Amines".

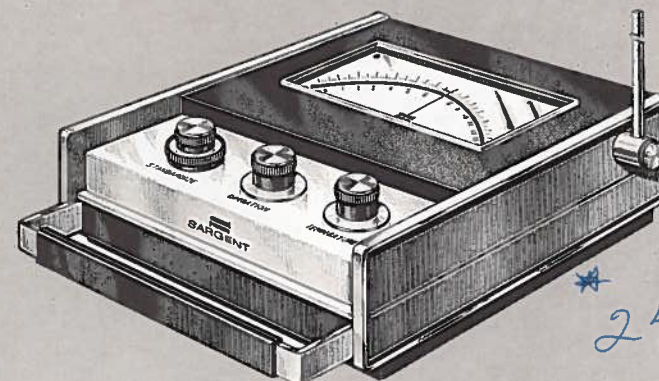
Professor J. D. H. Donnay, jointly with Dr. Hiroshi Takeda, presented a paper, entitled "Twinning and Polytypism in Lithium Micas", at the Winter meeting of the Am. Crystallographic Association, held in Suffern, N. Y., on February 24-25, 1965.

A memorial article by Professor J. D. H. Donnay in tribute to the late Isidor Fankuchen (1905-1964) was printed in the publication of the French Mineralogical Society, (Bull. Soc. Fr. Mineral 87, 299, 1964).

"The Deamination of Aliphatic Amines. II. The Cyclic Primary Amines, a and b 3-Aminocholestane", by Emil H. White and Frank W. Bachelor, was published in Tetrahedron Letters, January 1965.

The Catalysis Club of Metropolitan New York conducted a Symposium on Catalysis in honor of Professor Paul Hugh Emmett consisting of invited papers by a group of Professor Emmett's former students. It was held at the Hotel Robert Treat in Newark, New Jersey on Friday, March 19, 1965.

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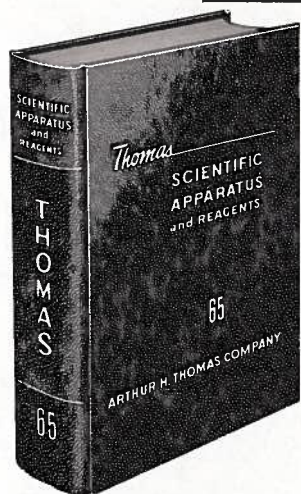
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