TELEPHONE HUDSON 3-6120

Manufacturing Chemists' Association, Inc.

(FOUNDED 1872)

1825 Connecticut Avenue, N. W.
WASHINGTON 9, D. C.

PLASTICS COMMITTEE MEETING
The Greenbrier
White Sulphur Springs, W. Va.
June 8, 1961

PRESENT:

Messrs. Walter H. Salzenberg, E. I. du Pont de Nemours & Co.
Earle S. Ebers, U. S. Rubber Company
W. C. Goggin, The Dow Chemical Company
W. C. Lowrey (for Martin Buck) Shell Chemical Co.
W. P. Marsh, Jr., U. S. Industrial Chemicals Co.
T. T. Miller, W. R. Grace & Co.
R. J. Nelson, Enjay Chemical Company
F. M. Norton (for T. J. Kinsella) Allied Chemical Corp.
J. C. Searer, Hooker Chemical Corp.
R. K. Turner, Union Carbide Plastics Co.
Harry B. Warner, B. F. Goodrich Chemical Co.
David C. Williams, Eastman Chemical Products, Inc.
H. R. Dinges, Spencer Chemical Company
E. J. Sullivan (for A. R. Marusi) The Borden Chemical Co.
H. W. Mason, Jr., Reichhold Chemicals, Inc.
R. K. Mueller, Monsanto Chemical Company
Henry Avery, Pittsburgh Chemical Company
W. C. Brown, Hercules Powder Company
George Wash, Phillips Chemical Company
F. H. Carman, MCA
William Demarest, MCA

The meeting was called to order at 8:20 A.M., with W. H. Salzenberg in the chair. The Secretary announced that 40 members of the Plastics Group (10 had not returned a ballot) cast unanimous votes for four new Committee members: H. R. Dinges, A. R. Marusi, H. W. Mason, Jr. and R. K. Mueller; appointment of these new Committee members, together with W. H. Salzenberg as Chairman and T. T. Miller as Vice Chairman, was confirmed by the Board in its meeting the previous evening.

Following welcome to these new members, to E. J. Sullivan representing A. R. Marusi, to W. C. Lowrey representing Martin Buck and to F. M. Norton representing T. J. Kinsella; and, to Henry Avery, W. C. Brown and George Wash, present by invitation, the Secretary commented briefly on Terms of Reference (approved by the Board in 1952) pertaining to the Plastics Committee's activities. A digest of these Terms is attached as Appendix A.

PLASTICS FINANCIAL PACKAGE

The estimate of 1960-1961 expenditures was forwarded to member Executive Representatives on May 15, together with ballot for new Committee members and individual company assessments for the

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new fiscal year. Total expenditures for 1960-1961 were $70,105.17 (estimate of May 15 was $70,033), and the actual deficit was $828.25 (originally estimated at $756).

The budget for the next fiscal year, previously approved by the Committee, totaled $72,500. Assessments to collect these funds were included in aforementioned letter to Executive Representatives; it was concluded this budget and assessments were acceptable and statements will be forwarded to members except where payment has already been received.

PLASTICS -- INSTITUTIONAL SEATING

With W. C. Brown and George Wash being present, all companies interested in this problem and participating in the May 4 meeting were represented at this Committee meeting. Mr. Wash commented briefly on the results of flammable tests conducted by Phillips Chemical Company and as reported to the SPI Board in their recent meeting. A copy of their laboratory's report is enclosed, together with comments by F. X. Ambrose, Chairman of the SPI Code Advisory Committee (Appendix B).

It was the consensus of those following this problem that the plastics industry should limit activity to that of the Code Advisory Committee and technical aspects at this time. The opposition to use of plastics appears to have been materially ameliorated and further contacts on an industry-wide basis can be handled better by the Code representatives and the Consultant on the West Coast.

UNDERWRITERS' LABORATORIES PROJECT

There have been no major developments since the May 4 Committee meeting. Samples of a self-extinguishing vinyl chloride sheet material have been supplied the U/L for further evaluation as a drip pan and grille in air conditioners under test.

The proposal of Baron Whitaker, Vice President of Underwriters' Laboratories, that the plastics industry committee continue liaison with the Laboratories and assist them in evaluating plastics for building, and the action of the Plastics Committee in February on a related subject were reviewed. On May 4 it was the consensus that the work should not be terminated abruptly on completion of the project now in the U/L and that it would be in the best interests of the industry for the committee technicians to continue a working or consultative relationship. With a view to maintaining this liaison with the Laboratories, the Committee endorsed the suggestion that the MCA staff, together with the chairmen of the U/L Advisory Committee and possibly of the Plastics in Building Committee, consult with Mr. Whitaker at an appropriate time.

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PLASTICS IN BUILDING

Mr. Demarest reported that the new Steering Committee (W. P. Marsh, Jr., T. T. Miller and R. K. Turner) had been supplied details on the plastics in building program to date; this Steering Committee had been invited to meet with the Building Committee on June 14.

Messrs. T. T. Miller and W. Demarest reported that the MCA and SPI contributions to the Annual BOCA meeting had been graciously acknowledged by Philadelphia Building Inspector Lieberman in an address in the SPI Annual Meeting earlier this week.

In reporting on the plastics aspects of the Building Research Institute Spring Conferences, William Demarest commented on the value of intersociety reports by the various industry organizations active in plastics in building.

Members' attention was called to a recently published volume on "Industrial Building" covering proceedings of the December 1960 Industrial Building Congress (232 pages) which includes a discussion of new developments in application of plastics to industrial construction by William Demarest.

OYSTER HARBORS CONFERENCE

Henry Avery, Chairman of the Arrangements Committee, commented briefly on the plans of the group to follow through on suggestions already supplied by the Committee in the May 4 meeting.

The suggestion made sometime ago that speakers be used on one morning only in an effort to obtain better attendance was then considered. Following a full discussion, it was voted that the Committee should obtain speakers for a one-morning session and that the Washington office advise Executive Representatives that this arrangement was made with the view of having a better attendance for the speakers and that the Executives be asked to do everything possible to have registrants attend.

ANNUAL MEETING -- PLASTICS GROUP

In view of the limited capacity of the Greenbrier's President Buchanan and Fillmore Rooms for the Annual Dinner meeting, the Secretary was authorized to propose that the evening dinner meeting be moved to the Gates Mountain Lodge, with the understanding that the business session will be terminated in time for registrants to join the Association activities scheduled later in the evening.

* * * * * * * * * * *

Member representatives attending the dinner meeting are listed in Appendix C. The program included (1) welcome by Chairman W. H. Salzenberg, who expressed regrets of T. J. Kinsella in not being able to be present, (2) remarks by MCA President J. E. Hull, (3) statement of appreciation for services of members who had completed their terms on the Plastics Committee -- namely, Earle S. Ebers, J. C. Searer, Harry B. Warner and David C. Williams,

(4) introduction of new Committee members, (5) announcement of members appointed as a steering group to maintain liaison with the SPI on building programs, and (6) announcement of the Arrangements Committee for the Oyster Harbors Conference, September 7 and 8, 1961.

Members were advised that the Plastics Committee ordinarily meets the second Tuesday of each month during the winter; the next meeting is scheduled for September 8 at Oyster Harbors. Executive Representatives were again reminded that they are always welcome to attend these meetings for a discussion of industry problems that warrant consideration by the Association. MCA Bulletins regularly carry announcements of forthcoming meetings and matters of general interest to the Plastics Group.

ADJOURNMENT

The dinner meeting adjourned at 9:15 P. M.

F. H. Carman,
Committee Secretary

FHC:ew

Enclosures

cc: Mr. A. Lloyd Symington
Executive Representatives of
Plastics Group and Alternates

June 15, 1961

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Manufacturing Chemists' Association, Inc.
June 20, 1952

Appendix A

TERMS OF REFERENCE
PLASTICS

The Board of Directors approved a resolution setting up certain Terms of Reference governing formation and activities of the Plastics Committee. These were approved in the early part of 1952 by the Plastics Committee. Pertinent provisions of interest are:

1. Members shall be appointed on a rotating basis with the objective that they do not at any time represent in numbers or volume of production a predominant position in the industry or any major segment.

2. The Committee is authorized to select its own chairman.

3. The Committee may make oral reports of its activities to the members twice a year at regularly scheduled sessions in conjunction with the Association meetings. Any other reports other than those at such special meetings as may be authorized by the Board shall be in writing.

4. The Committee is authorized to represent the manufacturers on broad problems arising from activities of Government agencies, etc.

5. The Committee is authorized to sponsor and make available technical literature as may be required.

6. The Committee is authorized to promote safety in the manufacture of plastics utilizing to a maximum extent the existing committees of the Association.

7. The Committee is authorized to participate in voluntary standardization programs with respect to color and the like in cooperation with the Commodity Standards Division of the Department of Commerce, and to maintain liaison with A.S.T.M. on similar programs.

8. The Committee is authorized to continue to encourage and participate on a voluntary basis in a fundamental research program such as that at M.I.T.

9. The Committee is authorized to collect statistical data pertaining to volume of production and past transactions or activities as required for specific, non-routine purposes.

In all instances these activities of the Committee and the Plastics Group must be consistent with the By-Laws. The above-mentioned activities were carried on by the former association and it is understood that they would be so conducted in M.C.A. on the same basis as was the practice in P.M.M.A. The only important departure from P.M.M.A. is frequency of general meetings.

C O P Y

Appendix B

PHILLIPS CHEMICAL LABORATORY
Tests on Materials -- Plastics Seating

C O P Y

Ignition Temperature

There are a number of methods (1,2,3) contained in the literature for determining the ignition temperature of solid materials. Due to obvious time limitations, however, the technique we employed to evaluate the ignition temperatures of our materials was in use in research. In operation, approximately 0.06 gram of the material in question is placed in a small steel crucible which is contained in a Ramsbottom furnace. The temperature of the furnace is then increased gradually and the temperature at which the material "flashes" was arbitrarily designated as the autoignition temperature. Using this procedure, we determined the ignition temperature on MARLEX*, impregnated plywood, conventional plywood, polypropylene, fiberglas filled epoxy, Kralastic and wood impregnated melamine. The results of this study are shown below:

Material	Autoignition Temperature, F
MARLEX	900
Impregnated Plywood	900
Plywood	950
Polypropylene	950
Fiberglas Filled Epoxy	950
Wood Impregnated Melamine	1025
Kralastic	1025

It should be realized that due to the inability to measure this ignition under precise conditions these data should be considered as only approximate. For more precise results, it is suggested that ignition temperature be determined according to the method of Setchkin (1). Nevertheless, this data can be used as a yardstick to compare the relative ignition temperatures of plastics. Incidentally, the many building codes classify a material as combustible if it will ignite when exposed to a temperature of 1200 or 1380 for five minutes. Needless to say under such a classification very few plastics would be considered as non-combustible.

Burning Tests:

The most widely used burning test for measuring the flammability of plastics is the ASTM D635-56T method. In this method, a specimen of known geometry is ignited and the rate of flame front travel between two previously marked gage lines on the test specimen is subsequently determined. The results are usually reported in inches/minute. A plastic material is designated as "slow burning" if the burning rate is less than 2.5 inches/minute. This procedure was used with the same materials as described previously and the results are tabulated below:

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*A trade-mark.

(Over)

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Material	Burning Rate in./min.	Comments
Kralastic	1.2	Very much soot and smoke, drips
Natural MARLEX	1.0	Melts, drips, candle-wax odor
Polypropylene	0.8	Burning area transparent, swells, drips, heavy sweet odor
Flame Retardant Coated MARLEX	0.7	Melts, drips, waxy odor
Fiberglas Filled Epoxy	0.7	Much soot, phenolic odor, does not drip
Plywood	Self-extinguishing	_____
Impregnated Plywood	Self-extinguishing	_____
Wood filled Melamine	Non-burning	Merely glows

Another widely used burning test for classifying materials is Underwriters' Laboratories tunnel test. This method which is described in various standard test procedures (4,5,6) consists of burning a section of material, twenty-five feet in length and twenty inches in width, under controlled conditions and subsequently measuring the flame spread. Comparing the burning rate of the material to red oak which has a flame spread index of 100 and cement asbestos which has a flame spread index of 0, a rating is then assigned to the plastic material. Due to the high equipment costs which would be necessary to conduct this test, MARLEX was not evaluated. However, since some model codes now include plastic materials on the basis of a flame spread index, it would be advisable to obtain such data. Underwriters' Laboratories in Chicago has the necessary equipment to perform this evaluation. Incidentally, the Uniform Building Code also approves plastic materials which have a flame spread rating of 225 or less according to UBC Standard #52-1-61. Since we did not have access to this particular procedure, it is not known whether this rating applies to the UL test or is a distinct flame spread rating procedure.

Another fire test which is used quite frequently is the "Standard Methods of Fire Tests of Building Construction and Materials." These tests, which are primarily applicable to assemblies of masonry units and to composite assemblies of structural material for buildings, prescribe a standard exposing fire of controlled extent and severity under which fire resistance is determined in terms of hours or fractions thereof.

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The temperatures involved in this test range from 1000 F to greater than 2300 F. For this reason, very few thermoplastic materials could be expected to pass this test.

In order to simulate some type of fire endurance test and at the same time obtain some indication of the effect that wax drippings from MARLEX would have on flooring material, three MARLEX seats were mounted 18" above three different types of flooring materials which included oak hardwood, vinyl tile and rubber tile. The seats were ignited at the outer edge by means of a bunsen burner, and photographs were then taken during a period of fifteen minutes. Figures I through III provide a graphic illustration of this test. You will note that even though the drippings did set the vinyl and rubber tile on fire, it was restricted to a specific area. Figure IV illustrates the effect of flame retardant coating. Both sides of a MARLEX seat (right side of which was treated with flame retardant coating) were ignited by means of a bunsen burner for the same period of time. You will note from Figire IV that after approximately one minute the flame was extinguished on the side with the coating while the uncoated side continued to burn.

Miscellaneous Tests:

(a) Drip Test

Underwriters' described what is referred to as a "drip test" in which they measure the time it requires for a melting droplet of flowing material to fall after a one-minute application with a bunsen burner. According to Underwriters' Laboratories who performed this test on MARLEX conduit, our material would be considered unacceptable at such time that the National Electrical Code would be revised to permit limited use of exposed nonmetallic conduit.

(b) Products of Combustion

No standard test method has been developed for measuring the combustion products of burning materials because of the lack of information on the mechanism of uncontrolled combustion. However, for MARLEX polymers, the principal combustion products that would be formed would be water, carbon monoxide, carbon dioxide and oxygen. The relative percentages of each that will be formed will be dependent on the degree of combustion. Some codes specify that materials would not develop gases more toxic than wood or paper where burned under similar circumstances. Under this general classification, MARLEX would probably be acceptable.

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(c) Smoke Density

Uniform Building Code has a restriction on the smoke that can be tolerated for an approved plastic material. A plastic material to be approved must have a smoke density not greater than that obtained from the burning of untreated wood under similar conditions when tested in accordance with UBC Standard #42-1-62. Although we do not have a copy of this code, it is recommended that we purchase the standard test volume so that we can rate MARLEX.

(Over)

Another method available for obtaining some indication of smoke intensity is by the use of the tunnel test in which the smoke generated during the test is quantitatively determined. However, there is some question whether this method is satisfactory.

Recommended Future Tests

(1) Since some of the Building Codes now require a maximum flame spread rating for plastic materials, it is suggested that we enlist the services of Underwriters' Laboratories in Chicago to run a tunnel type evaluation on MARLEX.

(2) Since fire officials place a great importance on smoke released, we should obtain a copy of Uniform Building Code Standard #42-1-61 and obtain a comparison of smoke density of MARLEX vs. wood.

(3) Although toxicity of products of combustion should not be a problem, we should enlist the aid of Research to obtain quantitative results on combustion products of MARLEX. In addition, we should check with either SPE, SPI, or Manufacturing Chemists' Association to ascertain which test method to employ.

(4) Since the ignition temperatures as determined by Research are only relative, we should repeat the test using the method of Setchkin. Perhaps we can have Underwriters' obtain these results since elaborate equipment is needed here also.

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BIBLIOGRAPHY

(1) Journal of Research of the National Bureau of Standards, Vol. 57, #4, October 1958.

(2) Modern Plastics, Vol. 20, #6, February 1943.

(3) ASTM Bulletin #151, March 1948.

(4) NFPA Bulletin #255.

(5) UL Bulletin #723.

(6) ASTM #E84.

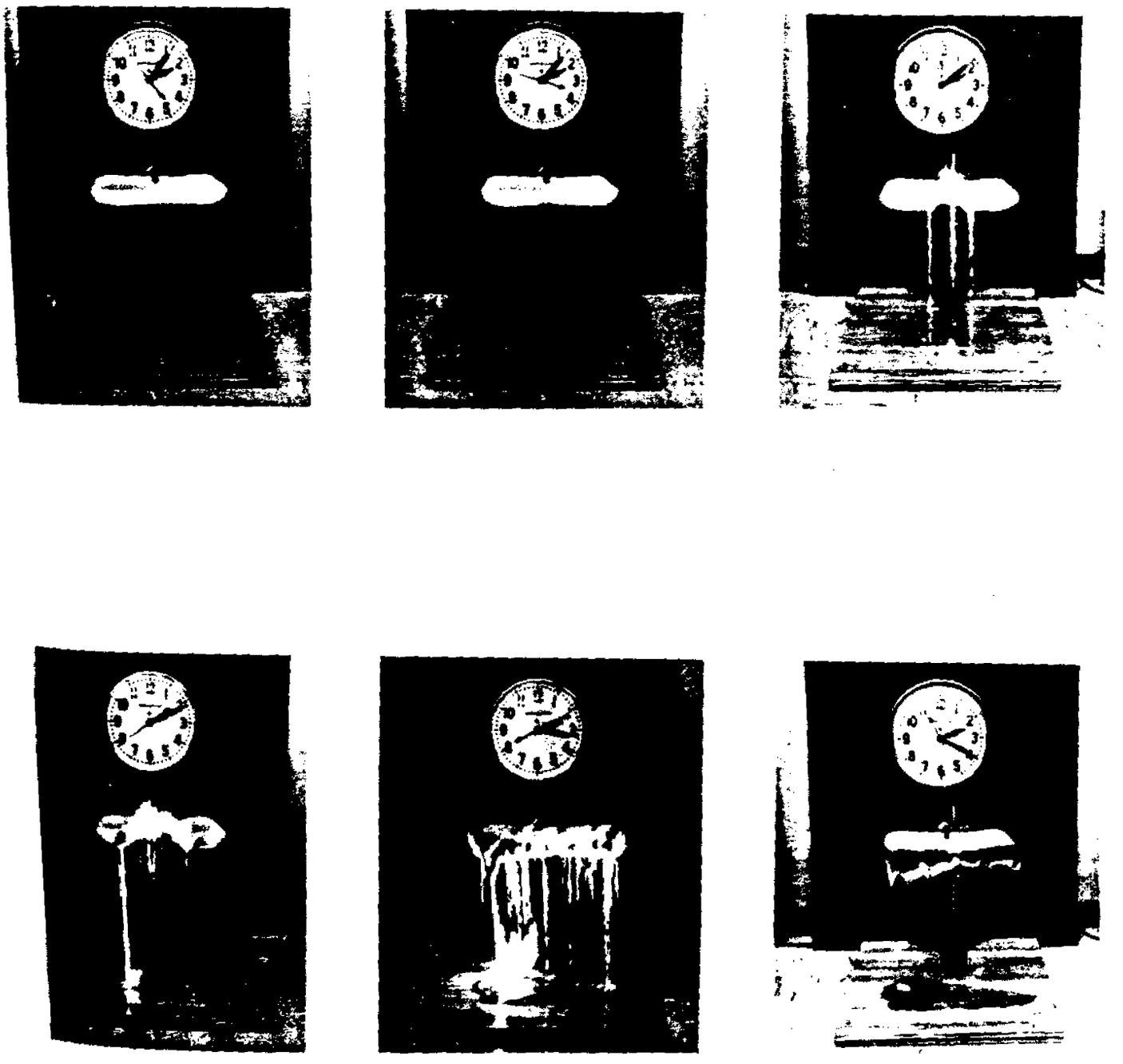
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This report prepared by Mr. Jones and supplied through courtesy of Mr. George Wash.

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June 15, 1961

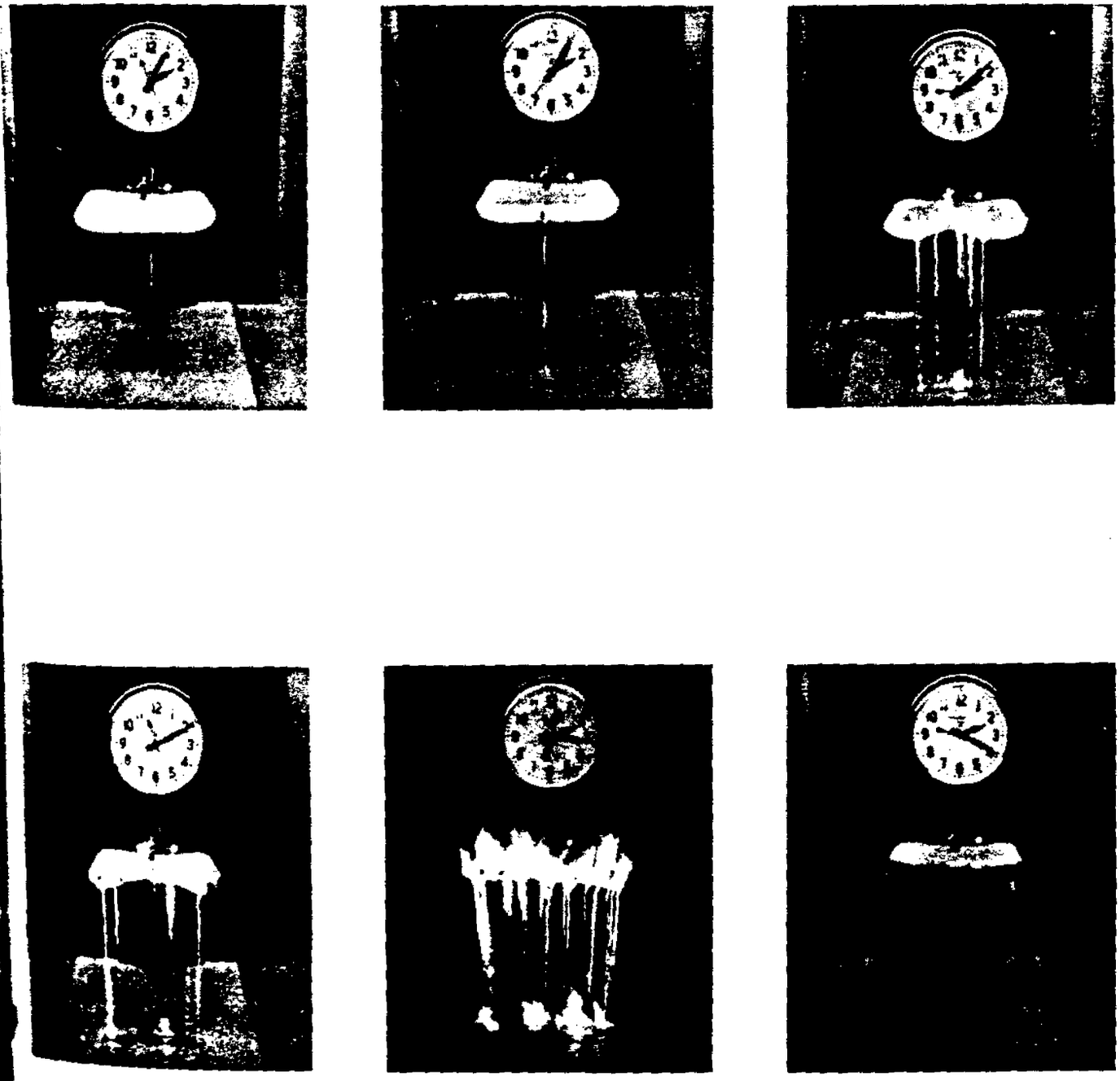
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FIGURE 1
MARLEX SEAT IGNITED ABOVE A HARDWOOD FLOOR



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FIGURE 2
MARLEX SEAT IGNITED ABOVE A VINYL TILE FLOOR



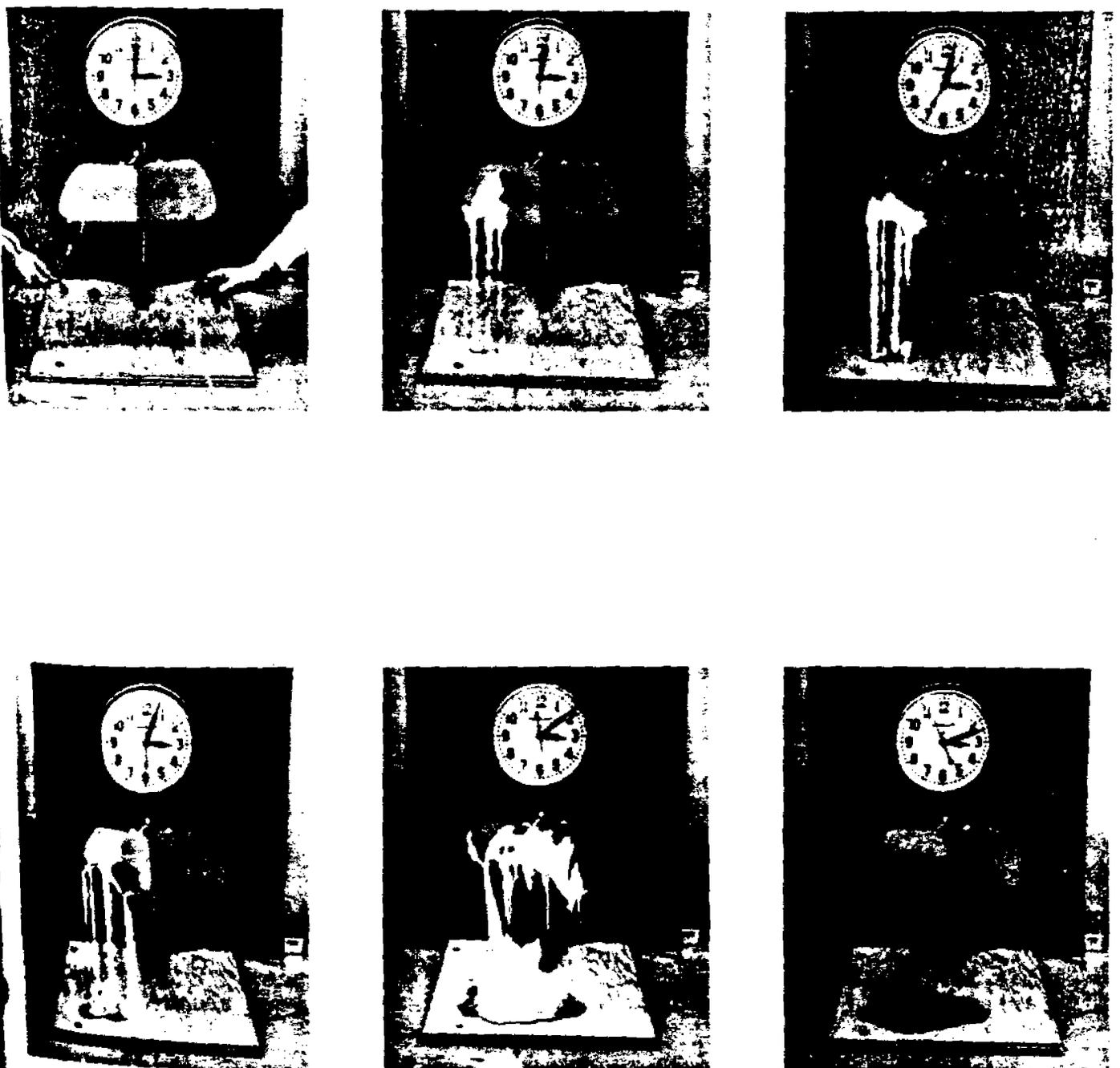
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FIGURE 3
MARLEX SEAT IGNITED ABOVE A RUBBER TILE FLOOR



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FIGURE 4
A COMPARISON OF THE BURNING RATE OF UNCOATED MARLEX
(on left)
WITH MARLEX COATED WITH FIRE RETARDANT PAINT
(on right)



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Appendix B

Comments by F. X. Ambrose, Chairman, SPI Code Advisory Committee

There are a few details which I might clear up for Mr. Jones. On Page 3, reference is made to UBC Standard 52-1-61. This is merely a reference to the Manufacturing Chemists' Association's book entitled "Technical Data on Plastics", current edition. The section of the Code in which this reference is contained, deals with identification and approval of plastics, and reads in part as follows: "Approved plastic materials shall be those specified in U.B.C. Standard No. 52-1-61 which have a flame-spread rating of 225 or less" ...etc.

The Tunnel Test is the Underwriters' standard procedure. On Page 4, reference is made to UBC Standard No. 42-1-61. This is identical with the Underwriters' Laboratories Tunnel Test.

In general, I think that the data which has been developed is favorable. Undoubtedly, the photographs would be disturbing to regulatory authorities, yet it is a universally accepted fact that there is no tendency for flame to travel across the surface of a floor. Hence, burning material on a floor can be considered relatively harmless.

In addition to the testing work which has been done or which has been recommended for future action, I would suggest that some data on heat of combustion be developed. The BTU's per pound of the Marlex could then be compared to the BTU's per pound of wood furniture, and the total design could be taken into consideration. It should be possible to develop a figure for BTU's per chair, molded plastic versus plywood or wood. The potential BTU release from a classroom fire, should be a very important factor. I say this, because I don't see how flame-spread could be a factor since there is no continuous surface over which flame could travel.

As a matter of fact, it would be my personal recommendation that the question of furniture standards or approval be kept as far as possible removed from any connection with building codes. Certainly, building codes are not intended to deal with furniture, and drawing the Building Departments into the picture might only serve to complicate the problems.

On the last page of Mr. Jones' report, there is mention of tests for toxicity (Item 3). This is a subject on which a fair amount of study has been conducted both by industry groups and, more recently, by the Code Advisory Committee. The fact of the matter is that extremely little is known about the exact cause of death where fire and smoke are involved. While casual newspaper and fire reports may attribute death to asphyxiation, smoke poisoning, carbon-dioxide (or monoxide), oxygen starvation, or hot gases, etc., all such statements appear to be opinion or conjecture. This undoubtedly accounts for the lack of any standard test for toxicity of combustion products. Where authorities have insisted on toxicity information, we have generally been able to resolve their questions with tests on white rats. A sample test report is enclosed. This type of test, plus an analysis of combustion cases, would certainly indicate whether or not noxious gases are given off in any harmful quantities.