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Acrylic Polymer Transparencies

Inez Allen Kendrick
Portland State University

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APPROVED BY MEMBERS OF THE THESIS COMMITTEE:

Richard J. Prasch, Chairman

Leonard B. Kimbrell

Robert S. Morton

Brief mentions by three writers on synthetic painting media first intrigued my interest in a new technique of making transparent acrylic paintings on glass or plexiglas supports, some of which were said to simulate stained-glass windows. In writing this paper on acrylic polymer transparencies, my problem was three-fold: first, to determine whether any major recognized works of art have been produced by this method; second, to experiment with the technique and materials in order to explore their possibilities for my own work; and third, to determine whether both materials and methods would be suitable for use in a classroom.

Pursuant to these objectives I reviewed art journals of the past decade to determine whether any major works in acrylic polymer transparencies have received national recognition. At the same time I consulted

every available book on acrylic painting methods, to obtain all possible information as to how to proceed. Following this, I experimented, over a period of approximately eight months, with a great many materials and methods. During the course of this experimentation, I produced a number of transparencies, using various colorants, media, supports and dikes, also exploring many methods of applying these materials to obtain a variety of effects.

As a result of my research and experimentation, I have reached the following conclusions:

First: So far as can be determined, no major works in acrylic polymer transparencies using these specific methods have yet received national recognition. However, a great many works in closely related art forms are being produced, and are receiving recognition.

Second: After several months of experimentation, I agree with Jensen, Woody and Chavatel that this medium has great possibilities, and that when these possibilities are realized in the future, by artists of skill and imagination, major works of great beauty may well be created.

Third: It is believed that acrylic polymer transparencies would be a most suitable project for use in many classrooms. The materials are non-toxic and perfectly safe and easy to use; both the emulsion and the colors are water-soluble, making for ease of cleanup; both materials and technique are new, and therefore challenging to young people; and finally, the beauty of the jewel-like colors when viewed by transmitted light furnish a great incentive to the student to create in this medium.

ACRYLIC POLYMER TRANSPARENCIES

by

INEZ ALLEN KENDRICK

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TO THE OFFICE OF GRADUATE STUDIES:

The members of the Committee approve the thesis of Inez Allen Kendrick presented April 26, 1972.

Richard J. Prasch, Chairman

Leonard B. Kimbrell

Robert S. Morton

APPROVED:

Frederick Heidel, Head, Department of Art

David T. Clark, Dean of Graduate Studies

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Inez Allen Kendrick

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INTRODUCTION

Definition

An acrylic polymer transparency is so named because its principal ingredients are acrylic polymer emulsion colored with acrylic pigments or other colorants, on a support of transparent acrylic sheet. The resulting work could be considered an acrylic painting, since acrylics are used in the process. However, it differs greatly from a conventional painting in both technique and in final effect, since it is made and displayed in such a way as to allow light to pass through with maximum luminosity; that is, it will be viewed by transmitted light as with a stained glass window, rather than by reflected light, as with a mural.

Acrylic polymer transparencies represent a new and comparatively untried technique. While partaking of the qualities of various other art forms, both ancient and modern, this technique is different from any other and for this reason must be considered a unique fine art medium in its own right.

Background References

The materials used in making a transparency are, themselves, of recent development, as the acrylics have been called the first really new painting material to be perfected in recent centuries. Newman says, "I expect that, as a painting vehicle, the acrylics...will revolutionize

painting concept and technique as the introduction of oil painting did in the fifteenth century." (13, p. 157) And, as Chavatel says, "The Polymer Medium is anything but totally defined today and offers the curious student the never-ending opportunity of discovering new things previously unknown to him." (4, pp. 44-45)

If the materials themselves are new, the technique of using them to create acrylic polymer transparencies is even more recent. It may be useful to mention references which describe this technique.

So far as can be determined, Lawrence Jensen, in 1964, seems to have been among the first to include in his book a relatively complete explanation of methods and materials. He devotes four pages to a description of what he calls "Polymer Tempera Transparencies." (9, pp. 69-73)

In 1965, Russell O. Woody, Jr., details a similar method in a brief section titled "Simulated Stained Glass Collage." (18, p. 77) He refers to it again, somewhat more fully, in his second book, published in 1969. (19, pp. 79-80)

Chavatel, in 1966, states: "A mural may be made by enclosing spaces on a sheet of glass...into which color mixed with Emulsion Medium is poured to set," then proceeds to explain the method. (4, pp. 59-60)

Related Art Forms

A search was made in art journals of the past decade to determine whether any major works in this technique have received recognition.

By far the most promising seemed to be a reference in Architectural Record to some panels executed by artist Abraham Joel Tobias for the Polytechnic Institute of Brooklyn in 1958. They are described as

"two large murals executed by a new technique based on the passage of light through multiple colors and layers of acrylic plastic." (12, p. 272) Jensen also refers to them as follows:

> The murals are built on 3' x 10' pieces of 1/4" Plexiglas, and overlaid with transparent colored pieces...and develop their impact by the passage of light through the design.... This mural is very similar to the paintings that can be made by means of the process described in this section. (Italics added.) (9, p. 73)

Following up on this lead, I wrote a letter to Mr. Tobias at the Brooklyn Institute, asking what pigments he had used to color the medium. He replied with a friendly and helpful letter, expressing an interest in my project and enclosing photographs of his murals. (One of these is shown in Figure 1.) He stated, however, "The two panels you refer to contain no applied pigmented paint films. The color is inherently a part of the material." The accompanying literature explains that the 3500 pieces of Plexiglas used were pre-colored at the New York laboratories of Rohm & Haas in 58 colors and shades. Since the process did not involve the pouring of a colored emulsion onto a transparent support, it is clear that although the general effect of these panels may resemble acrylic transparencies, the materials and techniques involved were quite different.

Several references were found to Harriet Fe Bland, of New York University, who has been called a pioneer in using Plexiglas. Many of her major works have been three-dimensional constructions of plastic and other materials. However, she has also worked in a technique very similar to, if not identical with, that of acrylic polymer transparencies. Several of these paintings were exhibited in December, 1961,

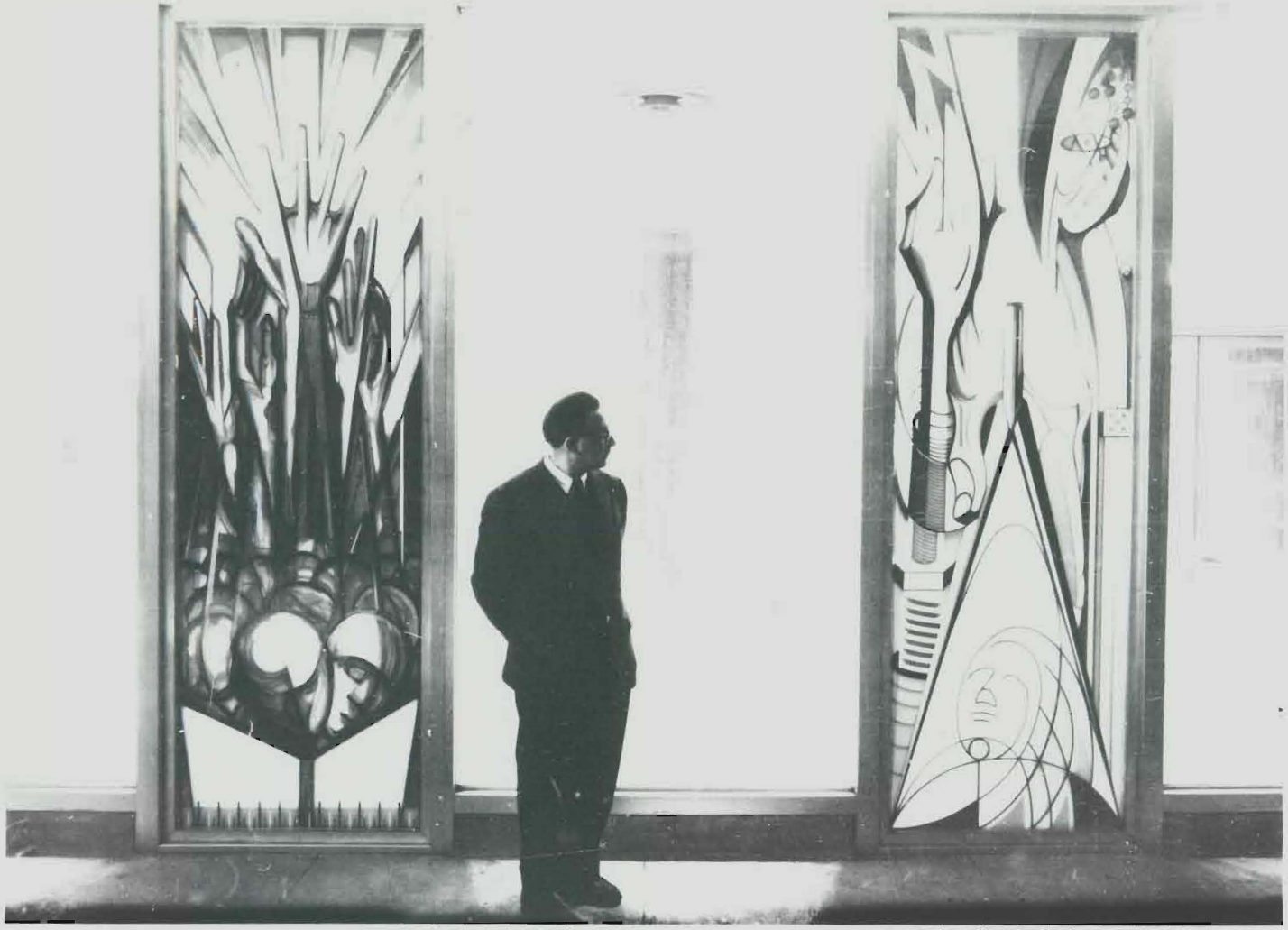


Fig. 1 -- Two 10-ft. murals, symbolizing "Science" and "Engineering", fabricated from Plexiglas, provide a unique architectural treatment of the entrance to the Brooklyn Polytechnic Institute, Brooklyn, N.Y. Designed and executed by the noted artist and muralist, Abraham Joel Tobias, at the plastics fabrication laboratory of the Rohm & Haas Co., these works of art represent the evolution of a new mural technique. The artist constructs the mural from individual precut pieces of pigmented acrylic plastic, cemented into one or several layers, to produce three-dimensional effects and extraordinary range of subtle color gradations.

and described as "tenuous abstractions brushed with acrylic on plastic and illuminated from behind." (7, p. 61) Newman also refers to some of Fe Bland's works as being "made on clear acrylic sheet with acrylic emulsion as a painting vehicle." (13, p. 163)

In 1963, in the UNESCO Courier, reference was made to the "lumidyne" paintings of Frank J. Malina, termed "artist-scientist of the space age." Although different in technique and materials, these works seem closely related, in visual impact, to acrylic transparencies:

> In purely artistic terms, his work evokes the art of stained glass. The artificial light he sets behind the screens of his pictures is a substitute for the changing sunlight to which Gothic stained glass owes part of its miraculous quality. (14, p. 20)

Some of this same "miraculous quality" can be sensed in the recent glass and heat-fused glass work of Frederick Heidel, Head of the Art Department at Portland State Univeristy. (Figure 2.) They have been described as "slabs of atmosphere" and combine the jewel-like colors of Gothic stained glass with modern designs and techniques.

Many of today's artists are exploring art forms which employ some of the new transparent materials such as acrylic lacquer and polyester resin; for example, Ron Cooper's plastic creations, involving the use of sprayed polyester resin, of which he says, "I am working with the closest thing to painting on air." (16, p. 115)

It becomes evident that the specific technique which is the subject of this paper has not yet been widely used. Today, as in 1964, "the possibilities and opportunities afforded by these new techniques are now almost completely unexplored." (9, p. 73)

"Six Foil Rose

"The Unicyclist"

Figure 2. Two examples of fused and laminated glass by artist Frederick Heidel, of Portland State University, from recent exhibition at Contemporary Crafts Gallery, Portland, Oregon.

CHAPTER II

MATERIALS

I. THE MEDIUM

The liquid medium known as Acrylic Polymer Emulsion is the basic material for beginning a transparency. As it comes from the bottle, the emulsion is a thick, chalky-white liquid having the consistency of heavy cream, but dries to a tough, permanent film which is either transparent or translucent. It is water-soluble when wet, so that all brushes and implements are easily cleaned with soap and water. But when thoroughly dry it is impervious to water and may be immersed without adverse effects. It is odorless, non-toxic and completely safe and easy for anyone to use. Further, due to the clarity of the medium when dry, colors retain their brilliance without fading or yellowing.

Acrylic polymer emulsion is marketed in three forms: Gloss Medium, Matte Medium and Gel Medium. Only the first two should be used, as it is my experience that the Gel is too heavy and will not produce satisfactory transparencies. In most of the work included in this paper, Liquitex products were used, since this brand can be purchased at considerable savings at a local discount store; and since the medium must be used in rather large quantities, these savings of up to 20 per cent can become significant. This will be especially true in a classroom situation, for both teacher and students.

Since the Gloss and the Matte have differing qualities which are definite factors in the appearance of the finished transparency, the two will be described separately.

Gloss Medium

The Gloss Medium dries to a film which is noticeably more transparent than the Matte, and this, in itself, is a definite advantage in many instances. However, it seems to have less inner cohesion, so that it tends to pull apart as it dries, causing cracks or striations in the film. This is particularly true when the colored medium is poured directly onto a rigid support, such as glass or plexiglas, and allowed to dry. This cracking can sometimes be minimized or eliminated when the initial work is done on a thin sheet of cellophane, and not mounted on a rigid support until thoroughly dry. This is due to the fact that the thin cellophane will curl at the edges, eliminating the stress which could cause the cracking. In any case, the accidental cracks may sometimes be used to actually enhance the design, whereas in other situations they may be distracting and undesirable. Experimentation is necessary.

Matte Medium

The flatting ingredient used in the manufacture of the Matte Medium is colloidal silica, which gives the emulsion several characteristics: It dries to a dull rather than glossy finish; it is translucent but not as transparent as the Gloss; and it has greater inner cohesion, so that the film is less prone to cracking as it dries.

Further, however, when this medium is diluted (as it must be when drawing ink is used as the colorant) the silica tends to separate out and form puddles at the bottom of the mixture, which show up in the finished transparency as opaque white spots. These may or may not be desirable in the particular design.

Sometimes I have found it advantageous to use equal parts of the gloss and the matte, thus utilizing the superior transparency of the one and the greater cohesion of the other.

II. COLORING AGENTS

Almost any water-soluble paint may be used to color the acrylic polymer emulsion, including inks, watercolor, acrylic paints, powdered batik dyes and perhaps others. Each colorant tested in this project has its own peculiarities, and each will be discussed separately.

Inks

Drawing ink has already been mentioned as one of the possible colorants, and it has some advantages. When used with the gloss medium, the resulting mixture dries to a very high degree of transparency. (Figure 3-a.) However, the opaque effect which sometimes results when the matte medium is used with ink should be kept in mind.

Further, caution must be used in selecting permanent colors, as some of the inks have faded considerably upon continued exposure to sunlight, and this can ruin an otherwise attractive transparency.

Also, it will be found that the extra dilution of the medium by drawing ink can slow the drying of the mixture by many hours, so that if time is a factor, it might be best to choose another colorant.

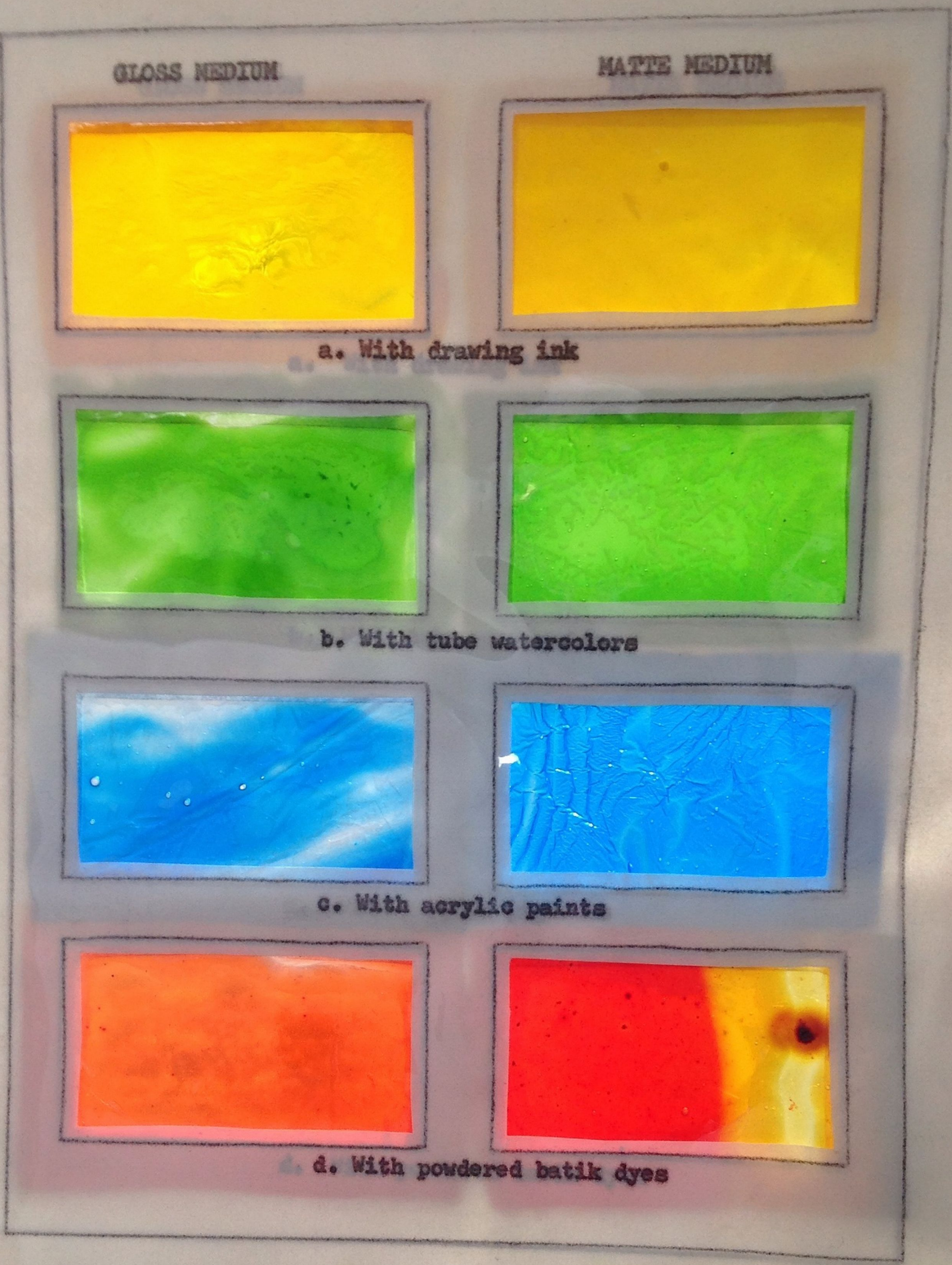


Figure 3. Mixtures of Gloss Medium with various colorants (left) and of Matte Medium with the same coloring agents (right) to show degrees of transparency and brilliance of color.

Watercolor

Transparent tube watercolors were used in some of the experiments in this project, and usually were found satisfactory, provided permanent pigments were chosen, then tested for transparency or translucence. (Figure 3-b.) However, it is my experience that the paint film in these cases sometimes tends to become brittle after a few months, and thus is subject to cracking.

Acrylic Paints

In most instances, acrylic pigment has proved to be one of the best colorants to use in making transparencies. Only a very small amount of paint is required in proportion to the medium, and the resulting paint film is lastingly flexible. (Figure 3-c.) Since the medium and the pigments contain basically the same acrylic ingredients, they are always compatible and so can be depended upon for consistently good results. A further advantage is their permanence. As Frederick Taubes states, "Every reasonable scientific test indicates the extraordinary durability of acrylic paints." (17, p. 11)

Here again, however, experimentation is necessary, since some acrylic pigments are highly transparent (viz. the Phthalo Blues and Greens and the Ultramarine) while others are less so, and therefore not as satisfactory for our purpose of obtaining maximum luminosity in a transparency. Sometimes a less transparent pigment may be improved by mixing it with the gloss rather than the matte medium; but for certain colors it may be necessary to turn to ink or batik dye in order to achieve the desired transparency.

Batik Dyes

Powdered batik dyes in gloss medium produce a color film of extraordinary clarity and brilliance. The colors tested seem to be stable and permanent, over the several months in which they have been used. Even when matte medium is the vehicle, the resulting color film is of good translucence. (Figure 3-d.)

Another advantage of using the powdered dyes is that drying time is greatly reduced over that of the other colorants.

It should be mentioned, however, that a similar product (such as Rit or Tintex) is not satisfactory, as it contains salt which does some strange things to the texture of the film and also interferes with its adhesion to a support or to other color films.

III. SUPPORTS

Cellophane

For all preliminary and experimental work, the support used will be cellophane, plastic wrap, waxed paper or similar inexpensive and readily available water-proof and transparent material. When completely dry, the paint film may be removed by peeling it away from the backing, then mounting it on a rigid support if desired. If a very heavy weight of cast cellulose is used, it may not always be necessary to use a more rigid support.

Glass

It is possible to achieve a satisfactory panel by pouring the colored acrylic polymer emulsion directly onto a sheet of glass. However, due to the obvious hazards of breakage, it may be advisable

when working with a group, to use cellophane or similar material in all the initial work, later mounting the piece on glass if desired.

Acrylic Sheet

Acrylic sheet is marketed under several trade names: Plexiglas, Lucite, Acrylite, and others. These products are ideal for use in acrylic transparencies. Quoting Jensen:

> For children's work, glass is adequate and inexpensive. For more serious work, sheets of Plexiglas or Lucite make ideal supports. Unlike glass, the expansion and contraction rates are exactly the same as those of the polymer tempera medium and colors. Since both the medium and the support are derived from an acrylic resin, they are perfectly compatible. (9, p. 72)

There are still more important reasons why acrylic sheet is to be preferred to glass. According to Newkirk:

> An outstanding quality of acrylic plastics is their crystal clearness; in fact they are more transparent than highest quality plate glass...Colored light loses none of its color in passing through the plastic... Although the acrylics have some of the characteristics of glass, they do not shatter or break readily, and they are less than half the weight of glass. (12, p. 248)

From a practical point of view, it should be mentioned that a saving of 50 per cent or more can be effected by using the "industrial grade" of Lucite from a local store. These sheets may contain occasional scratches or other imperfections which, however, become invisible or nearly so after the colored emulsion is applied. Either one-eighth inch or one-quarter inch thickness may be used, depending upon the size of the panel being made and the degree of rigidity required. All plexiglas panels shown as examples in this paper were made on the one-eighth inch thickness.

IV. DIKES

Since the acrylic polymer medium is quite liquid, it is often necessary to build small dikes in order to separate one color from another as the mixture is poured onto the support. Also, of course, the opaque lines of the dikes become an important component of the overall design, just as the leading of a stained glass window accents and enhances the beauty of the luminous colors outlined.

Plasticene Clay or Putty

Jensen suggests using plasticene clay, or a putty made of pigment, polymer medium and plaster of Paris, which has been kneaded, rolled out, cut into strips, coated with medium, then held into place with pins or staples until dry. He also describes a rather intricate method of making transparent dikes by pouring a sheet of clear polymer medium, allowing it to dry, then cutting it into strips to be used flat or set on edge, to serve as dikes. (9, p. 71) However, when these methods seemed unnecessarily tedious, several other solutions were found which serve the purpose as well or better, and are much simpler to use.

Commercial Preparations

At least two preparations are on the market locally which are satisfactory when used by a careful adult according to directions and with all the necessary precautions. They are called "Dam-It," and "Craft Steel." They are dispensed from a tube in liquid form and dry to a tough, pliable film in about an hour or less. This material bonds well to glass, acrylic sheet and cellophane, comes in several colors, in-

cluding black, is of proper consistency as it comes from the tube, (especially the Dam-It), and seals off each compartment so that there is no leakage of color from one area to another. It is quick and easy to use, and is sold in the same local store where the industrial grade of Lucite is available. The Dam-It is quite reasonable in price, when the dark green and other colors are used, for these are sold at approximately half the price of the same size tube in black.

However, in spite of the good qualities of these preparations, they have serious disadvantages which make their use prohibitive in a group, particularly a group of young people. One of the tubes bears the label: "Danger: Extremely flammable...Harmful or fatal if swallowed. Vapor harmful." The other label reads: "Warning: Flammable... Avoid prolonged or repeated breathing of vapors and prolonged or repeated contact with skin. Use with adequate ventilation...Before eating, smoking or after using, cleanse hands thoroughly." Obviously, these products must not be used by a group; and this fact made it necessary to look further for good dike material.

A third product is on the market locally under the name "Liquid Lead." It comes in a plastic squeeze bottle, and is both non-toxic and non-flammable. However, it has two disadvantages: It is much too expensive, and does not dispense from the bottle at all satisfactorily.

Acrylic Pigment

Black acrylic pigment, direct from the tube, can be used to form the dikes. It dries to a tough but very flexible film, and serves the purpose beautifully. Since the openings in the large tubes

would dispense a wasteful amount of pigment, it is best to cover the opening with heavy plastic in which a smaller hole has been punched. This will restrict the flow so that a ribbon of the proper size will be dispensed. Since the tubes of black acrylic cost considerably less than most of the colors, this is not as expensive as it might seem, particularly when purchased at the same discount store which handles the Liquitex Emulsion. It has the tremendous advantage of being non-toxic, non-flammable, without odor or fumes, and also is readily available.

String or Twine

An inexpensive solution in many cases can be a length of ordinary cotton twine, coated with the gloss medium and placed directly on the support, to outline the design. When dry, the gloss medium is invisible, and the enclosed spaces hold the liquid color adequately where the design is a simple one, and does not involve too many crossing lines. When the emulsion-coated twine is completely dry, the panel should be held up to the light to determine whether there are small holes in the dikes. If so, these can be filled in with spot applications of the polymer medium. Twine is especially useful and economical to contain the outer edges, when pouring sheets of color for later use in collages, or for other special effects.

Strips of Mat Board

Instead of twine around the outer edges, strips of mat board can be used to frame a panel. When these are glued to the support, they form a recessed well which contains the liquid adequately.

Tub and Tile Caulk

There are tubes of plastic material on the market which were made for sealing tubs and tiles, which can be a satisfactory dike material in certain situations.

Special Mixture

After a number of experiments, another solution to the dike problem was found by mixing three acrylic products. The base ingredient is a Modeling Paste sold by Liquitex and described on the label as "Prepared Acrylic Polymer Putty." To this paste is added enough of an acrylic pigment to give it the desired color, and sufficient acrylic polymer medium to give it the necessary liquid consistency. When dispensed from a plastic squeeze bottle, this mixture is most satisfactory for outlining even the most intricate design. When properly prepared, it dispenses well from the bottle, adheres perfectly to the acrylic sheet support, dries quickly, forms water-tight compartments, and remains flexible rather than becoming brittle when dry. Moreover, it is completely non-toxic, non-flammable, and without odor or fumes. Since all three products are water-soluble before drying, cleanup is easy; and the student is able to mix this preparation for himself, as needed, since all the ingredients are acrylic products which he probably keeps on hand or can easily obtain.

All the above should be tried by the student, plus any other creative solutions which may occur to him.

CHAPTER III

METHODS

I. PAINTING TECHNIQUES

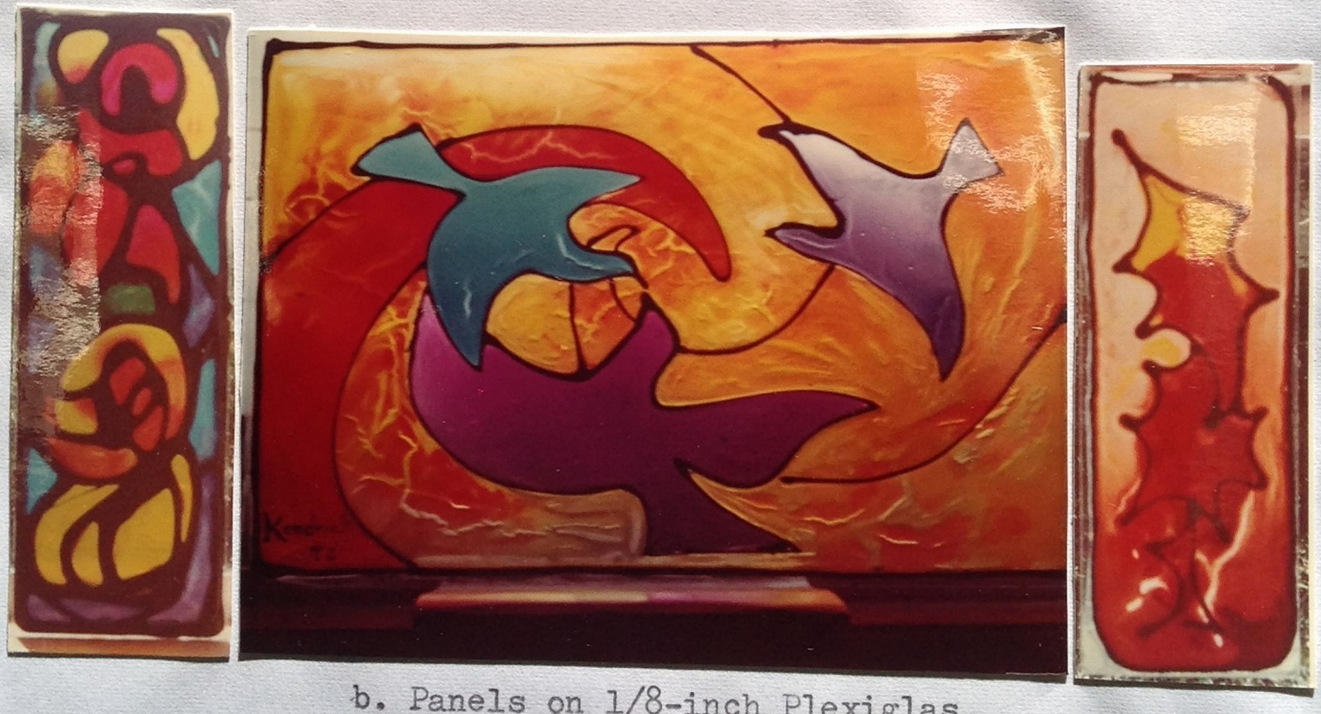
Basically, the first step in beginning to make an acrylic polymer transparency is to mix a small quantity of pigment, ink or dye in a much larger amount of the acrylic polymer medium and stir well. The proportions used will depend on the nature of the colorant used, the depth of color called for in the design, and the degree of transparency desired. In conventional acrylic painting, a very small amount of the medium may be mixed with the pigment, then applied with a brush or palette knife; but in making transparencies this is reversed, and only a very small proportion of pigment is mixed with the medium, the mixture then being poured into place and allowed to set.

There are a number of ways of proceeding, both before and after the pouring of the colored emulsion, depending upon the design and upon the effect the artist wishes to achieve. The following suggestions may be taken as merely a beginning vocabulary of technique. Each method may be used separately or combined with others, to achieve highly individual and expressive art forms.

With Dikes

Figure 4 illustrates the technique of using dikes in such a way as to simulate the leading of a stained glass window.

a. Panels on cellulose acetate.



b. Panels on 1/8-inch Plexiglas.

Figure 4. Photographs of transparencies made by using dikes of various materials to separate the color areas.

A simple arrangement of lines and shapes is drawn on a sheet of paper, exactly the size the finished transparency is to be. This design is then laid out on a flat, horizontal working surface and covered with a sheet of clear plastic or cellophane. Later handling will be greatly facilitated if both of these are taped to a drawing board or piece of heavy mat board. Now, using a tube of diking material, the design is drawn onto the cellophane, following the guide lines underneath.

While the dikes are drying, the colors are prepared. A separate covered jar is required for each color. (Jam or peanut butter jars are practical.) Proceed by pouring a quantity of the medium into the jar, then adding a small amount of pigment. (For example, one-fourth inch of Phthalo Blue acrylic pigment from the tube, mixed with one-half cup of gloss medium, will create a color film of clear, intense, jewel-like brilliance.) When the ingredients are well blended, place the lid on the jar while the remaining colors are prepared. It is a good idea to label each jar, giving the kinds and proportions of material used. Experience will prove the advisability of this procedure, since the appearance of the pastel opaque liquid in the jar often bears little resemblance to the final color of the dried film by transmitted light. A further help is to pour a little of the contents onto a piece of cellophane, let it dry, then use it as a cover for the jar, secured with a rubber band, thus giving immediate visual evidence of the actual color film.

By this time the dike material will have dried sufficiently, since only the outer skin need be dry at this stage; complete drying can take place along with the colored emulsion. Now the colored emulsions

are poured into their proper compartments. Often a plastic spoon is a useful tool for this. If one of the lakes of color threatens to overflow its dikes, an eyedropper can be used to suck up the excess; or a piece of dampened terry cloth is equally effective. If bubbles appear, they may be pricked with a pin before the liquid begins to dry.

The project will now be set aside in a flat, partially covered place for a day or two. The cover is advisable to prevent dust or other material from settling on the surface and becoming a permanent part of the paint film. Jensen states that "drying time will range from four to six hours, depending upon the thickness of the poured layer of medium and upon the degree of humidity present." (9, p. 70) However, I have found that a more realistic estimate under normal conditions of our local damp climate will be from two to four days, depending on the kind of colorant used and the thickness of the layer poured. However, drying may be hastened considerably by using a heat lamp or by placing the project near a fireplace or radiator. For the smaller sheets of color, I have found that a warm oven provides some excellent drying racks. When these devices are used, the drying may be accomplished within Jensen's estimate of four to six hours.

When the paint film is dry around the edges, it may be placed on a glass table or on a sheet of plexiglas with a lamp underneath, for viewing. In this way a judgment can be made as to whether both the color and the degree of transparency will be satisfactory. If a color appears too intense or not translucent enough, more medium must be added to the mixture in the jar. Often it is helpful to add gloss medium, if matte was the original vehicle, to improve transparency. When all the

colors have been corrected and notes made on what each jar now contains, the design is again outlined with dike material on another sheet of cellophane; or, if desired, on plexiglas or glass for the final panel. The corrected colors are then poured onto the design. There is no way to avoid this experimental approach until much practical experience has been gained. Constant testing is essential.

Without Dikes

Even when no dikes are used, it is sometimes possible to pour separate areas of color, closely juxtaposed but without intermixing. (Figure 5-a.) For this method, the best coloring agents are batik dyes or acrylic pigment with the polymer emulsion, so that the resulting mixture is sufficiently viscous to prevent the areas from running together when they collide. A little more care is required in the pouring and the design may be slightly less rigidly controllable than when dikes are used. Nevertheless, when this is the effect desired in the design, the method is quite practical.

It is also possible to achieve other effects without using dikes, such as pouring juxtaposed areas of color, then swirling them into each other in any manner desired. (Figure 5-b.)

If gloss medium and ink are used, the resulting mixture will be quite fluid and the various colors can be "washed" on in the manner of a freely-executed watercolor painting. In this technique it is necessary to provide dikes only on the outermost edges of the panel; and for this, twine coated with medium is economical and satisfactory. Or strips of mat board glued down provide an equally simple solution.

a. Colors juxtaposed but not intermixed.

b. Colors swirled together.

Figure 5. Photographs of panels showing colors poured without the use of dikes to separate the color areas.

Collage Method

The initial step in this method is to pour large separate sheets of each color, allowing them to dry thoroughly. If thin sheets of film are desired, the liquid may be poured onto the cellophane and allowed to spread until its natural level is reached, without any controlling dikes of any kind. If thicker sheets are required, a dike of twine or mat board strips is recommended. Here, again, complete drying time may require from two to four days; so that, in the meantime, it is useful to have a glass-top table for viewing the work, to see whether the colors will need correcting. If so, additional sheets can be poured.

When the entire sheet is thoroughly dry, the color film will be uniformly translucent throughout. At this time, it can be peeled away from the cellophane support. Usually this is accomplished quite easily, but if necessary, the entire painting may be soaked in water to facilitate the release. As stated before, the acrylic polymer paint film is impervious to water, and will not be harmed in any way.

When there are the required number of these "paint skins," in the proper colors and of the desired transparency, they may be used in a number of ways to create a transparent collage. (Figure 6.)

One method is to cut the shapes desired with a pair of scissors, and place the pieces about 1/8 inch apart on a glass or lucite support, holding them in place by brushing both surfaces with gloss medium and pressing together. The spaces in between may be filled in with either clear or colored medium, to give a stained-glass effect; or the pieces may be fitted closely together, without the connecting "leaded" effect.

Panel on cellulose acetate.

Panel on plexiglas.

Figure 6. Photographs of transparencies illustrating the collage method of painting, with two or more layers of translucent color film overlapping.

If the paint films are sufficiently transparent, they may be overlapped into two or more layers, as was done in Figure 6. It is this method which might visually approximate that used by Mr. Tobias in his panels previously discussed, and shown in Figure 1.

Special Effects

Many special effects can be achieved, if desired, and used either separately or in any combination with the foregoing methods. Some of these are suggested here, and shown in Figure 7.

Drops of colored ink may be placed in the wet colored emulsion, and allowed to spread at random. (Figure 7-a.)

Drops of water may be flicked into the wet colored emulsion, causing it to separate into patterns, giving a textured effect. (Figure 7-b.)

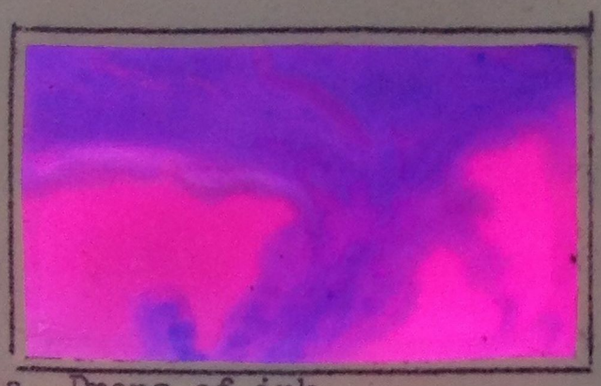
One colored emulsion can be swirled into another, after the two have been poured into juxtaposition. (Figure 7-c.)

Chavatel suggests dropping small glass beads, buttons, or other transparent objects into the wet colored emulsion. (4, p. 59) (Figure 7-d.)

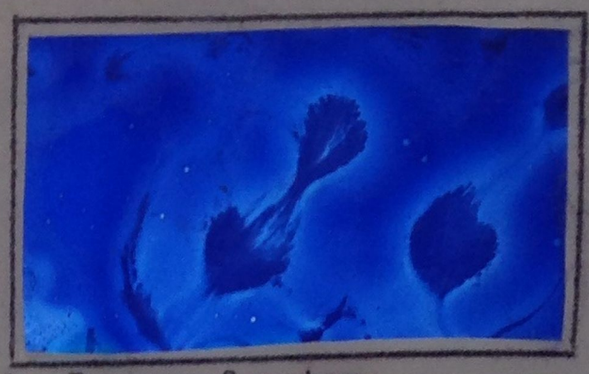
Details may be painted over the dried film of Medium, to give any effect desired. (Figure 7-e.)

Many glazes may be brushed over the initial dried paint film, in the same or different colors. These may be glazed or scumbled on, for many unusual effects. (Figure 7-f.)

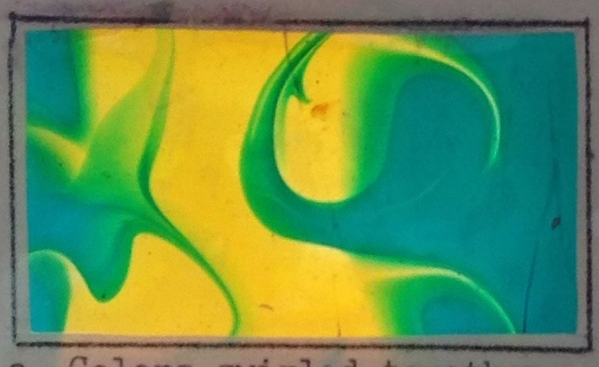
The sheet of colored emulsion may be baked at 150 to 200 degrees until dry. (Figure 7-g.)



a. Drops of ink



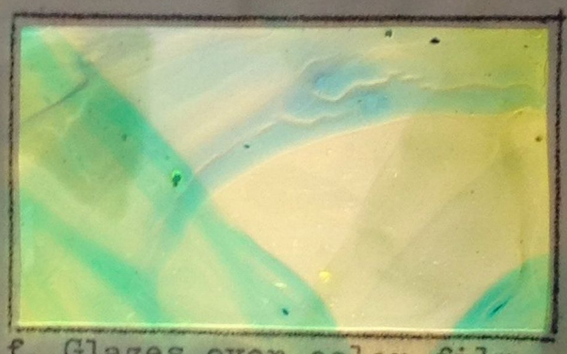
b. Drops of water



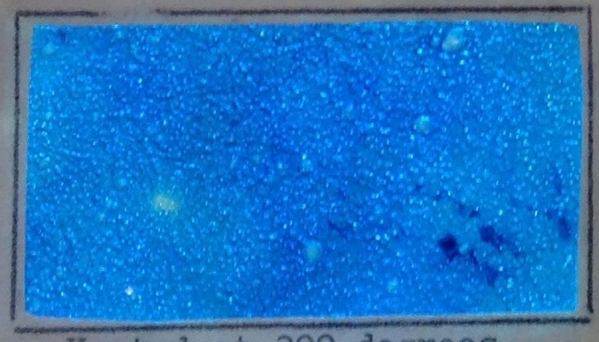
c. Colors swirled together

d. Embedments

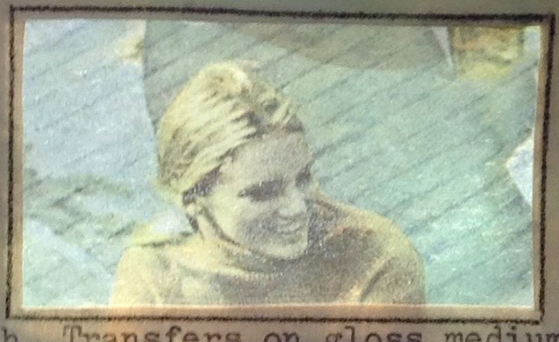
e. Details painted on



f. Glazes over color film



g. Heated at 200 degrees



h. Transfers on gloss medium

Figure 7. A series of transparencies showing special effects.

Woody mentions the possibility of making transfers of printed photographs or reproductions by painting over the subject with four separate coats of gloss medium, and allowing it to dry. (An equally good method, I find, is simply to pour the medium on, in one application.) After the medium has dried, Woody continues, "it is soaked in water until the uncoated back of the paper becomes soggy. The paper can then be carefully pulled off, leaving the printing ink in the polymer." (19, p. 80) (Figure 7-h.)

Woody goes on to describe how images reproduced in this way were incorporated into a portrait, titled "The Mind's Eye," painted by artist Tom Vincent.

> The realistic image can also be enhanced by polymer collage...The support is linen canvas primed with polymer gesso. Over this, a very realistic self-portrait was drawn and worked up with tones of polymer color... Later the collage figures and objects were introduced. Both the surface of the painting and the backs of the collage subjects were painted over with medium, then stuck together. Some of the reproductions dried with a wrinkled texture that fascinated the artist. (19, pp. 80-81)

Many additional ideas for special effects will undoubtedly occur to creative minds, as they continue to explore the possibilities of this new medium.

II. MOUNTING THE TRANSPARENCY

After removing the dried paint film from the plastic backing, as described previously, it may then be mounted on a permanent support, such as glass or plexiglas.

Since Jensen gives the most complete description of how to mount a piece on glass, his method is given here in its entirety:

> If glass is to be used as the support, it must be thoroughly cleaned with warm water and soap. A scrubbing with alcohol will remove any unwanted moisture. The glass can be improved as a surface by sanding or scratching it in order to improve the tooth. The artist may then coat the surface of the glass with an undiluted solution of the polymer medium. Allow it to dry. A heating lamp will hasten the drying time and improve the bond. Next, coat the back of the polymer pane with the undiluted polymer tempera medium, and allow this application to become tacky. Carefully press the tacky side against the prepared glass, applying even pressure. The heat lamp may again be used. Under normal conditions of temperature and humidity, the bond should be accomplished within two or three days. (9, p. 72)

If the support is to be acrylic sheet, such as Plexiglas or Lucite, Jensen suggests a different procedure. Since both the paint film and the acrylic sheet can be softened with the same solvent (a preparation called acetone) Jensen suggests brushing the two surfaces with this and pressing them together under weights, to achieve a bond. However, acetone is highly flammable and the fumes are quite toxic, so that this is not suitable for use in a group of young people. Instead, I have had good success in simply coating the two surfaces (acrylic sheet and paint film) with gloss medium, then proceeding in exactly the same way as described above, when glass was used for the support.

Another method is to place the transparency between two sheets of Lucite or Plexiglas and secure all three surfaces together with metal strips or clamps.

Woody has still another suggestion, which would eliminate the rigid support altogether. He likes the idea of using the paint film as it is, after removing it from the cellophane backing, saying, "It can be stretched on stretcher strips--no canvas, paper or support

is needed, just pure paint all the way through." (19, pp. 79-80) Of course, only a fairly thick paint film could be so treated, otherwise tearing might result. However, when of moderate thickness, these films are really surprisingly tough and flexible, especially when acrylic pigment has been used as the coloring agent.

III. MENDING AND CORRECTING

It often happens that a paint film will become torn, particularly when the film is pulled loose from its backing while some spots are still damp on the underside. These tears are easily mended by placing the film on a piece of cellophane and pouring gloss medium along the crack. When dry, pull loose from the backing and give a similar treatment to the reverse side. Sometimes unusual effects can be obtained by mending the tear with a colored solution of the gloss medium--either the same color as the piece being mended, or different colors, one on each side. This can give an effect of depth and richness to a passage.

Correcting a portion of the dried color film can be equally easy. If a section inside one of the dikes is not the color desired, simply cut out the entire section with a razor blade, following the inside rim of the dike. Coat the underside of the dike with gloss medium and lay it onto a piece of cellophane; then pour the corrected color emulsion into the dike area and allow to dry.

Other mending and correcting can be done in a similar manner, since the acrylic polymer medium adheres perfectly to itself and to the diking material.

CHAPTER IV

EFFECTIVE DISPLAY

I. QUALITIES OF TRANSPARENCY

All art forms which depend on transparent color for their impact have certain qualities in common. This is true whether the art form is an ancient one, such as stained glass, or a modern innovation, such as acrylic polymer transparencies. It is these qualities which should be examined in order to plan the most effective means of displaying and using the art form.

First and most obviously, transparency intensifies and dramatizes all the colors, increasing their visual and emotional impact.

Further, the colors of a transparency are ever-changing, since the source and intensity of the light behind the panel can vary from moment to moment, thus giving it a life and vitality different in both kind and degree from that possessed by a conventional painting.

A transparency goes beyond the surface and takes the viewer into itself, since all parts--front surface, back surface and interior embedments--are seen simultaneously. The transparent art form can also take the viewer beyond itself into its background environment, thus integrating the two into a unique whole. In this way, the viewer himself becomes a kinetic element in the design, for as he changes his position he also changes the background as seen through and around the panel.

II. SUGGESTED USES

Mobiles

Beginning in a small way, both Jensen and Woody suggest that mobiles be designed, using transparencies for the colored areas. Many variations of this art form can be devised, adapting it to any age group or situation.

Free-Standing Panels

Panels may be made of acrylic polymer on plexiglas, set in a grooved wood base or on a metal stand and placed so as to catch the light. Two examples of such panels created as a part of this project are shown in Figure 8. Other interesting free-standing panels in a somewhat related art form are Frederick Heidel's panels of laminated and fused glass set in metal stands, discussed previously and shown in Figure 2.

Woody suggests that several acrylic polymer panels "can be placed one behind the other and back-lighted for very unusual effects." (18, p. 80) Chavatel suggests using such panels as room dividers or "as illuminated table tops." (4, p. 60) Several panels on plexiglas may be framed and hinged together as flexible free-standing screens.

For maximum effectiveness all acrylic polymer transparencies must be back-lighted by a bright window or doorway, or by artificial lighting of some kind.

Wall Paintings

Transparencies may be framed and hung on the wall in the manner of conventional paintings, the difference being that some sort of back-

Figure 8. Photographs of transparencies on 1/8-inch Plexiglas, and displayed in front of a window for back-lighting. Top panel in grooved wood base. Bottom panel has Plexiglas bent back to form its own stand.

lighting device must be worked out. Harriet Fe Bland devised an interesting solution to this problem:

> Mrs. Fe Bland set up a master panel with lights at regularly spaced intervals that will also accommodate various sized mats. A fiberglass diffusing panel is placed over the illumination to soften the hot spots of light and provide a "heat shield." Then the lights are individually turned on and off, depending upon the intensity and effectiveness of each light position for the particular painting. Following the final light pattern of the master panel, a specific background is designed and wired for each painting's light box. (13, p. 163)

Frank Malina, previously referred to, seems to have worked out a similar lighting device to enhance the effectiveness of his "lumidyne" paintings. (14, p. 20)

Many present-day artists are preoccupied with the use of artificial lighting in connection with their work in various art forms of plastic and other new materials.

Panels to Flank an Entrance

Transparencies may be used with striking results to flank the entrance to a building, such as the Polytechnic Institute of Brooklyn, previously discussed and shown in Figure 1, page 4. Such transparencies should be equally effective in a residence as in a public building.

Windows

One of the most attractive ways of displaying an acrylic polymer transparency is to use it for covering an entire window or series of windows, as shown in Figure 9. Heavy Plexiglas was cut to size, then covered with collages of transparent and translucent paint film in colors to blend with the existing decor of the room. When these panels were placed over the inside window frames, they softened the original glare

Figure 9. Acrylic polymer transparencies used to cover clerestory windows in a Portland residence. Paint films were collaged onto heavy Plexiglas cut to fit the inside window frames.

of the clear glass windows, diffusing and coloring the light during the day. At night they are equally attractive from the outside, when back-lighted by the artificial illumination in the room.

Today these colorful windows are used with increasing frequency in buildings of all kinds, and are often made of the new plastic materials, either alone or combined with glass in various ways. One striking example is a large window in the California Masonic Temple. Created by Emile Norman, it uses glass embedded in resin and is three stories high and 48 feet wide.

Walls

Chavatel suggests that a whole series of panels made of acrylic polymer on heavy Plexiglas might be juxtaposed to form wall areas in schools, churches and office buildings, saying that such panels "are an excellent solution to the never-ending effort of integrating art and architectural form." (4, p. 60)

Truly, as Woody says, "the possibilities for using polymer in this manner are endless." (19, p. 80)

CHAPTER V

THE TRANSPARENCY AS A CLASSROOM PROJECT

I. SUITABILITY

Of Materials

That the materials used in acrylic polymer transparencies are well suited to classroom use can be asserted with confidence. Considering only the physical properties of the polymer medium and colors, there are a number of advantages:

1. No objectionable odors, fumes or vapors.
2. Non-flammable.
3. Non-toxic and perfectly safe for students to use.
4. Easily cleaned, while wet, from brushes and other implements, using only soap and water.
5. High resistance to fading.
6. Fast-drying in comparison with oil paints, with no prolonged chemical drying action.
7. Great adhesiveness to most painting supports.
8. High degree of light refraction for more brilliance of color.
9. High elasticity, thus permitting maximum flexibility, expansion and contraction in the paint film.

Jose Gûtierrez states: "Art educators, especially, should acquaint themselves with the plastic paints and present the new materials to their classes; students should be allowed to discover for themselves the

exciting possibilities of synthetics." (8, p. 18) According to artist Frederick Taubes, "that this relatively new material is more versatile and adaptable than any other aqueous medium is indisputable." (17, p. 141)

Further on the subject of these materials, Jensen gives the additional advantages that the new media are inexpensive when compared with traditional classroom art materials; that the polymer emulsion can be used with other coloring agents than pigments; and that when using these materials, "painting classes become exciting laboratories in which creative and experimental work is greatly encouraged by the broad range of effects available." (9, pp. 7-8) He makes these further relevant comments:

> The new synthetic media offer significant advantages over traditional media in the field of art education. These advantages are both technical and esthetic. A desirable freedom from technical limitations and restraints attends the use ...of the new media. Traditional instructional media for classroom use, if easy to manipulate, or simply convenient from the point of view of the teacher, are not conducive to rich and varied expression... In the high school, the use of oil paint presents a constant hazard both to the finished work and to the students... There is every likelihood...that the young artist can find a fresher outlet for his creative proclivities through their use, unrestricted by the memory of traditional solutions in traditional media. (9, pp. 6-7)

Of Technique

Not only are the materials ideal for classroom use, but the specific technique of using them to make transparencies is also eminently recommended. George Chavatel, himself a veteran teacher, advocates for "special classroom use" the making of pseudo stained glass windows by this method, saying this "may become part of any comprehensive art program." (4, p. 44) The fact that this technique is new and almost untried should constitute an intriguing challenge to young students.

II. PROCEDURES AND PROJECTS

While considering possible ways to present this project to a group of students, I read Robert Ross's article "On Group Teaching in Art," and agreed with many of his ideas:

> It soon became clear that the hustle, bustle and group interaction was stirring up an enthusiasm and mutual respect that didn't exist with problems that were done alone...
>
> It occurred to me that the fact of working together made each member of the group feel he was not on trial by himself, which therefore gave him a detached view of what was happening.
>
> ...It became increasingly evident that the few group problems given to classes...were very high moments for the classes and served as spiritual tonic for numbers of previously "uninvolved" students. (15, p. 45)

An adaptation of Mr. Ross's idea seemed to me an ideal approach, particularly since the techniques and some of the materials would be entirely new to the students. With this in mind, the following brief outline of procedures for five sessions is presented.

Play with Materials

At the first session the instructor will bring materials to class to be examined and discussed by the students. There will be large bottles of acrylic emulsion, several kinds of colorants, three kinds of dike materials, plus small jars, stirring sticks and other incidental articles. Also, several plexiglas panels will be furnished, as well as a package of cellophane to be dispensed from a container. All these will be explained, handled and discussed.

In addition, the instructor will have brought a number of "paint skins" in various colors which had been previously poured and dried--

enough of these for each student to have at least one. These will be held up to the light so that the group may observe the great difference between the appearance of a color by reflected light and the same color by transmitted light.

After each student has selected one of these paint films as his own, the group will be subdivided into three sections: Group I, Blues and Greens; Group II, Yellows and Oranges; and Group III, Reds and Violets. Each student will cut his sheet of color into various shapes, saving all the pieces in a cardboard box. Each group will then take one of the plexiglas panels, place it on a light table, and arrange some of the cut pieces into a collage of analagous colors. These will not be glued down at this stage, but left free to be moved about into other arrangements.

Each student will then fill a small jar about half full of the medium, add a small amount of a colorant and mix. Each student in a group will take a different colorant; for example, in Group II, one student will mix yellow batik dye into his jar of emulsion; a second will use orange acrylic pigment, a third may use a tube of orange printing ink, and another a tube of yellow watercolor. Each will use the inside of the lid of his cardboard box to write down what he used, and the proportions, as well as his name. The jar of colored emulsion will be placed in his box, along with the unused fragments of paint skins.

Next, each student will tear off a length of cellophane and place it inside the lid of his box. Each group will be given a different kind of dike material and each individual in the group will take turns outlining a rectangle on his piece of cellophane then making a simple design of crossing lines inside the rectangle. At the same time, the

instructor will prepare a large sheet in much the same way, using one of the dike materials.

The lids will be placed on top of their respective boxes, and stacked until the next session.

Explore Techniques and Methods

At the second session, each student will begin to explore the medium. He will take the design previously made with dikes, and pour three or four of the areas with the color in his own jar, and one each from the analagous colors in his own group. He may then borrow one color from each of the other two groups, and pour these into the last two compartments. All the lids will then be stacked, crosswise to each other, and left to dry until the next session.

Now, the instructor will lay out the larger sheet with diked design which he prepared at the previous session, and each student will bring his jar of colored emulsion, and pour from it two or three sections of the design. When all sections are filled with the liquid colors, the instructor will demonstrate some of the "special effects" shown in Figure 7, page 28. The students themselves will then, if they wish, create additional special effects in the remaining color sections.

If a student has used all the color in his jar, he may wish to wash it out and experiment with another color and a different coloring agent. He should be encouraged to experiment, at all times, with any of the materials which he has not yet handled.

For the next session, each student is asked to bring additional small jars from home.

At the beginning of the third session, some time will be spent in examining all the colors poured at the previous session, comparing them with those of the other individuals and groups, discussing what might be done differently, and how best to obtain other effects.

After this period of examination and consideration, the students will return to the groups set up in the first session, and continue with the collage panels of analagous colors. When the cut shapes of color film have been arranged as desired by the group, each piece is coated on the back with gloss medium, the section of plexiglas under it coated similarly, and the two pressed together. The students will take turns in this process, until all the pieces are in place. Then, if desired, the students in Group I, (Greens and Blues) may wish to borrow small bits of the clear yellow film from Group II, and superimpose them over portions of the collage to note the effect. The other groups would experiment in similar ways.

Before closing this session, the students will be allowed to fill the jars they brought from home with additional colors, and place them in their boxes for use at the next session. Also, if any students have not yet used any of the materials, they should be encouraged to become familiar with them.

Each student will be asked to bring to class next time a simple design in black pencil lines, drawn on a sheet of 9 x 12 drawing paper.

Create

At the fourth session, a small panel (9 x 12) of 1/8" plexiglas will be given to each student. Using the designs they have brought to

class, the students will proceed to make a transparency by the process outlined in Chapter III, pages 18 to 22, first tracing the designs on the plexiglas with dike material, then mixing and pouring the colors for the design.

Evaluate

At the last session, all the transparencies will be held up to the windows or viewed at the light table and the various colors will be discussed--which colorants seem to produce the most brilliant effects, which are transparent and which are merely translucent or even semi-opaque.

There will be a discussion of the many uses to which transparencies may lend themselves, and ways in which to display them.

The group-made panels will be displayed in the windows, and the individual panels, along with all the scraps of paint skins and jars of colored emulsion will be taken home by the students. Also, if any want to trade colors they will do so; and if they want to mix additional jars of color to take home, they will be allowed to do this.

III. CONCLUSIONS

Many benefits to the students are possible when acrylic polymer transparencies are made a part of the art curriculum as outlined above.

The group experience itself fosters cooperation, sharing of ideas and freedom of expression, since the student need not feel that he is personally on trial. Some degree of care and patience will be developed, since the transparencies usually must dry overnight before the actual appearance can be accurately judged.

But the most significant advantage to the student lies in the fact that both materials and technique are new and challenging.

As for the materials, some are so new that it is quite possible the students may not have had the opportunity of exploring them at all. Some individuals may have used acrylic paints, but not combined in this way with the polymer emulsion, and not by using cellulose acetate or clear acrylic sheet as a support for the paintings. It is this challenge of a new and untried medium which frees the class from "hidebound" and hackneyed approaches to the project. The student may feel something of the freedom and sense of adventure of a pioneer, blazing previously untrod and uncharted paths. All restraints are lifted, and the individual finds he can work unhampered by traditional rules and limitations. Since most of the problems will not have been previously encountered, he is free to work out his own creative and imaginative solutions.

Add to the above the excitement of viewing the brilliant transparent colors, and the students should feel a definite incentive to create in this medium. It is so versatile, so adaptable, and lends itself to such a variety of approaches that each student may emerge with his own unique and characteristic expression. It is even possible that one of the group may go on to develop the art form to its full potential. This is the hope and the belief of the present writer, who has found the project exciting, stimulating, rewarding and well worth sharing with other students and artists.

A SELECTED BIBLIOGRAPHY

1. Almasy, Paul. "Stained Glass: 400 Years in One Family," UNESCO Courier, (May 1963), 17-20.

2. Best, A. "Transparently Beautiful: Acrylic Sheet," Design Magazine, (London) 239 (November 1968), 26-31.

3. Bragdon, Joseph. "Creating with Plastics," School Arts Magazine, (October 1955), 15-18.

4. Chavatel, George. Exploring with Polymer. New York, 1966.

5. Edwards, Lanton. Making Things with Plastic. Peoria, Ill., 1954.

6. Fabri, Ralph. The Art of Polymer Painting. New York, 1966.

7. Fe Bland, Harriet. "Exhibition at Internationale," Art News, 60 (December 1961), 61.

8. Gutierrez, Jose and Nicholas Roukes. Painting with Acrylics. New York, 1966.

9. Jensen, Lawrence N. Synthetic Painting Media. Englewood Cliffs, New Jersey, 1964.

10. Longo, Vincent. "Plastics in New Art Materials: Interview with Charles Seide," Arts Magazine, 30 (May 1956), 62-63.

11. "Murals of Acrylic Plastic Introduce New Art Technique," Architectural Record, CCCIV, No. 3 (September 1958), 272.

12. Newkirk, Louis V. Adventures with Plastics. Chicago, 1947.

13. Newman, Thelma. Plastics as an Art Form. New York, 1964.

14. Popper, Frank. "Movement and Light in Today's Art," UNESCO Courier, 16 (September 1963), 12-20.

15. Ross, Robert. "On Group Teaching in Art," Art Journal, Fall 1971, 45-47.

16. Selz, Peter, with Carol Lindsley. "Plastics into Art," Art in America, 56 (May 1968), 114-15.

17. Taubes, Frederick. Acrylic Painting for the Beginner. New York, 1971.

18. Woody, Russell O., Jr. Painting with Synthetic Media. N. Y., 1965.

19. _____ Polymer Painting and Related Techniques. N. Y., 1969.