

JUST PAINT

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Dry Notes on Drying! Understanding How to Control the Drying Process of Acrylics

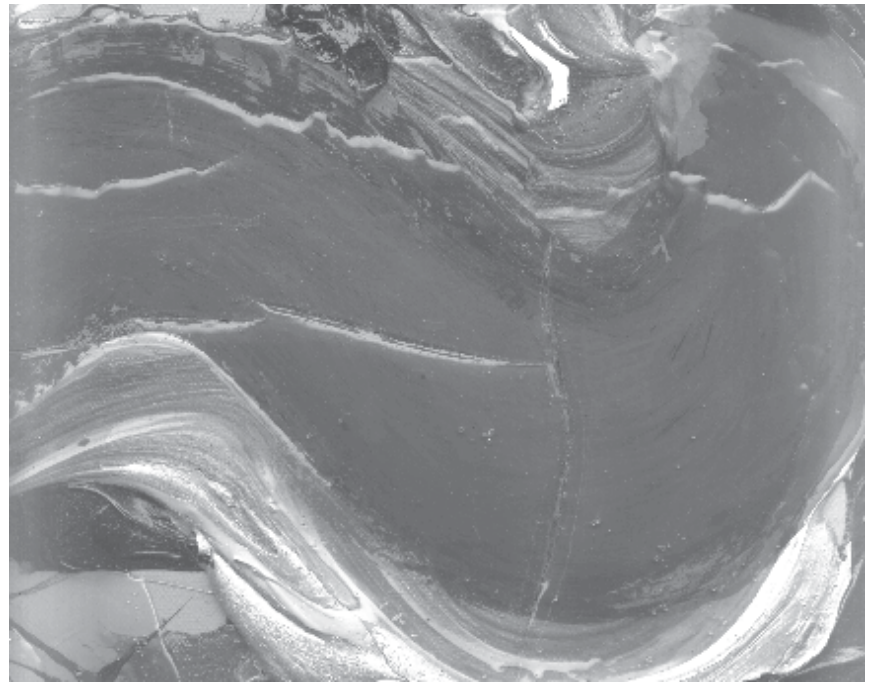
Acrylic waterborne paints tend to dry extremely quickly. This is not earth shaking news for anyone who has explored acrylic paints. For some, this is the Acrylics greatest advantage and for others its greatest weakness. Several techniques and additives can extend wet time on the palette, on the surface, on the tools and even in the containers. In this article, we will review the mechanism of drying of acrylic paint and how that process can be controlled and manipulated to an artist's advantage.

Paint Dries As Water Evaporates

Waterbased acrylics dry as the vehicle that carries them -- mostly water -- evaporates. As water evaporates, or is absorbed by the substrate (canvas, paper, gesso, etc.), the microscopic acrylic polymers, which are shaped like spheres, are forced into ever closer contact. Eventually they're crowded so tightly that the spaces between them create capillary-forces, and water is actually pulled from the paint film. This capillary action packs the acrylic spheres against one another in a honeycomb-like pattern, and they begin to form a more or less continuous, cohesive film. As this occurs, the polymer spheres deform and partially combine with one another in a process of film formation called coalescence.

Three stages of drying

Paint actually dries in three very different stages, hence drying times should be thought of in several different time frames. The **first stage** results in the formation of a semi-dry surface. No film formation has actually occurred at this



Thickly applying gels or watering down mediums can lead to stresses within the film causing crazing upon drying

point, but the paint no longer flows easily. Another indication is that the brush begins to drag over the surface. The paint doesn't seem dry, yet it is difficult to move and fairly sticky. This is often a point where overworking the acrylic will cause the

permanent clouding of glazes or clear coats. This stage is marked physically in the paint film by a dramatic reduction in water content at the surface. However, since evaporation is still occurring very quickly from layers below, no film formation has yet taken place. In very thin paint films this can occur within seconds.

In the **second stage** of drying the paint actually forms a skin over the surface. This is the time when people frequently judge the paint as, "dry to the touch". There is no

longer sufficient water to keep the acrylic polymer from forming a film. For very thin films this could occur within minutes, while the time for thick films to skin over may be a full day.

The **third stage** of drying is the time required for the entire thickness of the film to be thoroughly dry. That is when the remaining water and solvent (used as freeze-thaw stabilizer and coalescent) evaporate and leave the film. This is a most crucial time frame to be aware of as the ultimate physical properties, such as adhesion, hardness and clarity, do not fully develop until the film is near complete dryness. For very thin films, this time may be a few days, while films of 1/4 inch thickness or more will take months and up to a year to be completely dry.

Moving Artwork

Many artists are not aware of this sometimes lengthy drying time. Often

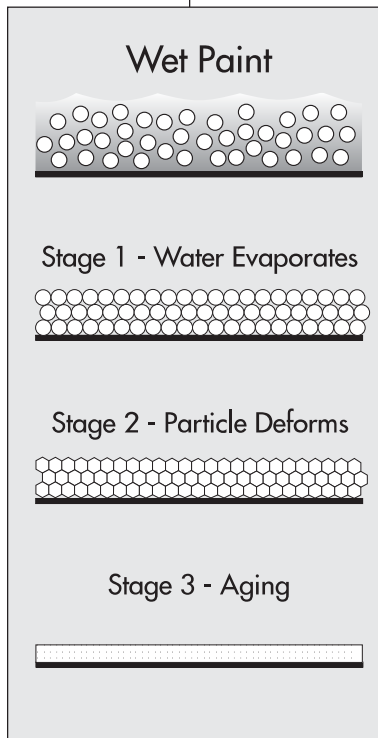
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PAINT DRIES
IN 3 DIFFERENT
STAGES.
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Drying Notes

paintings can be ruined if painted very thickly and moved during this period of drying. In very thick paintings, three weeks is a minimum before moving the work, as cracking may occur within the region of the film not thoroughly coalesced. Until complete coalescence or film formation has been achieved, the paint will not reach its optimum performance in adhesion, durability or block resistance (reduced tack of the surface). Additionally, clear films of gels, clear mediums, or lightly colored glazes will not reach total clarity until completely dry. Blanching or clouding may occur in works that have appeared clear, and are then stored away in a damp basement or on top of each other. These films may not have been thoroughly dry, or the storage conditions caused them to trap moisture. Given enough time for more complete drying, clarity, adhesion, block resistance and hardness may improve dramatically. (In very severe



cases treatment in a desiccant cabinet with reduced humidity may be necessary.)

Environmental Considerations

Environmental factors that regulate the evaporation of water also influence the drying times of acrylic paint films. These include: temperature, humidity and airflow. Temperatures below 49°F (9°C) will not allow the acrylic polymer solids to properly coalesce to form a continuous film, and may result in film failure (cracking, adhesion failure, powdered film, etc.). Relative humidities in excess of 75% will slow the evaporation of water from the surface, slowing the drying process. While a moderate and steady airflow in the drying area is favorable for thorough drying, a strong breeze, especially one directly on the paint surface, can cause film formation failure, such as cracking and/or wrinkling. Temperatures of 70 to 85°F and humidities under 75% are ideal. Yet acrylics have been very successfully painted within a wide range of

temperature and humidity conditions.

Practical Considerations:

There are no limitations for applying additional acrylic paint. That is, you can apply acrylic paints while the underpainting is still wet, just skinned over, or has dried for several years. (If painting over an old acrylic surface, be sure to clean off any accumulated dirt or grime). If you are going to apply oils over the acrylic underpainting, wait until the acrylics are completely dry.

For varnishing, it is also best to wait until the painting is completely dry. Trapping excessive levels of water and/or solvent, may result in clouding or poor initial adhesion of the varnish. This is more important when the varnish forms a tight, low-permeable film, such as in the case of GOLDEN MSA Varnish. When a top coat is more open, or permeable, such as an isolation coat of GOLDEN Soft Gel, the degree of drying is less crucial. When using GOLDEN Polymer Varnish, which is a waterborne product, the paint film must also be completely dry underneath. Applying this varnish over drying paint may result in tackiness, clouding or even cracking.

Controlling Drying Time:

Depending on the objectives and techniques, artists have varying needs to keep paint from drying too quickly. They may require longer mixing time on the

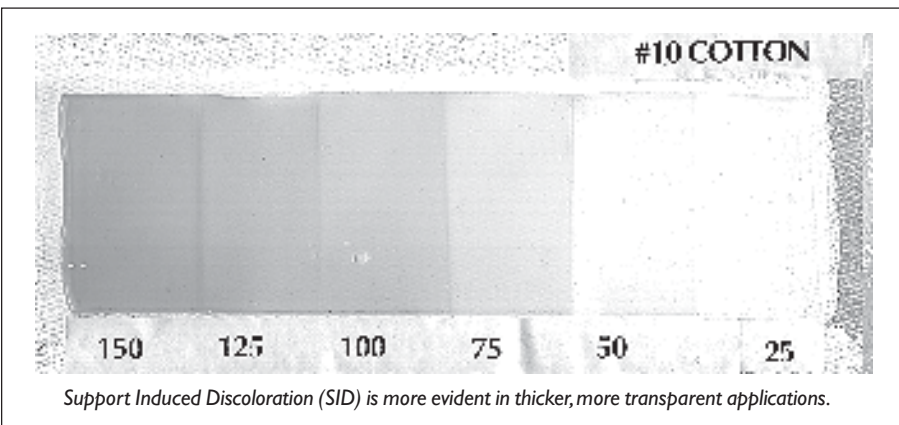
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ABSTRACT

Study Reveals Causes for 'Support Induced Discoloration'

by Mark Golden, President
Jim Hayes, Technical Director
Ben Gavett, Assistant Technical Director

This study was conducted by Golden Artist Colors, Inc. and Buffalo State University Department of Conservation. The researchers at Golden had uncovered a phenomena of discoloration previously not described within the literature. This discoloration, coined "support



Support Induced Discoloration (SID) is more evident in thicker, more transparent applications.

induced discoloration" (SID), comes from the water soluble components in unwashed canvas, linen, and masonite. The effect is particularly evident in very transparent glazes or thick applications of transparent and

translucent acrylic mediums.

This paper, available from Golden, is the reprint from the 1991 symposium "Saving the Twentieth Century, The Conservation of Modern Materials", held in Canada.

Glamour, Fame and Fortune Available Without Effort or Sacrifice!

Please don't be disappointed, but this article is really about the best alternatives for disposing of wastes generated while painting. I know it is a lousy trick, but the Editor insists on captivating headlines. However, there are real benefits to doing a good job with waste management practices, and if you stay till the end of the article, you may come away with some new ideas. - Ben Gavett

There are a few generalizations about waste disposal that are universally true. First, it is best for the health of the planet and its inhabitants if the byproducts of our creativity are kept to an absolute minimum and the issue of disposal is avoided entirely. Next, when wastes are produced, the manner of disposal which will have the least negative impact upon the environment should be selected. Finally, the legal requirements for disposal depend upon the nature of the waste produced, where it originates, and who is responsible for it. For example, disposal options will depend in part upon the classification of the waste generator. Wastes generated outside of the household, such as by a small manufacturing business or store, have tighter disposal restrictions. Alternatives will also depend upon how hazardous a waste is, based on reactivity, flammability, toxicity and physical state (solid, liquid, or gas).

Most waste is disposed of into either the water, ground, or air. The United States Environmental Protection Agency, state agencies, and local authorities all have regulations affecting such disposal. Questions are best addressed to the local facility first, such as the landfill or water treatment plant.¹ Questions about whether or not a material is considered a "hazardous waste" and the best method for its disposal, can also be directed to the manufacturer.

TIPS ON BEST DISPOSAL PRACTICES

- **Even with water-based products, it is best to discard a solid instead of washing everything down the drain.** Also, liquid paint should not be taken to a landfill. If allowed to dry, film-forming paints such as acrylics lock pigments in place and help prevent them from moving around in the groundwater. Allow residual paints and mediums to dry in the container. Dispose of as is, or remove the subsequent paint skin, leaving a fairly clean container. GOLDEN Acrylics are packaged in HDPE plastic, which can then be reused or recycled in many areas.
- **Small amounts of solvent-based products, like GOLDEN MSA Varnish, can usually be allowed to evaporate.** After complete drying, the container can be disposed of in a regular landfill. Significant amounts of these products are considered hazardous wastes and should be taken to a local Hazardous Waste Collection Center. Be careful, some of these limit their service to households and exclude small businesses. An expensive hazardous waste disposal service must then be utilized. In addition to solvent-based products, other art materials which are hazardous when disposed of include etching acids, pressurized aerosol cans, and certain highly toxic pigments. It is best to

avoid disposal of these by purchasing only what will be entirely used.

- **Before using water to clean palettes, brushes, containers and other tools, wipe them with a paper towel and allow it to dry before disposal.** This makes the wash water stay cleaner longer and keeps paint solids from going down the drain.
- **Solids in washwater can be further minimized by removing them with a simple treatment process.** See the other side for further information on treatment process.

TIPS TO REDUCE WASTE

- **Purchase products in the optimal container size.** Buying too small results in more packaging wastes. Buy too much, and you risk having more than can be used or having the product fail during storage.
- **Use work practices that minimize wasted paint.** For acrylics, try a moisturizing palette and keep the paint covered as much as possible.
- **Store products to maximize shelf life.** Avoid extremes of temperature, especially freeze-thaw cycles. Make sure lids are kept tight. Clean dried paint from the threads of jars and lids before closing to help get a better seal.
- **If products are still usable, but just aren't needed, give them to someone who can use them.** If properly labeled and nontoxic, many nonprofit organizations with art and craft programs would appreciate a donation of materials.
- **Recycle old acrylic paintings.** Apply a new gesso ground and use them for studies. They are also useful for practicing varnishing techniques and preevaluating the inevitable visual effect a varnish will impart.

Footnotes:

¹ For an overview of waste disposal regulations, send self-addressed, stamped envelope for *Waste Management and Disposal for Artists and Schools*, from the Center for Safety in the Arts at NYFA, 155 Avenue of the Americas, 14th Floor, NY, NY 10013.

Removing Water-Based Paint Solids from Rinse Water

If you would rather not flush water laden with acrylic paint solids down the drain, they can be removed prior to disposing of the water. This process consists of chemically treating the contaminated water to cause the solids to flocculate, followed by filtering to remove them from the water. The materials and equipment needed are available locally and/or via mail order from the "Vendor List" attached. The chemicals are hazardous so read label precautions and keep everything out of the reach of children. The process described is intended for nonindustrial users of acrylic paints.

Start by assembling the supplies listed below. Decide on the process batch size. Using 5 gallon pails allows you to process up to 2 1/2 gallons at a time. A 1 gallon pail and matching funnel allows for up to a 3/4 gallon batch.

1. Add 10 grams of granular aluminum sulfate for each gallon of water. This is about a 1/2 Tablespoon, well-rounded. So, 2 1/2 gallons would require about 25 grams, or 1 1/4 Tablespoons. Dissolve this material in a small jar with several ounces of water before adding to waste water. Then, add to waste water and stir vigorously.

2. Add 9 grams of powdered lime

per gallon being processed (a scant 3/4 Tablespoon). Stir in vigorously and observe. The flocculation of solids should start occurring within a couple of minutes. You should start to see a clear layer of water forming very quickly as the solids settle to the bottom. If, after several minutes, flocculation has not occurred, repeat steps 1 and 2.

3. Check the pH of clear water. It should be between 5 and 9. If lower, adjust by adding lime. If higher, adjust by adding aluminum sulfate.

4. Assemble the filtering equipment as shown. Use 2 coffee filters at a time. Pour the water through the filters after flocculation has occurred. The water will take several hours (over night) to completely pass through the filter. The resulting filtrate should be clear and should be flushed to a sanitary sewer. The solid filtered residue should be disposed of in a licensed landfill.

Vendor List

Filters may be found at restaurant supply houses. We use "Brew Rite" 18" x 7.5" for the 1 gallon setup and 25" x 11" for the 5 gallon, purchased from Smith Restaurant Supply Co, Inc., 500 Erie Boulevard East, Syracuse, NY 13202, Phone 315-474-8731.

Funnels need to be large enough to rest on rim of pail. Check with industrial supply firms, such as McMaster-Carr, 473 Ridge Road, Dayton, NJ 08810; Phone (908) 329-3200. Order the 13.5" diameter #4360T6 for the 5 gallon setup and the 9" #4144T4 for the 1 gallon.

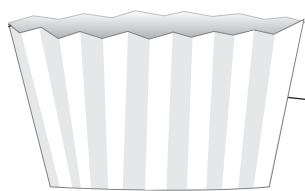
Pails, such as the polyethylene type that hold our products, work fine.

Aluminum Sulfate and Hydrated Lime are common soil amendments available from gardening centers.

pH paper is available from laboratory supply houses.

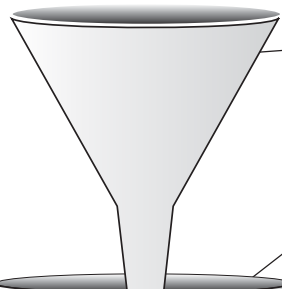
Measuring spoons should be purchased and kept separate from kitchen utensils.

SUPPLIES NEEDED TO PROCESS RINSE WATER



PAPER COFFEE FILTERS

The largest size we found can hold 2.5 gallons. These work well when using a 5 gallon pail. There is also a size available which works with a 1 gallon pail. See vendor list.

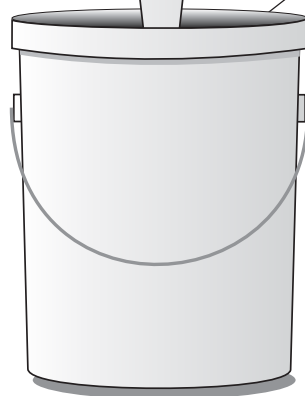


PLASTIC FUNNEL

Sized to match the filter and pail being used.

2 PLASTIC PAILS

Depending on amount of rinse water being processed, 1 or 5 gallon size. Polyethylene.



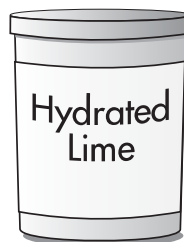
STIRRING PADDLE

Common paddle as available at Hardware or Paint Store.

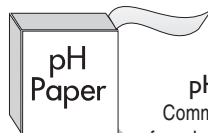
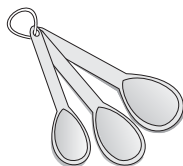


ALUMINUM SULFATE AND HYDRATED LIME

Commonly available at Gardening Centers.



WEIGHING DEVICE
OR
MEASURING SPOONS
(Do not use Mom's baking set)



pH PAPER
Commonly available
from Laboratory Supply
Houses.

Continued from page 2...

Drying Notes

palette, or longer blending time on the canvas or other support.

There are as many ways to control the drying process as there are ways to control the evaporation of water. High humidity, low temperature, low air flow, thick application and nonabsorbent surfaces slow the drying of acrylic paint. Conversely, dry conditions, high temperatures, significant air flow, thin application and absorbent surfaces speed the evaporation (or absorption) of water, and the drying process.

Some situations call for chemical agents that retard the drying of acrylic paint. These are usually a blend of several materials, predominantly glycols. By evaporating far more slowly than water, they keep the polymer spheres apart, preventing early coalescence. Retarders are not extremely effective if you need the paint to stay wet in thin films or on very absorbent surfaces. Humectants -- agents that absorb or hold water, like glycerin -- also have been added to retard or slow drying. However, humectants must be used with extreme care as they tend to percolate to the surface of the film during drying, leaving a residue that may reduce inter-coat adhesion.

On The Palette:

In addition to additives, several techniques will help keep paints wet on the palette. A most important first step is to use a non-absorbent palette. Glass works nicely, as do plastics such as polyethylene. Glass stays fresh and free from stains and works well as long as it doesn't break. The problem with a glass palette tends to be the weight. A new commercial tempered-glass palette made in several sizes, has convenient hand-sized holes for carrying. Many artists construct their own glass-topped taboret to use with acrylic paints. On wheels, the glass palette is portable and the artist can use larger plates of glass without worrying about excess weight or breakage.

To slow the drying of paints on glass or plastic palettes you may use a small amount of retarder. About three to ten percent of GOLDEN Retarder will keep a mass of paint from forming a skin for up to four to six hours, depending on the ambient conditions. Excessive quantities of retarder, especially when working in thicker impasto, will leave the paint skin feeling like soft gum, as the glycol may not totally release from the film.

Some people prefer to lightly mist the paint on their palettes. This can be a very effective technique to provide more open time, as it stops the first stage of drying. A simple plant mister, obtained at a hardware or drug store, may be filled with water (recommend distilled or deionized) or a 10:1 water/retarder mixture, for this purpose. Note again, that excessive levels of retarder will result in a weakened paint film, that remains sticky. Excessive spraying may cause colors to drip, or to stain into the support in an undesirable manner.

On the market are several varieties of plastic palettes that help keep acrylic paints in working condition. The most effective is the Stay-Wet Palette®, which takes advantage of what we know about acrylic drying: That is, if you control the atmosphere, you control the acrylic. The Stay-Wet Palette® is a large plastic tray on which you place a large, flat sponge. After soaking the sponge in water, a special filter paper is placed over it which acts as a palette surface. The filter paper allows water vapor to permeate, keeping the paints moist. If the sponge stays wet, paints will remain wet for hours without the use of a retarder. This palette has a cover to further extend working time. Some artists have suggested that the Stay-Wet Palette® slightly dilutes acrylic colors, but if you plan to work outdoors with acrylics on a palette, the Stay-Wet Palette® is nearly a necessity.

When paint dries on a glass or plastic palette, the best way for removal is to saturate the dried surface with water,

using a very wet sponge or rag. After a period of 3-5 minutes the paint film should be soft enough to be easily scraped or peeled off.

On The Surface:

Sealing canvas and other substrates may be the most dramatic way of increasing the open time of acrylics. As opposed to evaporation, very absorbent surfaces can almost immediately wick the water out of the acrylic and cause skinning. Several years ago an artist called us, complaining that our Heavy Body Acrylic was drying too quickly on her paper. When she first encountered the problem, she decided to slow down the drying by adding more water to the paint. Intuitively, her approach made sense, but when she added water, the paint dried even more quickly. What was happening was that the drying was not controlled by evaporation, but more so by absorption into the substrate (paper), which hadn't been sealed. As she thinned the paint, it had less hold-out, and the water was absorbed more easily into the paper. Had she sealed the surface first with a Polymer Medium or skim coat of Soft Gel Gloss, the substrate would not have absorbed as much water, and drying would have been controlled more by evaporation.

A cool air humidifier may prove useful to increase the localized relative humidity, and thus slow the drying process. Directing the cool moisture flow

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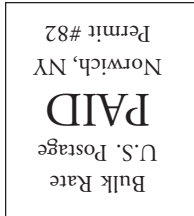
New Color Mixing Guide and Mixing Set for GOLDEN Acrylics

Throughout history painters and authors have recommended various palettes of color. Some give insight of the painter's working style. Others offer a simple palette for mixing but typically limit color possibilities. We have created a palette of eight professional acrylics to provide you the potential to mix the widest range of colors.

For a copy of the Mixing Guide, including a full color, visual mixing reference, phone 1-607-847-6154.

ABSTRACT





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GOLDEN Artist Colors, Inc.

JUST PAINT

Drying Acrylics... *Continued from page 5*

on the painting surface will maximize the effect. A cheaper way to achieve a similar result is to use a plant mister set on a very light spray setting. Spraying across the surface at regular intervals will dramatically lengthen the wet time of the paint

Another technique to retard drying capitalizes on the permeability of acrylic gesso. After allowing the gesso layers to completely dry, attach the canvas to a temporary stretcher. Soak the back of the canvas with water, and/or attach wet rags or sponges to the back of the canvas. You have now created a stay-wet canvas. The dried gesso acts as a semi-permeable membrane, allowing water through to keep the paint moist. This technique will allow you to paint in relatively thin glazes for hours with acrylics, but beware of some limitations. Cotton canvas may shrink, causing the stretcher to warp and necessitating restretching. Also, the water may

wash impurities out of the canvas and into the paint film. In severe cases this causes noticeable discoloration. These problems will be minimized or eliminated by using scoured (washed) cotton canvas. Or use polyester canvas, which is not dimensionally sensitive to water and does not contain the contaminants found in unwashed cotton canvas.

The naturally quick drying time of acrylics can also be of great benefit. Many of the most successful uses of acrylic paint come from people taking advantage of this property, which allows for painting over almost immediately. The unique acrylic glazing techniques, hard-edged applications and quick manipulation of the surface would not be possible without the very rapid drying of acrylic paint. Instead of fighting this characteristic, many artists have developed techniques to take advantage of it.

On Tools:

Tools should be kept wet to keep paint from hardening on them. Avoid storing brushes with the bristles, or hairs pointed up. Even a small amount of acrylic building up over time, working its way into the base of the ferrule, will start to harden the brush. If needed, a small amount of dish detergent added to water will help remove dried paint from tools. For hardened paint, most of the commercially available brush cleaners will work well, as long as the brush hasn't been abused. Pre-conditioning brushes with a small amount of brush conditioner will greatly improve the clean up of your brushes. Keeping your brushes well-conditioned will reduce the amount of acrylic that will stick. Be careful not to overuse conditioner, as it may affect the working properties of the paint.

Keeping Paints Fresh:

To prevent paint from drying out in storage, be sure not to place it near blowers or heaters. All plastic containers are slightly porous and allow a small amount of water vapor to escape. Golden uses a polyethylene plastic that has very low permeability. Some of the clearer plastic containers can lose water up to ten times as fast. It is critical to clean the threads of lids and jars. If paint accumulates on these surfaces the tops will not seal properly and the paints will begin to dry out. Some artists suggest spraying a small amount of water on top of the paint to keep the paint fresh. When spraying, use distilled water to avoid contaminating the paint. Paints will stay quite well in most basements, but should not be frozen. Although most acrylic paints will sustain several freeze-thaw cycles, freezing is not advisable.

Moving and Storage of Paintings:

Finally, the level of drying of the paint needs to be considered when arranging for storage and shipping. Generally, a painting should not be moved or put into any enclosed environment, until thoroughly dry. The preferred conditions for paintings that are in the process of drying, is to have ample air flow over the front and back of the paintings, while avoiding extremes in temperature or humidity. When shipping artwork, it is important **not** to let anything other than air touch the paint surface. This is very important for newly completed works. Bubble wrap, paper and glassine are the worst offenders, often sticking to the acrylic surface. Even polyethylene sheeting may cause ferrotyping (transferring a texture to the paint surface) of the film.

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