

# JUST PAINT

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*You would have thought that by now we would have figured out how acrylic paint dries. We've taken several stabs at this in our Just Paint #6 and in a paper for the American Institute for Conservation symposium in 2002. Yet we continue to get the pretty obvious question, "So how long will it take for my paint to dry?" As you know, the answer we've committed to is... "It depends". Both Michael Townsend in his article, "Investigating the Drying Process of Acrylic Color and Gel Medium," and Ulysses Jackson in his piece titled "Understanding and Controlling Acrylic Drying Time" give a more articulate answer to this vexing issue for acrylic painters. (For those who skip to the end of a story, the answer is still "It depends, but you knew that!")*

*In "The Color Graveyard," Dana Rice shares reasons why we lose colors and either wind up finding replacements for them or continue to pout with the rest of you when we're not successful.*

*If you haven't heard of our new tool for color mixing, the GOLDEN Virtual Paint Mixer, you're in for a treat! This is a breakthrough application from our IT Magician, Jeff Jones, in collaboration with Creative Director, Chris Farrell. Chris, in "GOLDEN Virtual Paint Mixer: Odyssey of Perspectives," walks you through our journey into color space. You will have to try it.*

*We've included the announcement of our new show by Knox Martin, "SHE," showing at The SAGG from Oct. 6th - Apr. 6, 2013. We're thrilled to have this powerful artist's work here.*

*We are pleased to have Jodi O'Dell share the exciting news about our BCA 10 Award from Americans for the Arts.*

*Finally, the Golden Foundation Artist Residence Program is a reality. It couldn't be more exciting to see this dream come true as the walls begin to fill up with paint.*

*Mark Golden*



**Figure 1** - Close-up image of acrylic gel during drying.

## Investigating the Drying Process of Acrylic Color and Gel Medium

*By Michael Townsend*

### Drying Rates of Acrylic Polymer Dispersion

On most containers of commercial paints, primers and coatings, it is common for the label to provide a specific timeframe for the product to be dry. "Dries in 2-4 hours under ideal conditions." "Dries to the touch in 30-60 minutes." "Allow to dry 4 hours before re-coating." So why then doesn't Golden Artist Colors list such information on most of its products? The answer is simple; our products are used in many different ways, on many different surfaces, and in a myriad of environmental settings. Therefore it is extremely difficult to offer a "guesstimate" without knowing more details about the application and taking into account the different needs at each stage of an artwork. Is this the priming layer before working in oils? Does the work need to be on a delivery truck in the morning? Are you going to heavily saturate the surface with washy layers of acrylics?

Is this an exterior mural in Louisiana? This complexity causes us to pause whenever asked the question, "how long will it take to dry?"

While it is impossible to account for every aspect and provide absolute drying times, in this article we describe some of the factors surrounding the drying process, reveal recent test results and discuss how all this can impact a real world situation.

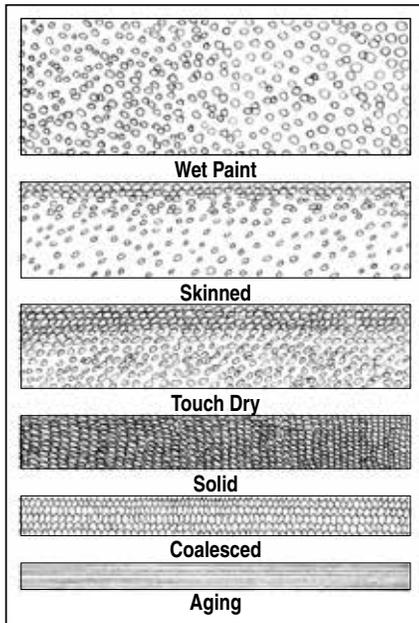
### Drying Stages of Acrylic Polymer Dispersion

At the simplest and most schematic level, acrylics dry by evaporation of water and other "volatiles" from the paint film. As these leave, the acrylic solids move closer together until they come into contact with one another and form a film. These eventually compact together with enough force to squeeze out water and additives until it reaches coalescence. The cured film is now quite stable and doesn't adversely react to moisture or subsequent paint layers.

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In thinner applications and under ideal drying conditions, acrylics will appear to be dry within minutes or hours. Conversely, it is not uncommon for thickly applied paint films to take weeks or months to reach the same state. Although all acrylic paint films dry via the same mechanisms – water and co-solvents leaving – there are many factors at play during the process affecting the outcome, particularly the rate of drying. In fact, thick paint films may have several zones at different stages of drying, each with a varying degree of volatile content.

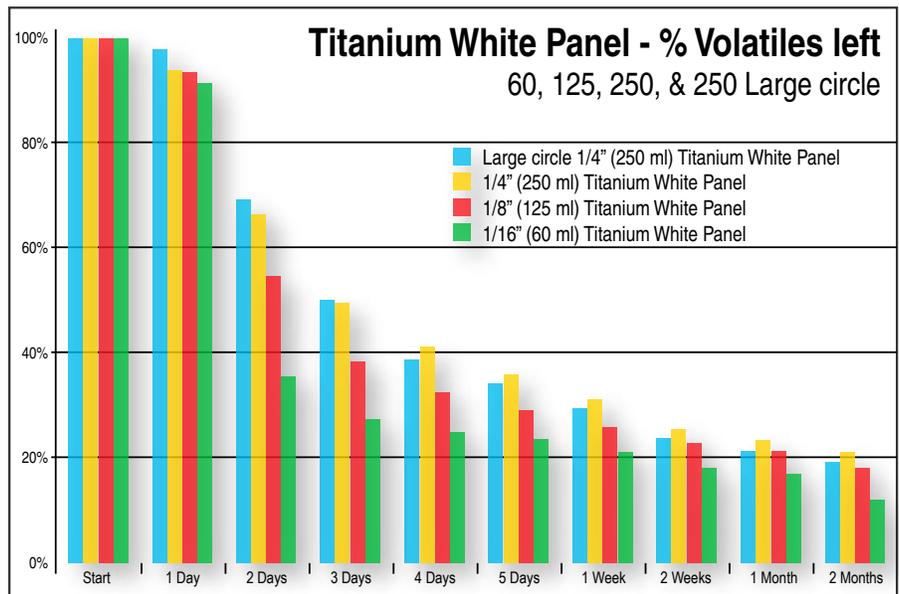
While over the years this process has been rather loosely defined, and some terms will mean different things to different people, the following is an attempt to represent the basic stages of the process (Figure 2).



**Figure 2** - Stages of acrylic drying from wet paint to aged film.

**Wet Paint** – The product from the container remains so until it is applied to the palette or canvas. The paint still has its starting level of volatiles (water and co-solvents) that begin evacuating the film as it is applied to the substrate. Wet paint is still movable and can be manipulated easily by brush or knife, but it is becoming noticeably stiffer. The polymer particles are drawn closer together and when the paint is no longer uniformly workable, the wet paint stage is over.

**Skinned Over** – As the volatiles



**Figure 3** - Loss of volatiles in Heavy Body Titanium White at various thicknesses over two months.

quickly begin leaving the paint film, the acrylic solids move closer together. Depending on the paint film thickness, the paint may go through several stages in very rapid succession. This particular one describes the moment when you can lightly touch the paint surface and enough of a skin has developed to where product doesn't lift up when it is touched. As a paint film becomes skinned over, the permanent film structure has started. **Touch Dry** – The touch dry stage is very closely related to the skinned over stage. A thin layer may move from wet paint, to skinned-over, to touch-dry within seconds! However, in the thicker films, there is usually a substantial enough skin to withstand some touching without it wrinkling or tearing. The skin grows continually as the volatiles escape, but there still remains a significant amount of additives underneath, especially on non absorbent substrates.

**Dry to Handle/Solid State** – At some point the paint film ceases to have any overly wet areas and the rate of weight loss slows down significantly. While artists may believe this is when their paint film is "dry", it is not. Plenty of additives still need to come out. This would be a bad time to try and pack up or roll the painting for transportation, as the acrylics are very fragile at this stage. Since the films are only partially cured, adhesion and film integrity are not yet fully developed.

**Cured/Coalesced** – During the drying

process the acrylic solids have moved into a closely packed arrangement (like some free-form Tetris® game), causing the majority of volatiles to be pushed out in the process. In addition, the presence of film formation additives has softened these acrylic solids to allow them to deform around one another and eliminate any air gaps between the particles. The gaps between the solids once occupied with water and other volatiles are now eliminated, allowing for a hexagonal, honeycomb-like polymer network to form. This process is known as coalescence. It is only after sufficient coalescence has occurred that the paint film is stable, and the final physical and chemical properties develop.

One would assume that coalescence is the final stage of an acrylic paint film process. While this is largely true, acrylic films must incorporate a certain degree of hydrophilic, or water loving, additives in order to be compatible with water. This means they will inevitably hold onto some water even after they are seemingly dry. In addition, a level of incomplete coalescence causes acrylic films to be somewhat porous, leaving channels that run along the walls of the hexagonally deformed particles. These pores are then passageways for water to move in and out of the film.

Some evidence of this is seen in the graph (Figure 3), where it is apparent that there remains a relatively significant amount of volatiles in the

film, even after an extended period of time. It is surprising how much film integrity has been achieved, when in fact, there is still 5-20% of the original level of volatiles still remaining. Acrylic films will continue to lose weight as well as gain weight, depending on the atmosphere they are in. Higher temperatures and increased air flow tend to drive off the moisture, while higher relative humidity encourages the film to hold onto moisture. This process will continue as the paint reacts with the environment, re-equilibrating to the moisture levels of the atmosphere. The process is quite slow to develop – especially in an ever-shifting climate such as New York – taking many more months to reach a point of stable equilibrium. As with any porous material, there will be a level of moisture that may never leave unless the humidity level is lowered long enough to draw the moisture out.

### Setting up the Test

In order to learn more about the timing of the drying process of acrylics, a series of test parameters were defined to look at some manageable and influential drying factors, and identify them with key stages of drying. We realized that we could not test every factor. Since the testing was all done at the same time, we were able to rule out differences in temperature and humidity. Environmental factors are important, but would be impractical to try and control during this round of testing. Whatever the ambient conditions were, they were recorded. Air flow was limited to normal room traffic.

A minimum of three test samples were always created, and substrates that were inert to moisture retention (aluminum, Lexan®, and polyester canvas) were chosen. One problem realized early on in the testing was that the most common artist supports are absorbent enough themselves to allow humidity to alter the substrate weight during testing. Cotton canvas absorbs and retains water. So does hardboard and paper. Within the chosen substrates, polyester canvas offered a more breathable surface, while the acrylic sheeting and aluminum panels offered more sealed surfaces. The goal was to see if sealed versus breathable



**Figure 4** - Toothpick comb used to manipulate hours-old gel cast at 1/4" on acrylic sheeting.

surfaces would alter the drying process.

The actual batch information of both the Regular Gel (Gloss) and Heavy Body Titanium White selected for this test were recorded and used to calculate the actual solids levels which are critical for comparing the loss of volatiles during drying.

There were two rounds of testing conducted. One set started over a year ago, and a second series was observed for a 60 day cycle.

### Film Thicknesses

Our Acrylic Dry Time Testing included a series of standard paint film thicknesses. We used the tools to decide the range of thickness and provide a realistic set of uniformly cast films. We chose 10 mil (about the thickness of a generously brushed application), 62.5 mil (1/16"), 125 mil (1/8"), and 250 mil (1/4") for this test.

### Methods to Assess Drying Rates

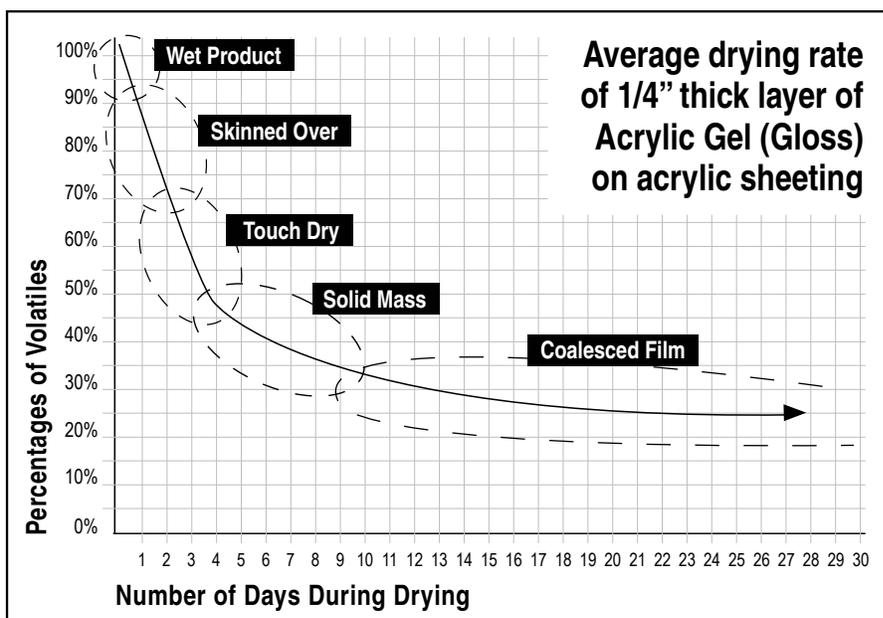
1. Physically manipulate the paint layer during drying to note key

stages. This is the most accessible way for artists to measure drying as well (Figure 4). Touching a paint film is the best way to determine how dry it is.

2. Visually inspect the layer for signs of skinning and clearing up. The surface shrinks and changes as it dries. Gels start milky white and then become translucent and hazy on their way towards clarity. Optical changes indicate crucial points in the drying cycle.
3. Weighing the test panel. Most artists are not able to weigh their artwork during the painting process. Even if they did, the information doesn't really mean too much unless you also know the actual solids level. By comparing the weight loss to the physical and visual results, an accurate picture of the drying process is revealed.

### Test Results

As one can imagine, this kind of testing creates massive spreadsheets full of data. Each test is looked at individually and then compared with the others. One of the most important parts of the testing was to try and define the level of volatiles in relation to the degree of dryness of the paint films at each interval. We created a graph to help visualize this (Figure 5). This range is based upon comparing sample weight loss to physical and



**Figure 5** - Comparing the volatile loss to physical and visual stages of the drying process.

visual changes, and in reality most stages happen so rapidly that one stage blurs into the next. Thicker films give us a better understanding of this relationship, but these key points in the drying cycle are important to establish for the results to follow.

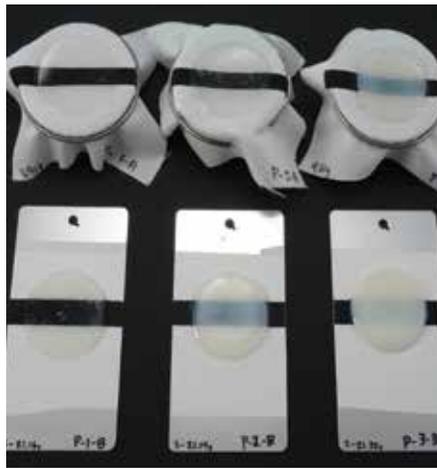
### Rapid Drying Early

Across the board, with each test panel, most of the volatile loss happens early on in the drying cycle. The loss of water and co-solvents is facilitated by the lack of a paint skin, or at least not a very substantial one. One can see this rapid loss by looking at the graphs in Figure 5. What was interesting was seeing each film creating the same drying curve line as we plotted the weight loss. We noted thin paint films take about 3 days to reach a solid state. This doesn't mean you can't continue to apply paint or mediums, but rather a general time frame to wait before doing anything extreme, such as stretching the painting, or varnishing.

### Substrate Influences Drying Rates

The impact of substrate on drying time was shown to be significant. The same product applied at the same thickness dries noticeably faster on a breathable substrate like canvas, which promotes two-way drying, when compared to a non-absorbent panel. Early on, the weight loss was similar, but as paint films began to develop a thicker skin on the surface, a pattern emerged showing the difference.

The testing shows that a more breathable substrate allows for two-way drying. The non-absorbent aluminum cards in almost every case showed significantly slower weight loss and slower clearing of the gels (Figure 6).



**Figure 7** - Regular Gel (Gloss) on polyester canvas and aluminum panels at 1/16", 1/8" and 1/4" thicknesses (left to right respectively).

### Film Thickness

Film thickness has always been recognized as a key factor in the drying rate of acrylics. 10 mil films of gels and Heavy Body Acrylics become touch dry in minutes. The paint film dries uniformly and follows the standard paint drying process. But when thicker layers are applied, the key difference is the development of a paint skin that becomes more substantial during drying until the entire paint film coalesces (Figure 7). This paint skin dramatically impedes the movement of volatiles out of the film.

We verify this by how quickly the Regular Gel (Gloss) is able to clear up, and there is direct evidence to support this by comparing it to the rate of weight loss. We further were able to confirm this against the physical manipulation data. In every case, thinner films dry faster than a thicker counterpart regardless of product or substrate.

### Product Differences

Due to the large scope of this testing, the number of products tested was limited. Heavy Body Titanium White and Regular Gel (Gloss) provided a reasonable range of product differences. We do recognize various kinds of pigments, paint formulations and other products are going to behave differently than these two products. Aside from the acrylic polymer solids, products may contain a large range of additional solids, including many kinds of pigments, fillers, grits and matting agents, whereas gels tend to only have the acrylic binder as the solids unless it contains matting solids.

When comparing Titanium White to Regular Gel, there were not many differences between them early on, across the various thicknesses and substrates. The Titanium White does seem to take an early lead regarding weight loss, and it maintained this edge for the 60 day testing cycle. In several test groups the final level of volatiles left in the film was between 7 and 15% (Figure 8).

### Manipulation Results

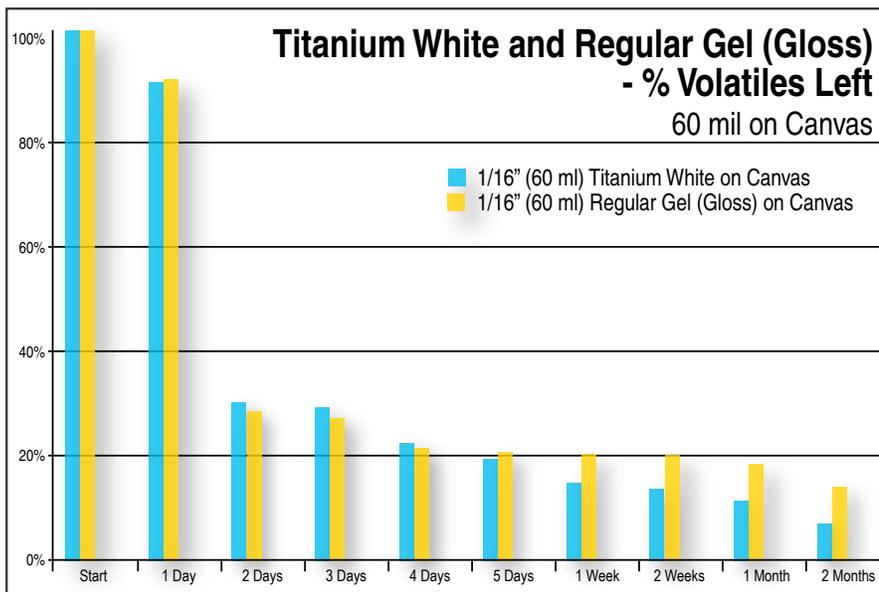
We manipulated (with toothpicks and later pencils) the surface of both the gel and white paint for several days until there wasn't a discernible difference in how the acrylic responded to being prodded (Figure 4). We found that thinner films dried so quickly it was hard to measure the various changes that occurred, so the thicker 1/4" applications provided the most recordable data.

Products became noticeably thicker and began to skin over during the first day of testing. In general, acrylic layers begin changing very quickly during their first day of drying. Within several hours, a "crust" developed on the Titanium White similar to the crust on Brie (soft, aged cheese), whereas the gel skin was more rubbery, pulling and stretching when probed.

By the second day, there was a point where it was difficult to use toothpicks anymore. The skins were thick and unyielding, making it necessary to switch to using pencils to check dryness. Gentle prodding soon gave way to more aggressive poking. By the end of the second week, the films were strong enough to break pencil leads.

Number of Days to Reach the Dry Stage (A 25% Volatiles Level)				
PRODUCT/THICKNESS	ON CANVAS		ON PANEL	
	50% Volatiles	25% Volatiles	50% Volatiles	25% Volatiles
Regular Gel (Gloss) at 1/4"	2	9	3	24
Regular Gel (Gloss) at 1/8"	1	5	2	12
Regular Gel (Gloss) at 1/16"	1	3	1	5
Titanium White at 1/4"	2	8	3	16
Titanium White at 1/8"	1	5	2	9
Titanium White at 1/16"	1	3	1	4

**Figure 6** - Comparing the drying differences of Regular Gel (Gloss) and Titanium White (in days).



**Figure 8** - Comparing the rate of volatile loss of Titanium White to Regular Gel (Gloss).

### Small Versus Large Area Size

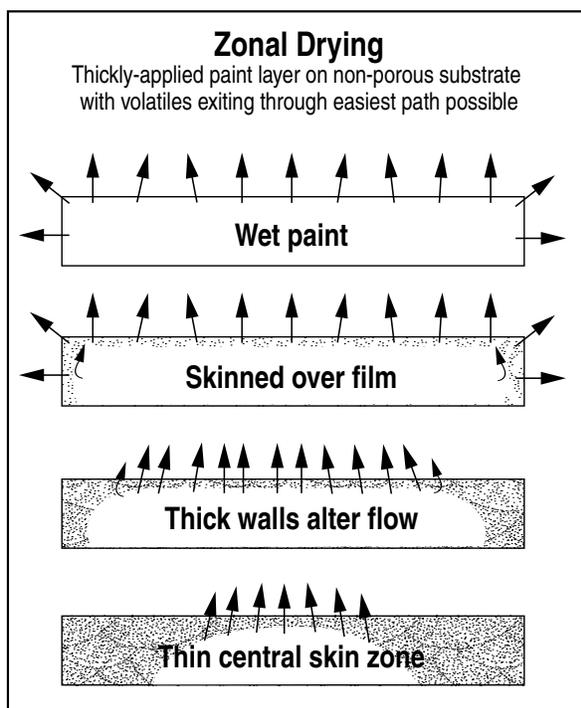
Every so often when doing this kind of research the testing data throws a curve ball. The standard assumption would be that a smaller acrylic paint film will dry faster than a larger one. Right? Not so fast. We compared a 2" circle of product to a 12" circle of product, both on panel. In both the Regular Gel (Gloss) and Heavy Body Titanium White samples, the larger circle lost weight faster than its smaller diameter counterpart. The differences may not be substantial, but there was enough of a difference to make us wonder why this happened.

### Zonal Drying

While more testing needs to be conducted to further understand these results, one theory is that on a large, thick layer of paint or gel, the initial product skins over just like the smaller 2" circle, but the overall thickness of this skin varies from center to edge (Figure 9). It may be that the center area of the paint skin is thinner because of the rush of volatiles to the center during drying caused by the edges drying. The outer edge skins first and is quickly tighter making it more difficult for the water to pass through the film. Water takes the easiest route to escape from a material. In this case, water flows inward towards the center, and results in the water being able to leave the film at a slightly faster rate than a thinner, more uniformly skinned paint layer will allow.

### Summary

Many artists take advantage of the fast drying nature of acrylics. It is one of its most noted features, and although it can be slowed down with the use of retarders, the fast drying allows for a great range of techniques. However, when time is critical, many artists who have not thought about all of the factors early on, will face the issue of having to wait longer than desired before beginning the



**Figure 9** - Zonal Drying Theory: As the edges develop a tighter film, water concentrates inward, keeping the skin thinner at the center of the paint layer.

next phase of their painting process. If one paints thickly, then they must understand the importance of giving that generous layer time to dry. If faster drying is important, then take a good look at what can be changed to improve the drying time.

*To summarize the test results, here are some key thoughts:*

- Thin layers dry faster than thicker layers. It doesn't mean you cannot end up with thick layers, but see if it's possible to apply several thinner coats rather than one heavy layer.
- Breathable fabrics facilitate faster two-way drying. Panels certainly provide great stability, but using them means all of the volatiles can only leave the paint film one way, mostly through a thickening paint skin.
- Product selection may influence drying, but not enough to be overly concerned.
- The size of the painting is not a critical factor.
- Environmental factors are big influencers on drying. Temperature, humidity and air flow can be adjusted to control drying times.

Finally, it is important to note that while we isolated the drying time variables in this testing, in the studio, the artist's ability to control as many as possible should result in faster overall drying times without causing potential issues. Thinly applied paint films on stretched canvas allowed to dry in a warm, dry space with good air flow are going to dry much faster than an impasto painting on panel in the basement. So even when you are in a hurry, take the time to factor as many variables into the drying time equations as possible in order to meet your needs.



## GOLDEN Virtual Paint Mixer: Odyssey of Perspectives

By Christopher Farrell

For *Just Paint* readers with good memories, this article may appear as the third in a series going back to *Just Paint* #21 and Sarah Sands' "Subtleties of Color," followed up by "Running the Color Gamut" in issue 26. While it's not necessary to read either of those articles to appreciate the story behind the GOLDEN Virtual Paint Mixer, one can easily see through these stories and studies, the foundation of what is currently being realized.

That said, it will be very helpful to have experienced the Virtual Paint Mixer [MXR] when reading this article, so we encourage everyone to go to [www.goldenMXR.com](http://www.goldenMXR.com) and play with this new, and we hope very helpful, resource on the Golden Artist Colors' Web site.

For the people close to the development of MXR, the term "odyssey" will appear more of an understatement than hyperbole. The reality of Web content is that it is intangible, so many spectacular things flash before the eyes and as quickly as they become an integral part of this universal consciousness, they evaporate to the dark of yesterday's technology, news and fashion. The properties that endure do so by continually running through the cycle of ideation, development, implementation, and analysis. Wash, rinse, repeat... ad infinitum.

You may interpret this as a preemptive apology or excusing of any flaws or inadequacies of MXR as it

exists at this reading, but this tool will only help artists as long as it remains a work in progress. If you take nothing else away from this story, it must be that this is just the beginning.

But, this question of beginning also has a discrete answer: November 2010.

Roughly two years ago the team at GOLDEN began discussions about the state of the company Web site and our desire to modernize and (most importantly) truly engage artists.

By analyzing the most viewed pages and terms searched within our site, we recognized that color mixing was a powerful concept. It was a very short leap to a discussion of why this was such a focus and how we could help artists master one of the more difficult skills associated with painting, or simply to help people get more out of the paints they buy.

For people just starting painting, and even some with experience, the mixing dynamic is rarely as simple as mixing yellow and blue to get green. Even when that combination works perfectly, the sense of proportion can surprise people. Like how a very tiny dab of Phthalo Blue will transform a mass of yellow into a very deep green.

Only the most patient and intent students will make it through a discussion of "inorganic versus organic" pigments. The misleading sound of those terms and the technical nature of pigment as a component of a paint system, transparency, opacity, and tint strength, all wield great influence over what happens on the palette and envelope the concept of mixing colors in mystery. Yet, few artists have the luxury of buying every color available and even with every color at your disposal, mixing happens.

We needed a tool that would demystify paint mixing. We wanted to flatten the learning curve and inspire people to try new colors with more confidence. What we needed, or so we thought, was a way to mix a lot of paint without wasting a lot of paint. A "virtual" paint mixer seems like such an obvious thing – and we were aware of some attempts at this concept available on the internet.

The main challenge for any virtual paint mixer is capturing the dynamic of actual paint. While it has always been a challenge to represent paint

colors effectively on the Web (see my last article) – this concept has the added challenge of capturing not only how the color appears on its own, but how that color influences other colors in mixtures. This is where the extensive data resource GOLDEN is known for, kicks in. We know our paints inside and out. We've tinted them and extended them and measured them for transparency and opacity, tint strength and even reflective surface qualities.

This new tool needed to account not just for blue and yellow making green, but how much of each would be required to make whatever green an artist wanted. Each color would have to be mapped for a set of qualities that make up their mixing dynamic, and then proportions needed to be calculated and reported. And while we were wrapping our heads around that challenge, we revisited a color matching concept that we had been kicking around for years. This meant the mixing dynamic of paint now had to be reconciled to the way color appears on the computer to reverse engineer a mixture of paint that matches some point on an RGB spectrum or a spot within an image.

Just to be clear, whether this sounds like a large or small programming challenge to the average reader, it is still only part of a larger plan.

Remember that in 2009 GOLDEN had gone through the methodical exercise of running out the entire Heavy Body color line in five tints and four glazes. All that data would seem to be a logical starting point for a virtual paint mixer. We even had academics outside of GOLDEN inquiring about using that data for their own projects. It never seemed as if it would be simple, but it seemed very do-able. Our first pass at the mixer was little more than an interactive navigation of the colors on the Tint & Glaze poster. This was obviously not a mixer, but it made the discussion of how we could or should interact with color online more productive.

Navigation was the first gate to build and get through. We looked at a large number of color navigation systems online and liked them. Many were fascinating, mesmerizing, and just plain cool. But they had limitations, mostly due to the fact that they were

theoretical. While it seemed intuitive to navigate color in a three dimensional space (and I mean “space” as they frequently had a NASA-like quality), this only works for the perception of color, or light, and misses the tangible universe of paint and all its physical qualities. Even when replicating the subtractive dynamic of color mixing with these theories, we could not find any that accounted for all the other qualities of paint: tint strength, opacity, luminosity.

Ironically, the solution would have to be far simpler than the theoretical examples we studied. We were driving toward a far more complicated result, but we needed a much more simple and intuitive path to that result. We decided to forego theory and just paint. Look at how artists find paint (not color) and interact with our product. Color charts and tubes of paint were seen as practically ubiquitous concepts among artists and became the basis for our interface.

What you’ll find in the mixer are paint tubes and a big swatch, rather than orbs in a galaxy of color. And the palette itself is adjustable, limiting the mixtures to the lines of products you work with, or even the handful of colors in one of our mixing sets. And, soon, just the colors you specify in your personal palette.

Okay, stop right here. We asked you at the beginning of the article to go to [www.goldenMXR.com](http://www.goldenMXR.com) to check out the MXR and experiment with it before delving too deep into the article. You didn’t do that, did you? Just take a few minutes to check it out. You’ll be glad you did – honest! The rest of the article will make more sense if you do. That is, if you ever get back to reading the rest of the article.

Tap a color, then a tube, slide the cap left and right to adjust the amount of each color in the mixture, and the big swatch will show you the color you’ve mixed, along with five tints for that color. You can click on the numeric tab and see what the color would translate to in RGB, L\*a\*b, and CMYK, or reverse engineer a mixture from one of those formulas.

If your starting point is an image, sketch, photo, or other reference, you can upload that to the mixer and sample colors for mixing. Again, the

palette limitations allow you to identify mixtures from the colors you choose. You can get the best two-color or single color match (though it may take a while).

Even though the mixing concept was fully formed and the programming initiated, the range of capabilities would change and evolve on a practically constant basis through the fall of 2011.

More basic deliberations included the number of colors available for mixing, possibly allowing users to mix four, five or six colors. Again, the complexity of the calculations and resulting mixtures seemed to diminish the benefit of such features, so we limited the mixing capability to three colors and opted to show the resulting tints next to the primary result. This also helped move the “image” tool along, as some technical parameters are needed for people wanting to quickly match colors in an image. Limiting the mixtures to three colors is more practical for someone building a palette for a project.

Another vital dimension of this project is its social and commercial nature. Among the objectives for the GOLDEN Web site is that of fostering community. We wanted artists to have

the opportunity to collaborate over the tool and share mixtures with colleagues or with their local art materials retailer. “The Report” users get when they share or print a mixture includes all the colors and percentages mixed, as well as the item numbers corresponding to that color in each of GOLDEN’s three main color lines. The ‘save’ feature captures not only the primary mixture, but all the saved mixes below to bookmarked links users can return to from their browser.

We have had the opportunity to show our GOLDEN Virtual Paint Mixer to our retail partners and many have requested the ability to put it on their Web sites. So expect to see this tool as a resource in quite a few locations.

As of this writing, we’ve collected hundreds of user surveys to help focus our efforts on refinements for the official launch version you can experience today. The Virtual Paint Mixer brings some things into critical focus for GOLDEN: change is constant; we’ll probably never stop refining this tool, just as we’ll never stop developing new tools to help artists realize their vision and get the most from their materials.

Start with the picker, mixer, and numeric colors, then adjust the mixture by sliding the caps on the paint tubes. For help with the virtual paint mixer, click here for an instructive overlay.

Change the mix by sliding cap or click left or right of cap. Tap color, then tube to change paint.

10:1  
0:1  
1:1  
1:3  
1:10

Naphthol Red Light  
64% ✖ Clean

Cobalt Titanate Green  
17% ✖ Clean

Transparent Yellow Iron Oxide  
20% ✖ Clean ✖ Clear all tubes.

Click here to try mixing from fewer colors.

Print, share or save this mixture

Save this color

Click or tap color to restore. Click on trash to delete.

[www.goldenMXR.com](http://www.goldenMXR.com)

# Understanding and Controlling Acrylic Drying Time

By Ulysses Jackson

Acrylics are mostly known for their ability to dry quickly, allowing artists to layer and over paint in rapid succession. Some artists even love to use fans or hairdryers to speed it along; however, there are many times when an effect is desired for which, frankly, acrylics dry too fast. This article hopes to explain both: how to control the drying rate of acrylics by discussing additives, studio conditions, and substrate; as well as describing the mechanisms of initial drying and how prolonged paint cure times may affect the properties of a dry paint film.

One area of initial control available to the artist is the layer immediately below where they will be painting. Substrates and absorbent layers (even previously painted layers with more porous pigment such as earth colors) tend to wick water away from the paint much faster than glossy/sealed layers. This causes paint, especially if in thin layers, to cure much faster as volatile components escape into the substrate as well as the atmosphere.

This image of Titan Buff next to Transparent Red Iron Oxide (right) is drawn out at a thickness of 3 mil (.003") and shows very clearly how the substrate affects dry time. The first zone of uncoated hot pressed watercolor paper wicks away moisture so fast that the artist realistically has 1 minute of working time and everything is pretty locked down after 3 minutes. Next, we created a second zone by simply coating the paper with a layer of GOLDEN White Gesso. Even though Gesso is designed to be absorbent, it is dramatically more sealed than the paper and offers just less than 5 minutes of working time and is very locked down after 10 minutes. Finally, we coated the Gesso with an additional layer of gloss acrylic. In this case we used GAC 100, but any gloss gel or medium will work similarly. As you can see, having a sealed surface offers an impressive 15 to 20 minutes of

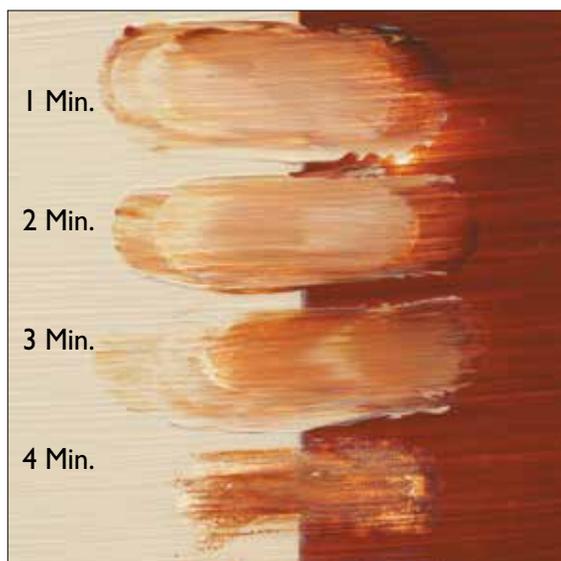
active working time at 70°F 50% Relative Humidity!

Often times, simply sealing sub-layers of a painting will provide greater blending time. Yet the look of a sealed layer may not be acceptable for ones style or it simply does not supply enough open time to complete a concept. If either of these conditions apply, it may be necessary to control the climate in which the painting is being created. Studio climate has a very dramatic effect on the curing rates of acrylic. By making small adjustments in temperature and humidity, surprising results can occur.

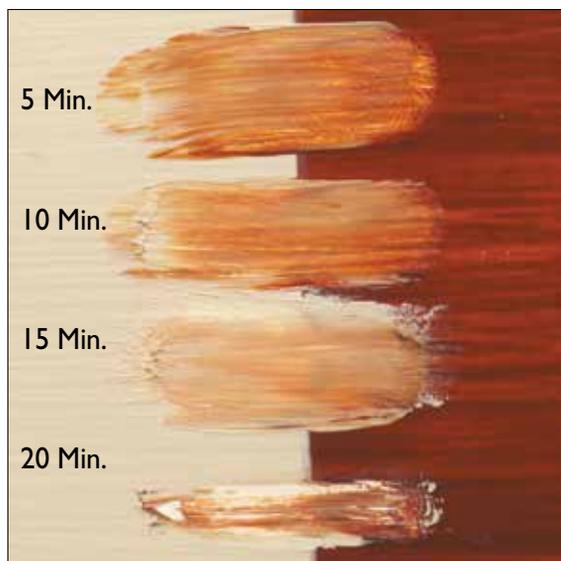
I once worked in a studio that was also a greenhouse in North Carolina in the summer months. It was a lovely space and I was very happy to have access to it at that time in order to work on larger paintings. However, as one could imagine, it was steamy in there with relative humidity probably near 100%. During the day the temperature was simply unbearable, so I would sleep odd hours and begin my studio practice around midnight. One "early morning" I wanted to paint a very soft gradient over the surface of a 4' x 6' gessoed canvas. Fearing that it would dry too fast, I first painted a layer of Acrylic Glazing Liquid (Gloss) over the surface and then began working into it with GOLDEN Heavy Body Acrylic colors. I painted comfortably for an hour



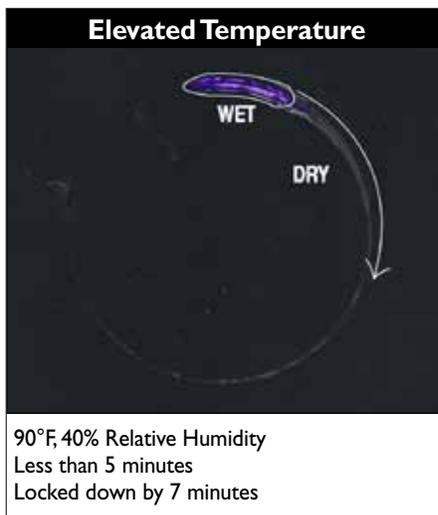
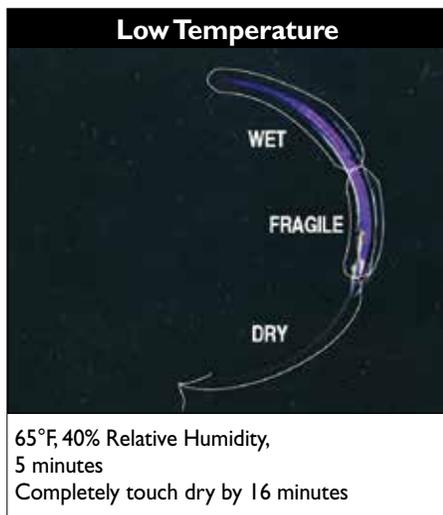
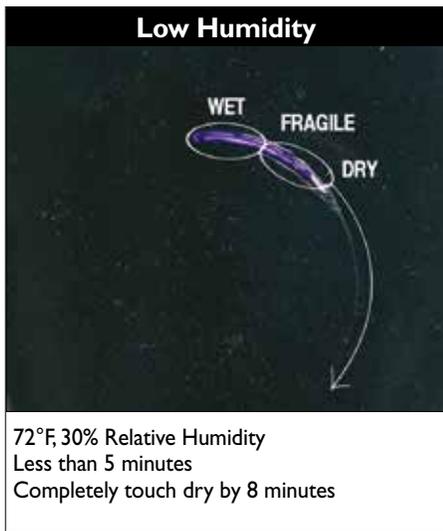
Uncoated Watercolor Paper



Watercolor Paper w/1 Coat Gesso



Watercolor Paper w/1 Coat Gesso and GAC 100



or so before I had to run off for an appointment. Upset, I ventured out of the studio and nervously satisfied my obligation; the entire time visualizing this huge background locked down and unsalvageable. After about two hours I returned to the sauna-like studio, to find to my surprise, that the paint was still perfectly wet. I finished the background and then continued to check the painting for drying for the next three days! Wanting to continue with my next layers, I lugged the wet painting into a low humidity environment and, due to air conditioning which kept the room low in humidity, it cured touch dry in just a few minutes. This demonstrates very clearly the effect of environmental factors on curing. Fortunately, working in a greenhouse is not the only way to have a high humidity environment.

Above are images of Heavy Body Dioxazine Purple tested at a thickness of 10 mil for drying time in various

climate conditions generated using the GOLDEN Laboratory environmental chamber and a 1 hour circle dry time recorder. In the first series we have maintained a comfortable room temperature and ramped up the humidity level. This simple test demonstrates the dramatic effect of humidity on cure time.

You can see from the results that humidity has a much greater effect on drying time than does temperature. So why does humidity affect the drying rate of water-based paints? This simply works because having a high humidity environment limits the evaporation of water by reducing differences between the amount of water in the paint and the amount of water in the air. Much like any difference in concentration, the laws of osmosis prevail. Probably the easiest way to raise the humidity in an environment, thus saturating the space, is to mist water into the air with a spray bottle or plant mister just before one begins to paint. Then

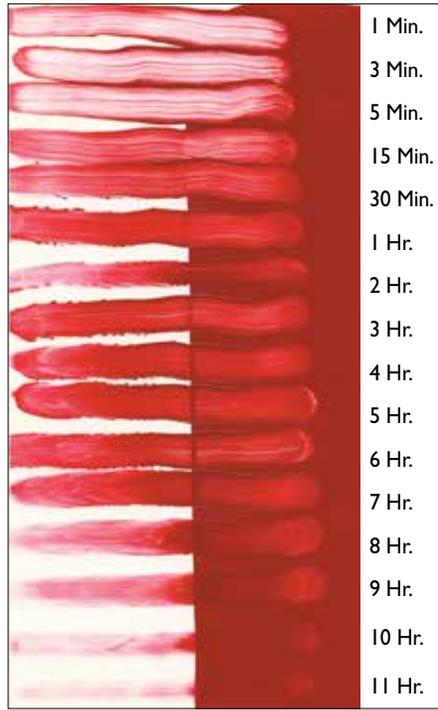
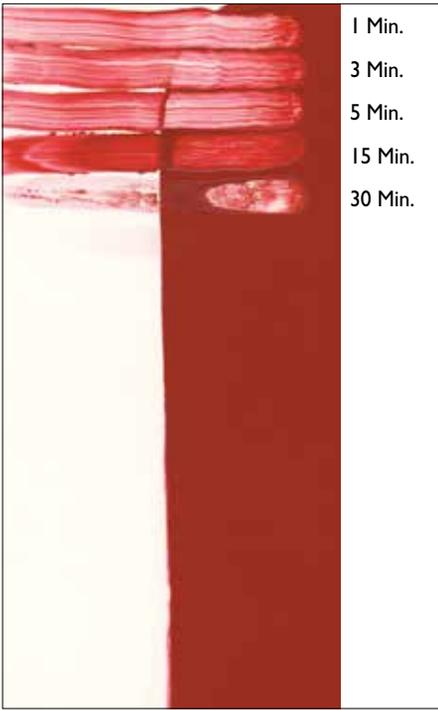
depending on how low the humidity is in ones studio, continued misting may be needed periodically during a painting session.

Additionally, some artists like to mist their paintings directly during certain steps in painting, which is perfectly fine, but realize that unwanted droplets on wet areas of a painting will alter the surface unless blended in / brushed over. This can create a great effect if you want it, but can also be potentially frustrating if it's not desired.

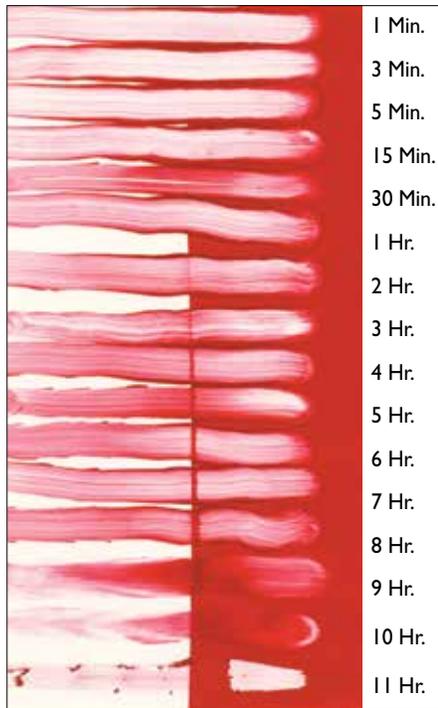
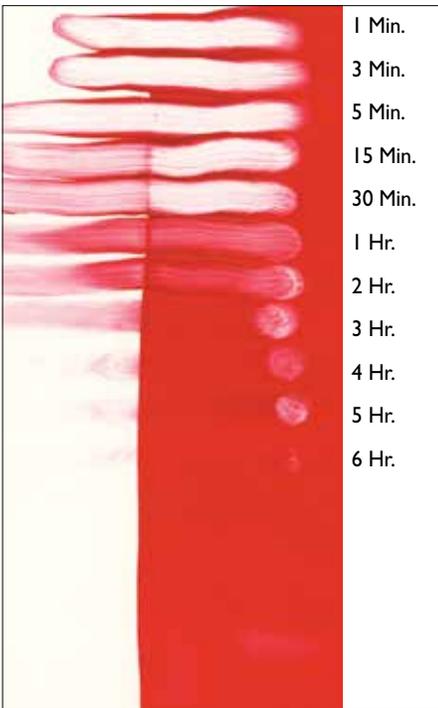
Another easy way to control the humidity in an environment is to purchase a cool air humidifier to actively saturate the studio air with moisture. Simply turn it on prior to painting and off when faster drying is desired. Some may find that this is a more extreme method with some initial associated cost, but it can be really helpful in dryer areas of the country during seasons where houses are naturally dry due to other climate conditions, or for the artist who wants the maximum working time possible.

Temperature can affect the rate of moisture loss in paint, but its effect is less dramatic. It may be common sense that cooler temperatures create an environment that slows paints curing; the reason for this can simply be explained in that the molecules in the air and the molecules in the paint are moving at a slower rate at lower temperatures so there are fewer collisions of air and water to pull moisture away from the surface. That said, there is a limit to how cold one can paint with acrylics and still achieve a stable paint film, so keep rooms above 49°F / 9°C (at least) and more realistically, in the 60°F or above range.

Using this same analogy from above, limiting air movement on the surface of the painting also reduces the molecular interactions. Turning fans away from painting surfaces or paying attention to air conditioning vents in the studio will give the artist more control of their studio. While it may not be for every artist, purchasing a temperature and humidity gauge is a great way to begin understanding the range of climate conditions in ones studio, and it also allows for better control of storage conditions



Left: 6 mil GOLDEN Heavy Body Naphthol Red Medium 75°F, 50% RH  
 Right: 6 mil OPEN Naphthol Red Medium 75°F, 50% RH



Left: 6 mil GOLDEN Heavy Body Naphthol Red Medium and AGL (Gloss), 10:1, 75°F, 50% RH  
 Right: 6 mil OPEN Naphthol Red Medium and OPEN Medium (Gloss), 5:1, 75°F, 50% RH

for finished paintings. These can be found for a very reasonable price and many types log information on the maximum and minimum ranges.

Besides controlling environmental factors, the paint itself can be adjusted to allow for a more relaxed working experience. GOLDEN OPEN Acrylics were created with this need in mind. For the artist who wants to always work with a slower drying product,

OPEN allows for an optimized relationship of thickness, pigment load and open time. The OPEN Acrylics product line is great for its ready-made convenience, wide color selection, and slow drying nature right out of the tube. Above are images of OPEN Naphthol Red Medium next to Heavy Body paint modified with various mediums and additives to offer increased working time. Notice how

much open time the OPEN Acrylic offers and the difference in color richness and thickness exhibited in the swiped area for the other trials.

These recommendations are for painting on a standard substrate. If working on either a very sealed nonabsorbent surface such as acrylic sheeting, or a very absorbent surface such as watercolor paper, the above guidelines may not apply. Also, when talking about humectants it should be noted that not all are created equal. Some artists have used compounds like glycerin or honey in their paints. This is a bad idea, as neither is volatile and a final non-drying substance similar to fly paper will be created.

Acrylic Glazing Liquid or OPEN Medium are great choices for an “add as much as you want” system because their binder content is carefully controlled to offer significant working time while drying to an acceptable film if used as is, direct from the container. The same binder in these products that allows for a full proof working experience will also increase the transparency of paints; making these mediums useful in creating both slower curing paint as well as slow drying transparent glazes.

Depending on how an artist maintains their palette or what they are trying to achieve utilizing a specific technique, a thin glaze may not be desirable. To maintain a thicker consistency of paint, but gain slower drying qualities, Silkscreen Medium and OPEN Gel are viable options as they are formulated to have a viscosity similar to Soft Gel (Gloss). These products, much like OPEN Medium and Acrylic Glazing Liquid, can be added at any ratio



5:1 color to OPEN Medium over Heavy Body Hansa Yellow Light on white card



Heavy Body Phthalo Blue (Red Shade)  
50 mil drawdown showing water sensitivity  
after 1 week cure at 75°F, 40% Relative Humidity



Heavy Body Phthalo Blue (Red Shade)  
mixed 8:1 with Retarder  
50 mil drawdown showing water sensitivity after  
1 week cure at 75°F, 40% Relative Humidity



Heavy Body Phthalo Blue (Red Shade)  
mixed 1:1 with Retarder  
50 mil drawdown showing water sensitivity after  
1 week cure at 75°F, 40% Relative Humidity

to paint mixtures without causing issues with drying as long as they are applied moderately thin. This allows for retention of some bristle marks and resistance to sagging on vertical applications. Very thick films may show excessive shrinking upon curing and prolong sensitivity to water or color lifting when over painting. Because of this, it is recommended to keep applications using large amounts of either Silkscreen Medium or OPEN Gel to less than 60 mil, or about the thickness of a penny.

OPEN Thinner was designed originally to replenish the volatile components of OPEN Acrylics. In essence, to keep the OPEN Acrylics hydrated as they sat on the palette. However, this product is also a very useful tool for reducing brush drag. Often regardless of the system of paint you are using, whether it is a slow drying product or conventional acrylic, when blending a passage one may find that there is a certain point in which the curing acrylic wants to ball up versus flow. In these initial stages of coalescence, adding a replenishing dip

of OPEN Thinner to ones brush really relaxes the paint back to a workable consistency while providing surface slip for the brush to glide on. The balance of humectant, amine, and water in the OPEN Thinner readily go into the surface layer without overly thinning or pulling off the area you are working on.

Hopefully these recommendations offer a better understanding of the mechanisms of drying as well as some possibilities for controlling certain attributes of paint to better serve

ones needs. It is recommended to experiment with some or all of the suggestions made in this article to gain personal insight and develop new techniques, and of course, if you have any specific project needs or questions, the GOLDEN Technical Support Services team is always happy to assist. You can reach them by email at [techsupport@goldenpaints.com](mailto:techsupport@goldenpaints.com) or you can call toll-free 800-959-6543 or direct at 607-847-6154.



OPEN Acrylics at 60 mil (thickness of a penny)



Left: Heavy Body paint blended until set up. Right: Heavy Body paint blended with OPEN Thinner.



Left: Cobalt Teal, Right: Teal

# What Happened to that Color?!

By Dana Rice

## The Color Graveyard

Graveyards can be fascinating places, full of history, imagination and stories. Places like Saint Louis Cemetery in New Orleans which holds the tomb of Voodoo Queen Marie LaVeau, or Forest Lawn in Los Angeles, with its array of replicated works of art and famous buildings.

Here at GOLDEN, we too have a graveyard of sorts that we refer to as the Color Graveyard. This is where colors, gels and textures go when we have to say good-bye for one reason or another. It's also a metaphorical place where we gather from time to time to reminisce about colors that we've lost and to pass along the oral traditions of our history.

The most recent addition to the Color Graveyard was our beloved Cobalt Teal, a sizzling single pigment color made famous by GOLDEN Certified Working Artist Program

Director Patti Brady, the pigment for which was discontinued by the supplier. While there are other suppliers that offer a Cobalt Teal pigment, none of the samples we tried could match the clean, crisp color that we were losing.

So, we had a choice to make. Knowing we were going to lose the



Quinacridone / Nickel Azo Gold

color we love, do we go with another single pigment Cobalt Teal that falls short of the original? Or do we let this lovely color go over the bridge and instead create a blended color, working to achieve the Cobalt Teal color space as closely as possible, knowing that it would never be a direct replacement?

In this case, our choice was to go with the blend, in the hopes of being able to find a true Cobalt Teal in the future that will meet our standards and the standards of all the artists who are passionate about this color. In the meantime, the blended color that we chose to call Teal offers a color that is in a similar space, but at a much lower price point, since it is a series 3 compared to the true Cobalt Teal that was a series 7 color.

Speaking of colors that were hard to let go, the original Quinacridone Gold was another color that had an extremely loyal following and one that we were forced to change due to a discontinuation by the manufacturer. GOLDEN was the first to introduce a Quinacridone Gold to the market and it quickly became a signature color for us. Again we were loath to let the color space go entirely, so with the retirement of Quinacridone Gold, we developed a blend called Quin / Nickel Azo Gold. In this case, by comparison to the original, the new color was a bit redder in shade and didn't have quite the same level of translucent glow. This color change happened back in 2004 and while plenty of artists will join us from time to time in the color graveyard with a longing remembrance for the original Quinacridone Gold, a whole contingency of artists have



Permanent Maroon with Soft Gel (Gloss)

come to the GOLDEN brand in the meantime and have fallen in love with the beautiful Quinacridone / Nickel Azo Gold, appreciating this color as it exists today; a great color for glazing or warming things up when used in an underpainting.

If we walk down memory lane even further, there was another color that seemed to have a star-crossed lover's type of relationship with the signature Quinacridone Gold. This color was called Naphthamide Maroon, a deep transparent maroon that did amazing things when paired with Quinacridone Gold. Only long time GOLDEN users would remember this single pigment color, since it was discontinued back in 1997 when again, the pigment became unavailable. For years, this color space remained elusive, and then in 2008 we developed a blend called Permanent Maroon. This smoky, reddish violet color glazes out to a deep dusty rose and dries with a sheen that is between glossy and semi-gloss.

Lest you think we only have fond memories of colors, we occasionally have had to bid farewell to other products as well. One such friend was Garnet Gel, formerly available in three grits: Fine, Coarse and Extra-Coarse. Garnet Gel was made with different grades of garnet sand, an abrasive, hard product that is most commonly used in the sand blasting industry. While garnet sand remains available on the market, in 2006 we began having problems getting a consistent quality of the raw material from our supplier. With a significantly widening variability in color and composition from batch to batch, we made the



Garnet Gels mixed with Heavy Body colors



Clockwise from top left: Crackle Paste, Glass Bead Gel, Fiber Paste and Coarse Molding Paste

tough decision in 2008 to discontinue all grits for Garnet Gel.

While there is no substitute for the Garnet Gel color, at the time this product was discontinued our Technical Support Services team put together some suggestions for alternate ways to achieve the textural qualities, such as using Clear Granular Gel for the Garnet Gel (Coarse) texture and blending Coarse Alumina 1:1 with Regular Gel (Gloss) to achieve the type of grit previously found in the Garnet Gel (Fine).

### The Custom Lab Bridge

While it may not look like it from the outside, the world of artist's grade pigments is a turbulent place where change is one of the few constants, as evidenced in part by the colors to which we have had to say good-bye. It is usually the folks in our Lab that get the bad news about raw material changes or eliminations first, but they are also usually the first to bring us new product ideas. Always on the lookout for new or unique pigments

and materials, the Lab regularly brings in samples of things for us to try, sometimes it's a better version of an existing pigment, but often it is something that is totally new and different. Over the years, this is how many of our gels and pastes have been developed, as well as some of our specialty colors.

To give you a little insight into our process, each summer we make a





Bismuth Vanadate Yellow

very small amount of some new and unique products based on materials our Lab has come across in the last year. We get our Marketing and Tech Support people together, get out the palette knives and brushes and have a bit of a play session. Some products gets oohs and aahs right away, others get the thumbs down, and still others get the “this is kind of interesting, can we make it thicker,” or thinner, or more opaque, or any number of directions that would potentially increase the interest in the material. For the products that pass this first review, we decide which of these we will share with college faculty at an annual conference in February, a venue where we have traditionally sampled some of our experimental products. Write ups on these products are also usually included in the winter issue of *Just Paint*.

But before any of the products actually see the light outside our factory, they must pass a rigorous set of testing protocols to ensure that they will be stable, compatible with our standard products, and pass health and safety requirements. A few years ago we had a beautiful iridescent color that everyone loved, but when we made it and put it through the shelf stability test, we discovered that it would literally explode with time – an interesting effect perhaps, but not good!

Based on the feedback we receive on the experimental products, these



OPEN Titan Green Pale

may or may not proceed further into the New Product Development Process. Some of the recently released Gels and Pastes that started as Experimental Products include, Crackle Paste, Coarse Molding Paste, Fiber Paste and Glass Bead Gel.

### The Artist's Imagination

In addition to the Lab as a source for new products, many of the colors we introduce, as well as some of the textures have started as suggestions from artists. For example, OPEN Titan Green Pale, the newest addition to the OPEN line of colors was based on a request from several artists for a cool color to balance the warmth of Titan Buff. A couple of years ago we introduced Bismuth Vanadate Yellow after hearing from artists that they needed a strong opaque yellow that could also stand up against the elements when used in outdoor murals.

The harsh condition of a central New York winter is usually one of those things that lead us to gathering in small groups from time to time to reminisce and share a story or two about a color that once was. The decision to add a color or texture to the Color Graveyard is never taken lightly and is often initiated by circumstances beyond our control, but we share the stories to remember and we recognize the importance of looking forward to the new possibilities that are bound to come from an artist's request or a discovery in the Lab.

## GOLDEN Receives BCA 10 Award

By Jodi O'Dell

Golden Artist Colors has continually demonstrated its commitment to the arts, the environment, its employees and local community and so you can imagine our excitement when we were recognized as a 2012 BCA 10: Best Companies Supporting the Arts in America honoree by Americans for the Arts. Given annually, the BCA 10 recognizes ten businesses of all sizes for their exceptional involvement with the arts to enrich their workplace, education, and community. Americans for the Arts honored GOLDEN “because of its dedication to fostering creativity in its employees and customers, through the arts.”

Other 2012 BCA 10 honorees setting the standard of excellence and serving as role models are:

- *Alltech, Inc., Kentucky*
- *Bank of America, North Carolina*
- *Chaves Consulting, Inc., Oregon*
- *Chesapeake Energy Corp., Oklahoma*
- *Earl Swensson Associates, Inc., Tenn.*
- *First Community Bank, Texas*
- *Jackson and Company, Texas*
- *Masco Corporation, Michigan*
- *Tampa Bay Times, Florida*

“We were absolutely thrilled when we received the incredible news,” said GOLDEN CEO, Mark Golden. “We are so fortunate to be able to work with the most creative artists in the world. This both inspires and enlivens our entire staff knowing we can make a difference. Giving back is just our way to join in this community that has given us so much.”

“Golden Artist Colors is passionate about the creative class and recognizes that our engagement and support of the arts is essential to the growth and prosperity of each and every community locally and worldwide,” said company President and COO Barbara Schindler.

The award will be presented at a gala in early October at The Central Park Boathouse in New York City.

To read about the company's receipt of the prestigious 2012 BCA 10 Award, go to [http://artsusa.org/news/press/2012/2012\\_06\\_26.asp](http://artsusa.org/news/press/2012/2012_06_26.asp).



"Knox Martin 2012", Photo credit: Ronald Lusk

## Knox Martin at the Sam & Adele Golden Gallery

We are delighted to announce an exhibition of works by Knox Martin, entitled: "SHE" at the Sam & Adele Golden Gallery (SAGG) in New Berlin, NY at the Golden Artist Colors facility. The show will premiere on October 6th, 2012 and run through April 6, 2013.

'SHE' will present over a dozen, recent large scale works by Knox Martin. Knox continues his powerful use of metaphor applied to these paintings of Woman. Knox Martin's work is in the permanent collections of major museums around the world, including the Whitney, MOMA, Albright-Knox, Hirshhorn and the Corcoran.

Throughout his long and prominent career painting and teaching in New York, Knox had many occasions to work with Leonard Bocour and Sam Golden at the Bocour shop. The first time I had the pleasure of working with Knox was when he was restoring his enormous, 12 story exterior mural

"Venus," completed in 1970 on the side of Bayview Correctional Facility at the corner of 19th and the West Side Highway. This mural, as well as his "Woman with Bicycle" painted on the side of a six-story structure on the corner of MacDougal and Houston in Soho, were visual icons of NY and truly an example of the public face of the vitality of the arts in NY. So when Knox asked me if we could provide the paints to keep "Venus" fresh, I thought it would be a wonderfully exciting project for us at Golden Artist Colors. I suggested to Knox that we use the MSA (Mineral Spirit Acrylic) colors to which we would incorporate a system of UV filters and light stabilizers. Knox gave us the list of colors and let us do our work. The mural looked brand new upon completion of the restoration in 1998.

Just a few years later in 2002, we lost Knox's aforementioned mural "Woman with Bicycle" as it was covered over by the ubiquitous Soho underwear ad! And in 2010, with the

construction of a new building right up against his "Venus" mural, we lost most of the view of the painting. In an act of heroic defiance, Knox, at age 87, hired a cherry picker and on a quiet Sunday morning, re-painted his name on the outer portion of the obscured mural.

Knox continues to display Herculean vigor with these new works on display at The SAGG. At the same time, he continues to give back to the artist community with his mentorship of incredibly devoted students. And he continues to champion the value of public art and is not at all finished with defining his place in that arena. Currently, Knox is deeply engaged in the production of a new mural, "The Whaling Wall," a visual story of a cry for peace and humanity. We are thrilled that he will share his work with us here in Central New York at The SAGG.

*Mark Golden, August 2012*



Artist Residents visit with Technical Support

## Golden Foundation Residency Celebrates Its First Year!

By Emma Golden

We are in the midst of an incredibly exciting first year at the Golden Foundation's new Artist Residency Program and are delighted to announce that we've just opened up the invitations for applications for our 2013 expanded season. For the Artists in Residence, this has been a

wonderful time to explore materials in large beautiful studios with a host of technical experts supporting their work. The talented artists were incredibly generous in turn, providing important insights and guidance in ways to continue to grow the program.

It has been a personal thrill for me to join my family in seeing this dream come true as the Residency Program Coordinator (although if truth be known, in this small group, we all wear lots of hats).

People always ask me if I'm an artist when they find out I am in the Golden family. I've never considered myself to be an artist but I've always felt that art is in my blood. The home where I grew up was always filled with art and artists. I can't remember a time when I wasn't happily giving up my bedroom to an artist for the weekend. Having meals together and hearing their excitement of being able to spend some time in the country and getting to work with the amazing team at Golden Artist Colors, made it feel as if these artists were part of our family.

The opening of the newly reconstructed dairy barn down the road from Golden Artist Colors has since replaced my bedroom at home. The Residency Barn holds living and studio space for 3 artists

at a time. For 2012, nine artists were selected for our shortened inaugural year with sessions running from mid-July thru October. Attending the program were artists from California, Pennsylvania and New York and internationally, from Canada and Germany. The Golden Foundation was able to secure at least partial funding for all the Artist Residents this year. We hope to continue this tradition and eventually offer fully funded residencies to all selected artists.

The dates for the 2013 Residency have been set as follows:

Session I: Apr. 21 – May 18

Session II: June 2 – June 29

Session III: July 7 – August 3

Session IV: Aug. 4 – Aug. 31

Session V: Sept. 15 – Oct. 12

Session VI: Oct. 20 – Nov. 16

Please visit [www.goldenfoundation.org](http://www.goldenfoundation.org) for information on how to apply for 2013.

As we complete our last residency session for 2012, the collaboration that has taken place with this year's artists continues to excite me just as it did when I was young. And while visitors may not be staying in my room at home anymore, I am thrilled that there's a place for them to stay, down the road from Golden Artist Colors.

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