ARTIST OIL PAINTS

Prepared for:

Mississippi Oil Painters Association

Prepared by:

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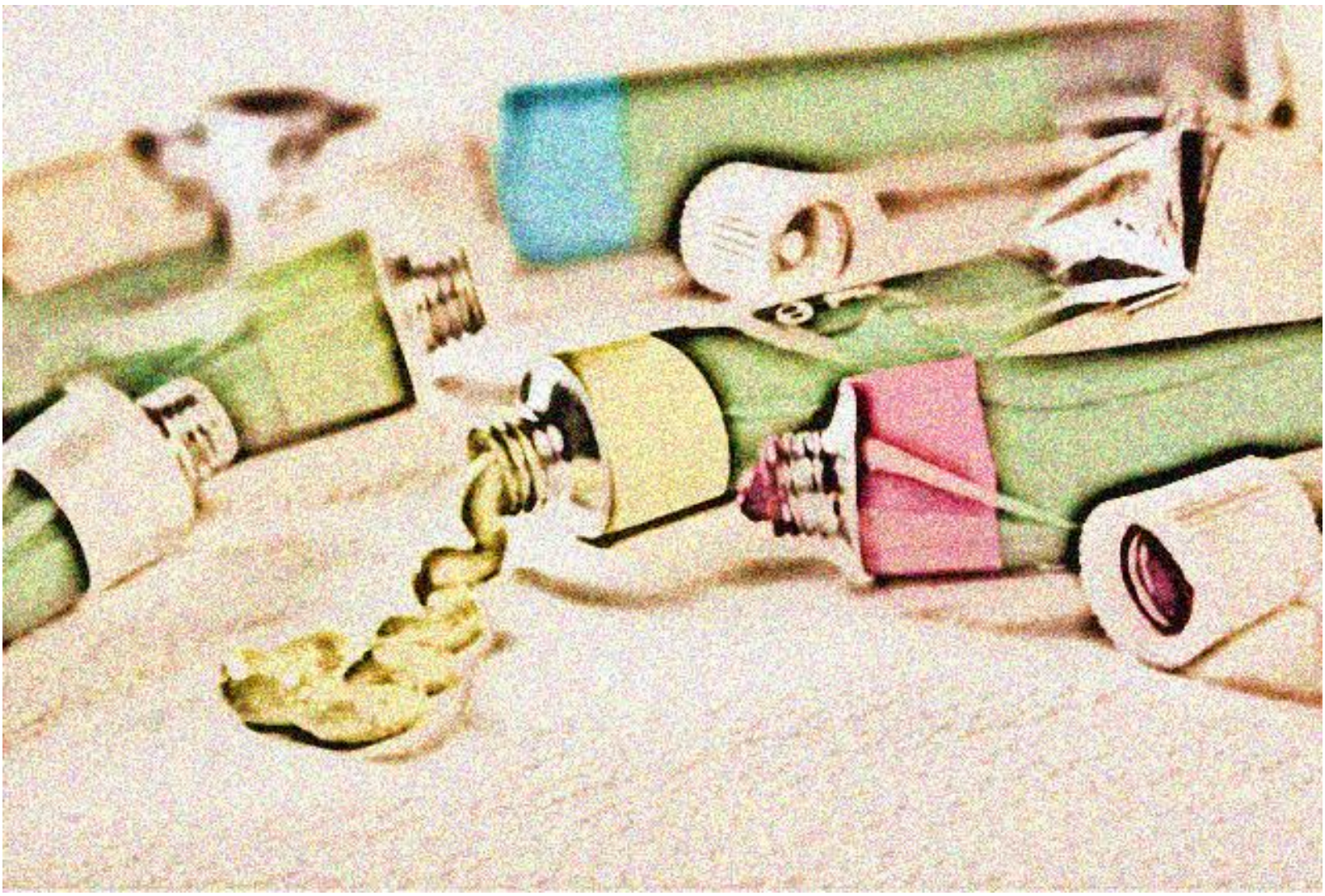

Phanitta Chomsinsap

12712 Larwin Rd.

Norwalk, CA 90650

December 11, 2014

Jason Bouldin, Signature Member

Mississippi Oil Painters Association

3971 Council Circle

Jackson, MS 39206

Dear Jason Bouldin:

I am submitting the report entitled *Artist Oil Paints*.

This report compares three competing oil paint brands: Old Holland, Michael Harding, and M. Graham. The recommendation of the best oil paint is based on these following requirements: color range, lightfastness, binder, drying time, safety, and price.

I hope this report will help you find the greatest quality paint that will produce an artistic masterpiece!

Sincerely,

Phanitta Chomsinsap

End.: Artist Oil Paints (report)

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EXECUTIVE SUMMARY

This report compares three brands of oil paint, Old Holland, Michael Harding, and M. Graham, to determine the best product for professional oil painting. Oil paints are evaluated based on six criteria: color range, lightfastness, drying time, binder, safety, and price. Old Holland paint is the most durable because it receives the highest lightfastness rating and uses excellent binder. Old Holland is also considered the safest due to its lowest percentage of toxic chemical content. Although Old Holland is the most expensive, it is the overall most recommended.

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INTRODUCTION

This report will compare three oil paint brands and recommend the best paint for professional oil artists. Three manufacturers being evaluated are Old Holland, Michael Harding, and M. Graham. Their products will be compared based on color range, lightfastness, drying time, binder, safety, and price. A wide range of colors benefits artists who experiment with multiple styles of art. Highly-rated lightfastness pigments are better for preserving the aesthetic value of an artwork. Excellent binders create more durable paint that lasts longer and is less prone to cracking. Less toxic paints create safer working environment. Affordable price is great for those with lower budget. Overall, Old Holland satisfies most requirements and is considered to be the best choice.

PRODUCT BACKGROUND

Oil paint was invented during the 15th century. Famous oil paintings include Monet's *Impression Sunrise*, Van Gogh's *Starry Night*, and Gainsborough's *The Blue Boy*, just to name a few. Until now oil paint has been one of the most popular media of art.

TECHNICAL DESCRIPTION

Oil paint is a paint composed of pigment, which gives the color, and an oil binder that adheres paint to the surface. Common binders for oil paints include linseed, poppy seed, safflower, and walnut oils.

SCOPE OF RESEARCH

The requirements for point-by-point comparisons include

- Color range
- Lightfastness
- Drying time
- Binder
- Safety
- Price

REPORT FORMAT

This report includes two main sections:

1. Point-by-point comparisons
2. Conclusion and Recommendation

POINT-BY-POINT-COMPARISONS

COLOR RANGE

Old Holland has a range of 168 colors in 18ml, 40ml, 60ml, 125ml, and 225 ml tubes. All whites and 2 blacks are also available in 475ml and 1000ml tins. [11]

Michael Harding's handmade oil paints are available in 76 colors in 40ml, 60ml, and 225 tubes [9].

M. Graham's oil paints have 50 colors available in 37ml tubes and 148ml tubes [7].

Of the three brands, Old Holland has the widest range of colors. Unfortunately, a wide color range might not benefit artists who employ limited palette because they use very limited number of colors (from 4 to 12 colors at most). Claude Monet, an impressionist artist, famous for his work of art, *Impression Sunrise*, also used a limited palette. Monet's palette has nine colors: lead white, chrome yellow, cadmium yellow, viridian green, emerald green, French ultramarine, cobalt blue, madder red, vermilion, and ivory black [2].

In contrast, artists who work with various styles of art will benefit from the extensive range of palettes because different art style uses different tones of colors. For instance, impressionist palette has more intense colors, whereas portraiture palette has more earth tone colors.

Figure 1. Impressionist Palette [5]

Cadmium Yellow Light, Cadmium Yellow Medium, Cadmium Red Light, Alizarin Permanent, Ultramarine Blue, Cerulean Blue, Viridian, Ivory Black, Flake White Replacement

Figure 2. Portraiture Palette [5]

Naples Yellow Hue, Caucasian Flesh Tone, Yellow Ochre, Transparent Earth Yellow, Transparent Earth Orange, Transparent Earth Red, Terre Verte, Ultramarine Blue, Cobalt Green, Van Dyke Brown, Flake White Replacement

LIGHTFASTNESS

Lightfastness defines the permanence of a paint or how long a paint can retain its original color under light exposure. Lightfastness is one of the most important factors in oil painting because it keeps color from fading over the years. As an artist, longevity of an artwork holds an invaluable price.

A paint's lightfastness is measured by the American Standard Test Measure (ASTM). The rating ranges from I to V, where I is the highest. An oil paint with a lightfastness of I and II lasts for 100 years or longer. Ratings of III consider the paint as fair, in which the color lasts from 25 to 100 years. Paints with ratings of IV and V are fugitive and should be avoid. [1]

In England the Blue Wool Standard, rating the lightfastness from 1 to 8, is used instead of ASTM. Conversion on the two scales are [1]:

ASTM I = Blue Woolscale 7 and 8.
ASTM II = Blue Woolscale 6.
ASTM III = Blue Woolscale 4 and 5.
ASTM IV = Blue Woolscale 2 and 3.
ASTM V = Blue Woolscale 1.

All of Old Holland's paints have Blue Woolscale ratings of 7/8 (ASTM I), except for one paint, Madder (crimson) lake deep extra, which has the lightfastness of 6/7 (ASTM I/II). [10]

67 colors of Michael Harding's paints are rated with ASTM I, 7 colors with ASTM II, and 1 color with ASTM III. 1 color of the total colors is labeled as N/L or not listed. [9] Paints labeled as N/L have not yet been tested or rated by the ASTM; however, it does not indicate a paint as fugitive or nonpermanent [15].

47 colors of M. Graham's oil paints have lightfastness of ASTM I. 2 colors are labeled as ASTM II, and 1 color as ASTM III. [7]

All oil paints from Old Holland, Michael Harding, and M. Graham have acceptable lightfast ratings of III or higher. Excluding any paint labeled as N/L, lightfastness of three oil paint brands are of equal grades.

DRYING TIME

Different oil colors dry at different rates. Factors that affect the drying rate are types of pigments and binders used. In general, oil paint dries in 2-12 days. The drying rates for three brands of oil paints are listed in the table below.

Table 1. Oil Paint Drying Time [7] [9] [10]

Brand	Fast Drying	Medium Drying	Slow Drying	Total Paints
Old Holland	72 colors	78 colors	18 colors	168 colors
Michael Harding	37 colors	32 colors	7 colors	76 colors
M. Graham	12 colors	21 colors	17 colors	50 colors

Fast = 2 days, Medium = 5 days, Slow = 5+ days

Figure 3. Oil Paint Drying Time (Percentage) [7] [9] [10]

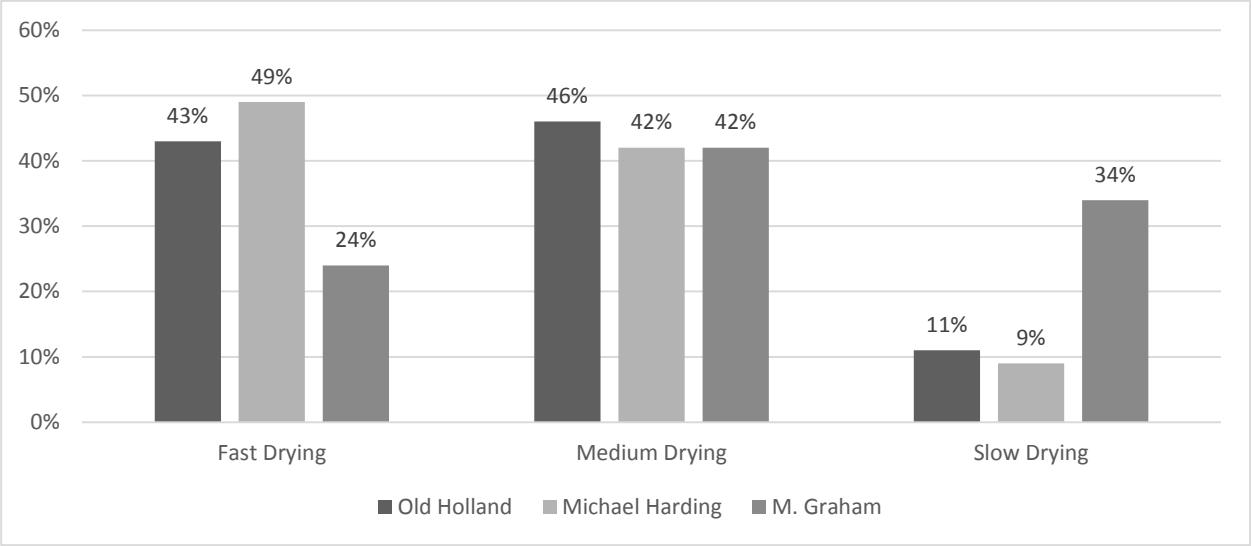

Figure 3 shows that Michael Harding has the highest percentage of fast drying paints, whereas M. Graham has the highest percentage of slow drying oils. However, neither fast drying nor slow drying paint is better than the other. In fact, different drying time suits different paint techniques. In glazing, previous paint layer is required to dry before another layer can be applied, so fast drying paint is highly preferred. On the contrary, wet-on-wet prefers slower drying paint in order to generate beautiful blending effects that requires longer time to complete.

For these specific painting techniques, Michael Harding is great for glazing, so is M. Graham for wet-on-wet.

BINDER

Binder is another important factor to consider when buying a new paint. Binders do not only affect the drying rate, but also the quality and durability of the paint over time. The type of drying oils used by each manufacturer are listed below:

Old Holland [10]:

- Cold-pressed[1] extra virgin linseed oil (168 colors)

Michael Harding [9]:

- Refined cold-pressed linseed oil (68 colors)
- Linseed oil (5 colors)
- Safflower oil (2 colors)
- Walnut oil (1 color)

M. Graham [8]:

- Walnut oil (50 colors)

The paint's quality and durability can be compared based on fatty acid composition of each binder. Two types of fatty acids that characterize the binder's properties are linolenic and linoleic acids. Linolenic acid contributes to the hardness of a paint coat. Binders that have low content in linolenic acid are weak and highly subject to cracking [6], and therefore, resulting in poor durability of the paint. Linoleic acid, on the other hand, suppresses any change of pigment color. Oil paints that have high content of linoleic acid have less tendency to yellow and darken over time [6], resulting in higher aesthetic quality of the pigment. Another type of fatty acid, oleic acid, also plays an important role regarding the preservation of the paint [12]. Higher content of oleic acid lengthens the oil's storage time.

Table 2. Fatty Acid Composition in Drying Oils [3] [4]

Oil Type	Linolenic Acid	Linoleic Acid	Oleic Acid
Linseed Oil	35-60%	17-24%	12-34%
Safflower Oil	-	73-79%	13-21%
Walnut Oil	14-18%	50-54%	23-27%

Linseed oil is today's most important binder for oil paint [13]. Linseed oil is well-known for creating a strong paint film due to its high component of linolenic acid. Apart from this strengthening property, it also has good preservative properties. Oil paints that use

[1] Cold-pressed linseed oil is the greatest quality linseed oil. This type of linseed oil is extracted with less pressure and heat involved than in other techniques. (The Role of Chemistry in History. (2008). *The Extraction of Linseed Oil.* Retrieved from http://itech.dickinson.edu/chemistry/?p=607.)

linseed oil as a binder can be stored for years without worry of spoilage. Despite all advantages of linseed oil binder, low content of linoleic acid in linseed oil may cause the paint to yellow with time. Although paints with linseed oil binder do not have the greatest quality, they achieve the highest durability. Therefore, linseed oil is considered the best binder.

Safflower oil, a weaker binder than linseed oil, has its reputation for non-yellowing properties [13]. Its high content of linoleic acid makes safflower oil a great binder for pale and white colors as a way to achieve the highest color stability [13]. One setback of safflower oil is its rancidity due to very low content of oleic acid.

Walnut oil, a stronger binder than safflower oil and a weaker binder than linseed oil, is also a preferred binder for whites. Because walnut oil's fatty acid composition lies in between the other two binders, it shares properties of both linseed and safflower oils. Although paints with walnut oil binder are less likely to yellow, they do not create a paint coat as strong as the ones with linseed oil.

Old Holland and Michael Harding paints use cold-pressed linseed oil as a binder for all and most of their paints.

SAFETY

Artist oil paints may contain hazardous chemicals such as heavy metals that can pose a danger to our health and our environment when not used properly. These hazardous components can be found in pigments.

Table 3. List of Commonly Known Highly Toxic Pigments [7] [9] [10] [14]

Highly Toxic Pigment	Old Holland	Michael Harding	M. Graham
Antimony Trioxide	-	-	-
Barium Chromate	-	Yes	-
Barium Sulfate	-	-	-
Cadmium Selenide	-	Yes	Yes
Cadmium Sulfide	-	Yes	Yes
Cobalt Arsenate	-	-	-
Cobalt Phosphate	Yes	Yes	-
Iron Oxide	-	-	-
Lead Antimonate	-	Yes	-
Lead Carbonate	Yes	Yes	-
Lead Chromate	-	-	-
Lead Molybdate	-	-	-
Lead Sulfate	-	-	-
Manganese Ammonium Pyrophosphate	Yes	Yes	-
Manganese Silicates or Dioxide	-	-	-
Mercuric Sulfide	-	Yes	-
Potassium Cobaltinitrate	-	-	-
Sodium, Barium and Calcium Salts of Soluble Azo Pigment	-	-	-
Strontium Chromate	-	-	-
Zinc Chromate	-	-	-
Zinc Sulfide	Yes	-	Yes

“Yes” indicates the use of pigment by the oil paint manufacturer.

4 types of highly toxic pigments are used by Old Holland, 8 types by Michael Harding, and 3 types by M. Graham.

Table 4. List of Commonly Known Moderately and Slightly Toxic Pigments [7] [9] [10] [14]

Moderately/Slightly Toxic Pigment	Old Holland	Michael Harding	M. Graham
(Insoluble) Azo Pigment	-	**-**	**-**
Barium Manganate	Yes	**-**	**-**
Calcined Cobalt, Zinc and Aluminum Oxides	-	**-**	**-**
Carbon (Carbon Black)	Yes	Yes	Yes
Chromic Oxide	-	-	-
Cobalt Stannate	-	-	-
Ferric Ferrocyanide	-	-	-
Lakes of 1,2-Dihydroxyanthaquinone	-	-	-
Zinc oxide	Yes	Yes	Yes

“Yes” indicates the use of pigment by the oil paint manufacturer.

3 types of moderately and slightly toxic pigments are used by Old Holland, 2 types by Michael Harding, and 2 types by M. Graham.

Table 5. Number of Toxic Paints [7] [9] [10]

Brand	Number of Highly Toxic Paints	Number of Moderately/Slightly Toxic Paints	Total Number of Toxic Paints	Total Number of Paints
Old Holland	14	31	45	168
Michael Harding	16	13	29	76
M. Graham	4	10	14	50

Old Holland:

45 out of 168 colors are slow drying = 45/168 x 100%

= 27% of total colors are toxic

(8% highly toxic; 18% moderately or slightly toxic)

Michael Harding:

29 out of 76 colors are toxic = 29/76 x 100%

= 38% of total colors are toxic

(21% highly toxic; 17% moderately or slightly toxic)

M. Graham:

14 out of 50 colors are toxic = 14/50 x 100%

= 28% of total colors are toxic

(8% highly toxic; 20% moderately or slightly toxic)

Michael Harding has the highest percentage, 38%, of toxic paints. For this category, Old Holland and M. Graham paints are recommended. Although there are precautions that put paint to safely use, it is better to avoid paints with highly toxic chemicals. Accidental ingestion or inhalation of pigments can occur any time with lack of care and attention [14].

PRICE

Table 6. Price

Color	Old Holland (40ml tube)	Michael Harding (40ml tube)	M. Graham (37ml tube)
Alizarin Crimson	$36.49	$25.50	$15.05
Burnt Sienna	$16.59	$11.54	$10.40
Burnt Umber	$16.59	$11.54	$10.40
Cadmium Orange	$71.75	$47.94	$30.75
Cadmium Red Deep	$71.75	$47.94	$30.75
Cadmium Yellow Deep	$60.15	$41.16	$30.75
Cerulean Blue	$109.00	$74.11	$30.75
Cobalt Blue	$71.75	$47.94	$30.75
Ivory Black	$16.59	$11.54	$10.40
Payne’s Gray	$25.99	$11.54	$10.40
Permanent Green Light	$25.99	$18.53	$15.35
Raw Umber	$16.59	$11.54	$10.40
Titanium White	$16.59	$11.54	$10.40
Ultramarine Blue	$16.59	$11.54	$15.05
Ultramarine Violet	$25.99	$18.53	$15.05
Viridian	$60.15	$47.94	$30.75
Zinc White	$16.59	$11.54	$10.40

All prices are from www.dickblick.com.

M. Graham Artists’ Oil Color is the least expensive of the three brands.

CONCLUSIONS AND RECOMMENDATIONS

This report concluded that Old Holland is the best oil paint for professional artists. The recommendation for Old Holland was determined by the highest score received, 92.2, in the recommendation table below. The scores given to each criteria are based on their importance. For instance, safety receives a score of 35 and is more important than price, which has a score of 15. The number of points from each criteria adds up to a total score.

Table 7. Recommendation Table for Professional Artists

	Old Holland	Michael Harding	M. Graham
Lightfastness (25)	25	22.3	23.5
Binder (25)	25	24.6	18.8
Safety (35)	35	19.1	34.4
Price (15)	7.2	10.2	15
Total (100)	92.2	76.2	91.7

Conclusion:

1) Highest quality pigments that last over 100 years
2) Highest binder quality
3) Overall safest paints

Please note that color range and drying time criteria are not included in the recommendation table above. Color range addresses specific artists who work with multiple styles of art rather than all artists. Likewise, oil drying time is dependent on painting techniques used by different painters, in which one drying rate will not be satisfying to all. Recommendations for specific audiences can be found in tables 8, 9, and 10.

Table 8. Recommendation Table for Artists with Multiple Painting Styles

	Old Holland	Michael Harding	M. Graham
Lightfastness (25)	25	22.3	23.5
Binder (25)	25	24.6	18.8
Safety (35)	35	19.1	34.4
Price (15)	7.2	10.2	15
Color Range (10)	10	4.5	3.0
Total (110)	102.2	80.7	94.7

For artists who employ multiple styles of painting, Old Holland is the most recommended.

Table 9. Recommendation Table for Artists with Glazing Techniques

	Old Holland	Michael Harding	M. Graham
Lightfastness (25)	25	22.3	23.5
Binder (25)	25	24.6	18.8
Safety (35)	35	19.1	34.4
Price (15)	7.2	10.2	15
Fast Drying (10)	8.8	10	4.9
Total (110)	101	86.2	96.6

For artists who use glazing technique, Old Holland is the most recommended.

Table 10. Recommendation Table for Artists with Wet-on-wet Techniques

	Old Holland	Michael Harding	M. Graham
Lightfastness (25)	25	22.3	23.5
Binder (25)	25	24.6	18.8
Safety (35)	35	19.1	34.4
Price (15)	7.2	10.2	15
Slow Drying (10)	3.2	2.7	10
Total (110)	95.4	78.9	101.7

For artists who use wet-on-wet technique, M. Graham is the most recommended.

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