

MATERIALS INFORMATION and TECHNICAL RESOURCES for ARTISTS – Myths, FAQs, and Common Misconceptions

1) Lead white, cadmium, copper, and chromium pigments should never be used because they are toxic...

Some metal pigments can pose a significant health risk particularly those that contain lead and other heavy metals. Lead white and other poisonous pigments are still considered essential for some artists, especially in oil paint where their unique handling, flexibility, and permanence have no adequate substitute. The dangers to the artist are primarily associated the pigment in its dry form where inhalation is a possibility. Pigments already ground into paint pose far fewer risks to the user. While most pigments are not readily transdermal, some solvents can facilitate absorption through the skin. These risks are completely mitigated by the use of gloves and proper hygiene. Dry pigments can be handled safely by using the proper precautions. Those working with dry pigments should only do so in a designated studio space and always wear a dust mask and nitrile gloves. Studios should be free of food and drink and the artist should make sure that they have completely removed any residual pigments or paint from their hands and clothing before leaving the studio. The area around the working space should also be covered with sheets of paper to catch any accidental spills. All materials contaminated with toxic pigments, including solid and solvent waste, should be properly disposed of. Please refer to the *Health and Safety* document for additional information.

2) Oil paints are toxic...

The binder in traditional oil paint is generally a drying oil derived from edible oils (flax, poppy, walnut, safflower, etc). On their own these do not pose any health risk (although there are a handful of individuals who may possess a particular allergy to certain oils). The toxic components in oil paints come completely from the pigments, additives like artificial driers , and solvents. Many commercial oil paint lines do incorporate vary small amounts of dissolved metal salts that are used to promote rapid or uniform drying. These driers often contain cobalt as well as other heavy metals and therefore care should be taken to avoid contact with the skin if these additives are present. By eliminating the use of solvents, many painters will find that they are able to paint using oils as long as proper precautions are exercised regarding driers and potentially toxic pigments. Please refer to the *Health and Safety* document for additional information.

3) Oils are bad because they yellow...

All drying oils will yellow to a certain extent but this process is a natural phenomenon and is not one associated with degradation. The yellowing of oil binders in a properly formulated oil paint is generally masked by the

pigment load; however, adding too much oil to your paints can lead to pronounced yellowing, an effect that is particularly noticeable in lighter colors such as whites and blues. The manner in which an oil binder is prepared can also have an effect on the overall degree of yellowing as well as the presence of certain pigments (such as non-coated rutile titanium dioxide and anatase titanium dioxide), driers (oleates and resinates), and the environment (heat in the absence of light). There are measures that can be taken to combat yellowing. Some artists choose to place their paintings in direct sunlight for a certain period of time as UV light can break up some of the chemical bonds that are responsible for yellowing (although care should be taken if your painting contains a significant amount of wax and/or potentially fugitive pigments).

4) Alkyd mediums, polyurethanes, shellac, and hard resins (i.e. copals) are great as varnish coatings...

These materials should never, repeat, never be used as surface coatings. Not only can these materials discolor and/or degrade over time but they are irremovable should your painting withstand surface damage and/or require conservation treatment in the future. Today there is a wide-range of lacquer-, alkyd mediums- (e.g. Liquin), polyurethane-, and enamel-based coatings available to artists, some of which consist of nitrocellulose (and other cellulose derivatives) or vinyl-based/acrylic resins dissolved in solvents. While many of these products dry fairly quickly, they are not recommended for use as surface coatings as they are irremovable once dry, can produce brittle surface coatings, and can potentially yellow and darken over time. These types of products have experienced a rise in popularity among contemporary artists and while they may create aesthetically pleasing surfaces for some, they have not yet been thoroughly tested for compatibility with art materials or for their long-term aging properties. Please refer to the *Varnish* document for more information on surface coatings.

5) Adding soft resins like mastic and dammar create a more resilient paint film...

False. Soft resins (dammar, mastic, larch turpentine, Strasbourg turpentine, Canada balsam, elemi, etc.) produce paint films that are always more susceptible to damage during any conservation/restoration campaigns. Additionally, these materials can increase the brittleness of a paint film, making it more likely to develop disfiguring cracks and/or lead to possible delamination/flaking. The addition of soft resins always create an oil paint film that is more susceptible to the action of solvents. There are paintings that cannot be safely cleaned using today's technology due to an artist's overuse of soft resin mediums and are consequently relegated to deep storage. There are also issues with yellowing and/or darkening when adding soft resins in significant amounts. While, in theory, it may be fine to add very small amounts of soft resins to oilpaint, artists tend to quickly develop a reliance on these mediums that makes it easy to overload the oil film and add

too much. In summary, paints that contain soft resins are always weaker and more susceptible to damage than paints that do not contain them. If artists choose to use these materials, it is recommended that they document this on the reverse of their painting so that conservators are alerted to potential conservation issues. A reasonably safe alternative is the use of alkyd oil mediums. These can be looked at as a modern/synthesized resinous-like medium that dries insoluble in typical painting solvents. Alkyds do not greatly weaken the paint film nor do they create films that are potential soluble. While alkyds also yellow to some extent, they yellow less than most soft and hard resins. Alkyds should probably be the first choice for artists that feel that they need a special effect not possible using standard oil paint, straight oil mediums, oil-chalk mediums, or solvents.

6) It is not necessary to varnish paintings....

Varnishing is certainly a personal aesthetic decision. However, varnish coatings can add a layer of protection and impart saturation, giving more depth to darker passages and making lighter areas appear brighter by contrast. The choice of what type of varnish coating to use can have a significant impact on both the immediate appearance of the artwork but also how an artwork will look in the years to come. Some varnishes are more susceptible to yellowing and/or darkening while others can turn cloudy or hazy over time. Finally, a handful of materials that are marketed as surface coatings should never be used as varnishes for fine art, as some of these proprietary materials and industrial coatings become irreversible as they age. Today artists have at their disposal a wider range of varnishes to choose from, some of which have been extensively tested to evaluate specific aging properties (including ease of removability, propensity for yellowing/darkening, and glass transition temperature as it relates to tackiness). It is important to remember that even if the source of a varnish is "natural" (e.g. is harvested from the sap of a tree) this does not necessarily mean that it is a superior product that will withstand the test of time. Please refer to the *Varnishes* document for additional information.

7) Homemade art materials are superior than commercially available materials...

This depends entirely on the brand and/or quality of the commercially available material that one is comparing. Certainly it is possible make one's own sizing, ground/priming, paints, and varnishes. The main benefit of making homemade products is that the artist has complete control over what goes into his/her materials. On the other hand, some of these processes can be extraordinarily laborious and in some instances not as efficient. One example is the process involving dispersing pigments into a given medium like oil. Industrial three roll mills are far more efficient at evenly dispersing pigments while hand-mulling paints can still lead to the unwanted formation of pigment aggregates which in turn creates paint films that are unevenly

pigmented. Homemade paints also tend to be much fatter (possess more medium than necessary) as compared to commercially available paints.

8) The Old Masters never used X, Y, and Z but always used A, B, and C...

Unless you have access to recent unequivocal analysis of an artist's oeuvre or have personally performed scientific analysis on an Old Master painting it is probably best to avoid making grand pronouncements. Often these type of discussion rely on outmoded, obsolete, or incorrect "authorities" (e.g. Doerner, Maroger), unreliable sources verbal transmission from a respected painter or instructor based on their painting experience, informal discussion, or ill-informed online discussions. MITRA is moderated by several individuals (conservators as well as scientists) who have first-hand familiarity with historic art materials and techniques, analysis of historical artwork, and access to lesser known conservation literature and journals. Participants are encouraged to post questions they might have relating to this subject and/or consult the "Technical Art History and Conservation Publications" document for additional resources.

9) Eastlake, Deorner, Maroger, and other texts on materials and techniques are reliable sources for contemporary artistic practice...

Please refer to Number 6 as this misconception is related. While 19th and early 20th century texts (as well as some contemporary publications) are full of interesting and potential useful information and recipes, they should never be treated as sources that are 100% reliable. Scientific techniques have now discovered new information about historic artistic practices that far supersedes these sources which was discovered long after these texts were published. Furthermore, some of these texts contain advice and recipes that do not adhere to what is considered best practice for creating artworks that are meant to last. MITRA will be able to offer additional insight into what can be considered reliable information and best practice for artists.

10) It does not matter if my artwork falls apart after I am no longer on this earth OR my paintings have not changed in 50 some years so my technique is clearly sound...

In addressing the first point it is important to stress that none of this matters unless you are selling your artworks or intending to hand down your artwork to future generations of beloved friends and family. It is also true that some artists claim to embrace the "entropy" of their work and honor its natural deterioration. While this may be true, it is really only a viable concept if both the creator and purchaser agree on this philosophical position. If you are selling your artworks, you are responsible to ensure that you are exercising best practices as there is an implied warrant of merchantability: a responsibility to the purchaser to make sure the materials and workmanship that went into the object sold meet high standards that are consistent with the concept of professionalism. A high price is based on the connotation of high quality, and the concept of quality includes not only the appearance of

the artwork on the date of sale, but also the materials and technique that are associated with the piece.

The second point is also complicated. It can be very difficult to assess whether a work has changed over a lengthy period of time. Humans often do not possess strong enough visual memory skills to make this assessment.. Also, artists should realize that 25-50 years may not be enough time to witness problematic changes that may be occurring in an artwork. It may be that your technique is sound and that your paintings have been well cared for (have lived in a stable environment); however, it can take more than a century for some of these chemical degradation reactions to become visible to the naked eye. In fact, there are some Old Master paintings that can no longer be safely loaned or displayed due to discovery of problematic materials and/or techniques that were used long ago by the artist. In addition, it is impossible to state whether or not an artwork has suffered from color shifts, darkening, and/or yellowing unless the artwork has been rigorously photodocumented using standardized high-resolution methods that account for lighting conditions and color correction. Our eyes cannot evaluate subtle changes that may happen over a relatively short period of time (e.g. 25-50 years) and then extrapolate such observations to predict the appearance of the artwork throughout its entire lifespan. of the artwork. It is also impossible to know if your painting will fall into the hands of an untrained restorer. If you have used certain materials that are known to increase the solubility of your paints or if you have used an irreversible surface coating, these could have a negative impact on how your painting is treated in the future. If you continue to use materials that are known to cause potential problems in the long-term, it is recommended that you record all of your materials, brands, etc. on the reverse of your painting so that it might be properly cared for in the future.

11) I painted out test swatches of certain paints and they seem fine, even after several years...

Again this is somewhat related to the topic discussed in Number 8. Artists should always consider creating mock-ups or painting out new materials if not to simply get a feel for the working/handling properties of the product. Artists are also encouraged to paint out certain colors when testing for lightfastness by exposing paints to direct sunlight and/or UV light over an extended period of time. While neither of these approaches should be considered scientific ones, they can certainly help to reveal surprising information. However, in order to effectively test the short- and long-term aging properties of a material, more sophisticated methods are required. Experts in cultural heritage science and in the industry employ artificial aging units, spectroscopic methods, mechanical testing, chromatography methods, and other techniques in order to a) monitor the migration of certain substances within ground/paint/varnish layers b) identify and understand the formation of certain products (e.g. metal soaps) c) evaluate film elasticity and/or strength d) identify and monitor fugitive pigments e)

evaluate a material's propensity to become discolored, brittle, friable, etc., and e) and detecting presence of additives that may not be listed on a product's label. None of these tests can be easily performed by artists working independently in their studios.

12) "Sinking in" is something I just have to live with...

Sinking in can be avoided by using paints that are properly bound and not overly thinned with a diluent and/or using an appropriate ground (e.g. one that is not too absorbent). Some pigments, like umbers, are prone to "sinking in" especially if they contain high amounts of clays. These pigments can be avoided or can be made fatter with small additions of the appropriate binder as long as this is kept to upper layers to follow the "more flexible over less flexible paint rule" (often termed fat-over-lean). Areas that suffer from sinking-in or appear overly matte can be addressed by carefully applying the appropriate medium over the areas to be retouched, wiping off any excess medium with a lint free cloth. If sinking in occurs after the composition has been completed, this problem can be addressed by locally applying varnish to selective areas, followed by an overall coat of varnish to create an even level of gloss or sheen (allowing the varnish to dry in between applications). Oiling out should not be performed in areas that will not receive additional paint layers as this would result in later yellowing and darkening. Please refer to the *Varnishes* document for additional information on sinking-in and oiling out.

13) If it is a product made for the outdoors and for industrial purposes it must be long-lasting and it is appropriate for fine art purposes...

Industrial materials made to withstand outdoor (and even indoor) conditions were formulated for very different purposes than traditional art materials. There are many choices that paint manufacturers make that affect the outcome of a given product and paints produced on an industrial scale often use additives that are relatively economical and/or are the easiest to incorporate into the paint formulations. These additives can aid in creating a more workable paint and helps the paint film to withstand severe weather conditions and extreme exposure to light; however, these additives (i.e. anti-fungal agents, wetting agents, rheology modifiers, dispersants, anti-freezing agents, driers, thickeners, de-foamers, small additions of toxic solvents, etc.) can potentially lead to problematic consequences when these paints are used to create fine art that is intended to last for decades and centuries rather than a short time in a very hostile environment (i.e. 7-15 years). Some of these additives are known to eventually migrate out of these commercial paints after a certain period of time, industrial products are not recommended as suitable materials for grounds, paint layers, and/or varnish coatings. Additional research is required to assess whether these additives can form potentially deleterious complexes with pigments, create a hazy film on the paint surface, impart brittleness, and/or create a paint film that is more sensitive to solvents. As little is presently known about how these

materials will age over extended periods of time, industrial products are not recommended for use. If artists choose to use such products, they are encouraged to record the brand, material, and date of purchase (commercial manufacturers may change their formulation often without notifying the consumer) of the product on the back of the artwork.

14) I can just fix it with tape...

False. It's easy to be tempted by the many "archival" tapes on the market which are sold by conservation and art supply houses – but the truth is, no tape is truly archival. Mounting and tear repair should never be done by placing tape directly on an object, even if the tape is labeled by the manufacturer as "acid free" or "removable." Tape removal often requires the use of heat, water, or solvents, which can affect the paper and media underneath. Furthermore, fresh tape has different properties than tape which has aged; aging tape can become gooey, brittle, and extremely difficult to remove - even by a conservator. It also has the potential to cause discoloration and staining in the areas it was applied to paper. No matter how quick and easy it seems to use a bit of tape to hinge your drawing or repair the back of a torn print, the end result may be permanent damage

15) Labels that include terms like "acid-free" or "archival" are meaningful and can be used to identify superior products...

There is, in fact, no standardization for the use of these terms. "Archival" and "acid-free" are designations which manufacturers originally used to describe a material which was suitable for long-term storage. However, over time these terms have been used indiscriminately to the point where they do not necessarily mean anything at all – don't be fooled by seeing them, unless the manufacturer has also included other information to identify pH and fiber content. A claim of being "archival" must also be supported by material content and pH information (i.e. 100% cotton, acid-free rag paper, etc). "Acid-free" is also a problematic term. For example, acid-free paper products can in theory be composed of almost any fiber – from cotton rag to wood pulp, and many other things in between. However, because of wood pulp's acidic nature, this means that the finished sheet has must be buffered with an alkaline reserve (usually calcium carbonate) and/or has had the lignin content chemically removed or diminished. The term acid-free connotes material which is designed to remain stable over time, but the reality is that the acid-free label is only given at the time of manufacture. Having a buffer is also not a guarantee that the paper won't become acidic over time, as the alkaline reserve becomes depleted. This is where it helps to know what plant material the paper is composed of; certain materials and paper processes are inherently more stable than others (i.e. mold-made cotton papers, handmade mulberry papers). If a material isn't labeled "acid free," or this information needs to be verified, a pH pen or pH strips are an inexpensive way of testing this in the studio or at home.

16) If it is a “natural” or “organic” product it must be safer, non-toxic, and considered suitable for creating artwork that stable and long-lasting...

False. A similar problem can be noted in our grocery stores, with the rampant use of these terms being used to sell and promote food products. It should never be assumed that these terms are being used responsibly. Today many essential oils (e.g. spike lavender oil, citrus-based, etc.) and soy-based art materials are being marketed using these terms; however, certain individuals may find that these products spur allergic or unpleasant reactions so it is always best to err on the side of caution. In addition, not all of these products are recommended for those who are interested in following best studio practices. For example, some soy-based products are being modified to serve as a replacement for solvents (effectively creating an oil with extremely slow-drying properties). Adding significant amounts of oil with un-saturated fatty acids can lead to the formation of a poor-drying paint film, which can sag, drip, and accumulate dirt and grime over time. Artists are therefore encouraged to exercise due diligence when using “organic” and “natural” art materials.

17) All pigments/colorants, pastels, pens, markers, colored pencils available today are stable...

False. Realize that lightfastness ratings have been assigned to most available pigments and dyes available today. Generally speaking, certain organic colorants (pigments that tend to only be composed of carbon, hydrogen, and oxygen) and some modern synthetic dyes exhibit a certain propensity for fading when exposed to certain lighting conditions (particularly if UV light is involved). Artists should also note that the binder can play a role in lightfastness (e.g. vermilion has an excellent lightfastness rating in oils and acrylics but is only considered “fair” in watercolor) and the presence of a protective varnish with UV light stabilizers can also help to mitigate color shifts and/or fading. Certain manufacturers may provide information about “permanence” rather than lightfastness, or use proprietary terminology, symbols, and reference scales. Unless specifically stated, do not assume that these ratings correlate with ASTM standards. Finally, even if a company lists ASTM ratings (as is done for lightfastness), they may not always be applying the exact protocols outlined in the corresponding ASTM test (e.g. ASTM D4303 for Lightfastness Testing). It is hoped in the future that more companies will begin to conform to the ASTM guidelines in order to help artists become better informed. Please refer to the “ASTM and Lightfastness” document for more information.

18) Manufacturers of art materials are required to list any and all components present in their products...

False. Companies are only required to list materials if they have been identified as toxic and/or potentially carcinogenic. Safety Data Sheets (SDS or MSDS) will also list the relative amounts of these hazardous components. On the other hand, additives such as fillers, surfactants, semi-drying oils, anti-

freezing/anti-fungal agents, emulsifiers, etc. are typically not included on a label unless they are considered toxic. While there is an organization in place (ASTM) that emphasizes the importance of transparency when it comes to listing components in art materials, not all companies abide by ASTM standards. It is hoped in the future that more companies will begin to conform to the ASTM guidelines in order to help artists become better informed. Please refer to the *ASTM and Lightfastness of Media* document for more information.

19) I am a better painter than artist X therefore I know more about materials and techniques than artist X...

This argument comes from a place of ignorance and short-sightedness. Many phenomenal painters were poor technicians in terms of preservation strategies and subsequently their works are conservation nightmares. Turner, Sir Joshua Reynolds, and Albert Pinkham Ryder are just some of the more famous. Conversely, there have been many artists whose works were impeccably constructed using the best materials which offer the world little in terms of artistic vision. While artistic vision, fame, and cultural relevance are completely separate criteria from sound technical practice, these are not mutually exclusive. Generally, the selection of better materials and strategies can allow for similar painterly effects without risking premature deterioration.

20) If my artwork begins to show signs of degradation it is usually the fault of the materials...

Not necessarily. This is why it is important for artists to accurately document their materials (including information like the date of purchase, particular brand names, etc.) as they continue to work throughout their careers. One way to ensure that this information is kept with your painting is to record your materials and technique on the reverse of your painting (preferably on the stretcher bars or a backing board if the work is executed on a flexible support). There are instances in which signs of degradation can be directly linked to a poorly made product or even a “bad batch” of a material. But unless an artist rigorously documents their technique in a consistent way, it can be difficult to prove that the fault lies with the materials.

21) Graphite can migrate through the paint layers...

This has become a common misconception amongst artists that can be easily explained. Most paints containing fatty acids (oils, alkyds, and egg tempera) can become more transparent as they age. The predominant effect is caused by the conversion of higher refractive index pigments (such as lead white, zinc white, etc.) into soaps, stearates, and other complexes that have a lower refractive index, and therefore create a more transparent paint layer that eventually exposes the underlying paint layers or underdrawing. In oil paintings, this is further compounded by a slight increase in refractive index that occurs in oil binders over time. This gives the optical impression that an

underdrawing (done in graphite, for example) is “migrating” to the surface when in fact it is simply a natural chemical change that has occurred in the overlying paint layers. This phenomenon is also associated with the term “pentimenti,” as the increased transparency of the uppermost paint layers can reveal earlier compositional changes and even unrelated paintings or sketches.

22) Maroger Mediums and Megilp were most certainly used by the Old Masters and have therefore withstood the test of time...

The oil painting mediums proposed by the restorer and painter Jacques Maroger remain a source of interest and at times reverence by some painters, especially those working in the Classical Realist tradition. There is little evidence, however, that any of the mediums proposed by Maroger were ever commonly used by painters commonly called “The Old Masters.” Maroger was obsessed with the idea that a major reason for a perceived decline in painting quality and preservation came not from the breakdown of the workshop traditions of sound painting practice nor from shifting aesthetics, but from the lack of use of some fundamental paint binder or medium. When 21st-century painters mention Maroger mediums they are generally referring to what he termed “Rubens Medium” and to a lesser extent “Italian Medium. Maroger had proposed various recipes before his more popular mediums yet even these continued to change after the publication of his 1948 book, *The Secret Formulas and Techniques of the Masters*. One example, involves an emulsion made by whipping linseed oil containing a proportion of dissolved dammar resin into a gum Arabic solution. However, it is well known that Dammar, does not appear to have been used to any real extent in Europe before the 19th century and researchers/conservators have never found Flemish oil paintings to be water-sensitive, a characteristic that would have resulted from the extensive incorporation of gum Arabic. Maroger “reconstructed” many mediums but the Rubens and Italian/Venetian still remain by far the most popular among his proponents. Variations of his Rubens Medium all contain mastic resin, linseed oil, and turpentine but differ according to the specific proportions used and whether the mastic and leaded oil components were first dissolved separately and then mixed or were cooked together before straining and then thinning with turpentine. While Maroger mentions treatises and anecdotes to support his theories (often quoting a passage from de Mayerne’s treatise), subsequent research has failed to locate most all of these references. Despite the pronouncements of Maroger’s proponents, formulas relating to his Rubens medium are identical to many recipes for megilp which were commonly used and sold throughout the 18th and 19th centuries. In addition, scientific analysis of the works of Rubens and his contemporaries has found no evidence of these mediums; in fact, their works display a great resilience to the actions of solvents that are typically used to remove discolored varnishes, a characteristic that is not typical for paintings that possess significant additions of varnish in the paint. Maroger proponents also try to differentiate the Rubens medium from megilp by stating that the latter involves actually boiling the drying oil with lead salts rather than the more moderate heating suggested by Maroger; however, most

meglip recipes make no mention of boiling and such claims also ignore the difficulty of precise heating during the Renaissance and Baroque period attributed to Maroger's mediums.

Maroger's Italian or Venetian Medium is a mixture of leaded oil and wax. He attributed the impasto of the Venetian Renaissance to the addition of wax. Again no wax has been found in the large number of Venetian paintings that have managed to survive. If significant proportions of wax (at least the quantity suggested by Maroger) were used by these painters, this would have most likely been discovered during restoration campaigns that involved lining; heat from the lining process (almost all paintings from that era have since been lined) would have immediately caused paint layers to melt and become permanently deformed, something that has not been observed. Maroger's adherents also point to the fact that he was the Technical Director of the Louvre Laboratory and that he tested the works of the Flemish and Italian masters. It needs to be understood that there were no instruments (e.g. chromatography coupled with mass spectrometry) at his disposal that could confirm the presence of these proposed mediums. While Maroger's mediums may be pleasant to work with, there is no evidence that they were used by the great masters of the Renaissance and the Baroque. What is well recorded, however, are the disastrous consequences of certain artists who used meglip, including Reynolds, Turner, and many others. Maroger's influence on artists of the early-mid 20th century and the documented use of his "reconstructed" mediums affords us the chance to evaluate his claims about the effect of his mediums on the preservation of paintings containing them. Artists who continue to paint with the Rubens medium should consider the fact that their paintings will remain sensitive to solvents for years to come. The same is true of paintings created using his Italian Medium, with additions of wax contributing to solvent sensitivity as well as heat. Large amounts of resin can also irreversibly darken paint films and even cause embrittlement, leading to severe cracking and loss of paint. Maroger proponents also point to the supposed protective effects of the "black oil" or leaded oil so central to Maroger's recipes and theories. Dr. Marion Mecklenberg of the Smithsonian Institute's Museum Conservation Institute, however, has shown that paint films containing even small amounts of leaded oil are substantially weaker than those containing only cold pressed linseed oil. Those that continue to use Maroger mediums should record the recipe or brand used (as well as the general amount employed) on the back of their paintings so that future conservation efforts can take their presence into account.