

THEMATIC UNIT Nº 7

PAINTING BINDERS AND COADYUVANT SUBSTANCES.

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7.1. BINDERS AND MEDIUMS: DEFINITION, FUNCTION, AND CLASIFICATION.

The binder is a more or less liquid substance that allows binding and fixing, permanently, the pigment particles to the surface on which they applied. It is already in prehistoric times when tailings pigments and colored land began to be set with different substances such as fats, milk, resins and gums of some of the trees in their surroundings.

The medium can be defined as an accessory or additive used to dilute and get better glazes. They are generally anticoagulants based on resins which allow the artist superimpose paint layers more quickly without mixing the new colors with the first layer. With different combinations, you can increase or decrease the setting time, change the density, texture and adjust the brightness and transparency of paint layer.

Within the painting techniques and procedures, the term binder collect the various substances, fat or lean, natural or synthetic, simple or compound (glues, resins, gums, balsams, oils, waxes), whose main function is to hold together, firmly, the pigment particles together and with the support. Generally, the definition of the various painting procedures is determined by the type of binder used. Except for the pastel, in which the pigment is fixed on the support exclusively by the roughness or the primer applied thereon.

The ideal binder, is that absolutely inert to any chemical or physical reaction, which incidentally does not exist, it is essential the knowledge of the binders that are resistant to the passage of time.

It makes no sense to use the best products if you do not know their characteristics and reactions and, especially, if not used properly. And take into account that the material with binding power, according to its properties, may also be employed as varnishes, adhesives or diluents. At present the binders used are numerous and confusing nomenclature. To the traditional they have been adding new synthetics that greatly expand the range of possibilities, both technical and creative. Often are used products which were developed for industrial use, but which are perfectly usable in the arts, such as plastics.

We'll start from a two-step approach, when selecting the binder to be used, resulting from the simplicity of the materials used and a thorough knowledge of these as a guaranty for the successful implementation and maintenance of the work. Rather than stick to the use of the great classics or the latest formulas and novel materials.

We discuss the binders according to the use made of them in the field of painting techniques and procedures. Therefore, whenever we use the term binder can be referring to any of the materials as such, so we'll see their characteristics and requirements to be met for use for artistic purposes, according to each of them, separately.

QUALITY REQUIREMENTS FOR ARTISTIC BINDERS.

- If they are fat, they must have a good drying power.
- Do not react (chemically) negatively with the colors or any other constituent of the paint layer.
- Do not generate excessive tension forces, which cannot be controlled easily and that endanger good technical development and conservation of the painting.
- In the case of works with mixed techniques, they must be compatible.
Provide a balanced level of adherence to any component of the paint layer.
- We should avoid using them, especially in the form of mediums, thinners and varnishes in complex mixtures involving many types of components.
- Only those who are employed prepared specifically for use artistic training.

7.1.1. GLUES.

In the classical treatises are cited numerous recipes for the manufacture of glues, especially those of animal origin, and how to use them. They have also been of great importance in the preparation of colors as binder for great number of techniques, especially those belonging to the group of water procedures.

The term "glue" is used generically to define all those substances that have the ability to hold together firmly, the pigment particles together and with the support. And in particular, in the glues, they are limited to those of animal, vegetable or synthetic origin which only solvent is water.

Recently, there have joined to the group of glues, a number of synthetic materials, especially thermoplastic acrylic and vinyl resins in aqueous dispersion, which have moved to the traditional natural origin glues.

7.1.1.1. Glues and binders of animal origin.

The types of glues and binders most important animal used and documented throughout the history of the procedures and techniques of painting are: rabbit skin glue, glue remnants, glue gloves, goat tail, tail to scroll, isinglass, glue Flanders, egg, casein.

Raw materials.

Raw materials usually employed for obtaining the glues of animal origin are:

Skins: Rabbit glue, patchwork gloves, kid, of parchment.

Bones, tendons and cartilage: Carpenter's strong glue and glue of Flanders

Remains of fish: mainly from the swim bladder of sturgeon, called isinglass or fish glue.

Milk derivatives: milk, cheese, cottage cheese, casein (although currently the casein is produced by industrial methods).

Process for obtaining.

Raw materials are boiled with water, simmer until the volume is reduced to approximately one third of the total. The resulting water is filtered through a cloth strainer, leaving to cool the water until it coagulates to form gelatin, which is cut into loaves, leaving them to dry on wire mesh and then storing them in clean containers that protect them from moisture.

Casein glue.

The process traditionally used to obtain this type of glue is casein obtained from milk and its derivatives, leaving them to dry, then grind and pulp.

Animal glues' characteristics.

Uses. Not the best as an adhesive.

Casein instead was one of the stronger adhesives until the advent of synthetic glues, mixed with lime, forming lime caseinate. Also been used as binder in the preparation of products for pictorial supports and paints.

Solubility. The animal glues, less casein, upon drying and the film once formed, are soluble in water; with oils and solvents typically used in paint are insoluble. For that reason, they offer very good results when applied as binders for the preparation of primers and water-based paints which are then painted over with fat techniques.

Hardness. Are not very resistant to mechanical action, except casein.

Drying capacity. All natural glues dry firmly and offer very short drying times.

Stability and aging. Following the instructions, materials and times offer guarantees of good preservation.

Incompatibilities. Except for moisture, which is their main enemy, pigments, binders, mediums, solvents and fillers have no major incompatibilities.

7.1.1.2. Glues of vegetable origin.

The types of vegetable glues more used are pastes of flour, starch and dextrin.

Raw materials.

The raw materials used routinely to obtain vegetable glues are:

Flours. They are obtained mainly grinding cereals and pulses. Not be appropriate in humid and hot because of the mold. Currently not used and have been replaced by different types of fillers made with synthetic binders.

Starches. At present is obtained from fermentation; in addition to the potato is also used rice and maize.

Dextrin. The dextrin is obtained by hydrolysis of starch. Also called starch gum, British gum, *gomolina*, etc. Well as an adhesive, is also used as paint thickener. At present the same drawbacks as the pastes of flour, not recommended for use for artistic purposes.

Characteristics of Glues of vegetable origin.

Uses. Have been used for gluing paper mainly. And also as an adhesive for reentelar in restoration work.

Solubility. Are also soluble in water.

Hardness. They are very resistant to the mechanical action.

Incompatibilities. Moisture.

Handling Precautions. They are not toxic.

Synthetic glues.

The so-called synthetic glues are derived from synthetic resins, and even, are the same product, and for that reason, we will see in the sections corresponding to the synthetic resins. The most used as glue are thermoplastic resins (acrylic and vinyl).

7.1.2. RESINS.

Resins are substances that may have natural origin when comes from the exudation, natural or artificially by cutting, for certain types of trees, both living and fossil or synthetic, when obtained by chemical means, usually from hydrocarbons. The traditional natural resins, like glues, can be found in all treaties of all times and places. Currently have joined the group the synthetic resins (acrylic, vinyl, alkyd, ketonic, and to a lesser extent cyclohexanones and polyurethanes) displacing traditional ones. One of the most important characteristics of the resins is that they are insoluble in water and soluble in alcohol, oils and essences. Its main application in the field of painting procedures is the essential raw material for the manufacture of finishing and retouching varnishes, mediums, solvents and emulsions.

In turn, the most widely used natural resins can be classified according to their degree of hardness in hard and soft.

7.1.2.1. Hard natural resins.

Harsh are the copal and amber. The former are produced from various vegetable secretions of living and fossilized. And although it is sometimes used for the preparation of varnishes and mediums for oil is not advisable because they blacken the work and produce deep cracks in the paint layer. As for Amber, this is a fossil matter harder even than the copal and having the same problems so that these also have fallen into disuse and has been replaced by thermoplastic resins and ketone, which are much safer.

7.1.2.2. Soft natural resins.

The types of soft natural resins most important and most cited and used by painters in the development of his paintings are: dammar, sandarac, mastic, and rosin.

The basic raw materials are secretions of different vegetables like sandarac, mastic and dammar. It is also available (such as rosin) by deriving from the distillation of pine resin.

Sandarac resin

The real sandarac resin obtained from juniper, arborvitae and other conifers. Also known as little grease, gum arabic, common sandarac or sandarac tears. Appear in the treaties of Leonardo da Vinci, Francisco Pacheco, Antonio Palomino, etc. Yellow or reddish is soluble in turpentine and alcohol; in ether, acetone or benzene is only partially.

Mastic resin

It is also called "mastic", gum mastic, raw mastic, female mastic, mastic in tears and officinal mastic. Mastic resin obtained from *Pistacia lentiscus* in Mediterranean countries. The highest quality comes from the island of Chios. In XIX century decayed use, replaced by that of dammar and ketonic resins.

Dammar resin

The dammar resin is obtained from *Hopea* and *Shorea* trees and is commercialized under different names according to their origin. Which is considered the best quality is that of Batavia. It is soluble in turpentine, white spirit, benzene and partially in alcohol. The French Vivert prepared a retouch varnish of dammar resin, poppy oil and white spirit. This mixture led to "retouch varnish Vivert".

Rosin

The rosin is, in fact, an artificial resin, as a product, is obtained by the procedure followed for the distillation of pine resin, aimed at obtaining turpentine and subsequently turpentine essence. It is not advisable to use for artistic purposes.

Shellac

The term gum is not appropriate to refer to this material, because in reality it is a resin. Shellac belongs to the family of soft resins, is a resinous secretion produced by the insect translucent *Laccifer lacca*, from which it takes its name. Coming from the East Indies, is a realm of color and comes from a kind of cochineal. This secretion is attached to the branches of the plant invaded, and it is contained the bug for most of his life. Once collected, crushed and cooked with other resins and minerals, shellac becomes... The lacquer maggot lives and feeds from trees found in rainforests and exudes a hard material like a shell. Local growers collect twigs and lined them removed from the shell-like material. This waste is then crushed to form granules, is then placed in bags of fabric and heated over an open fire until the material begins to soften and finally melt.

Cellulose derivatives resins.

Raw materials. Obtaining and characteristics.

Cellulose is the constituent of the plant world. Procurement processes are complex. Though the thin their layers could be applied and the great rapidity by the drying time they are not used in the artistic field because of the incompatibilities with pigments, binders and some tools as for its high degree of toxicity and flammability hazard.

7.1.2.3. Synthetic Resins.

Thermoplastic and thermostable.

The term "plastic" is used so widely to define materials composed by resins obtained by natural polymers, if they come from animal or vegetable, or synthetic polymers, whether its origin is purely chemical. In this section we shall refer only to synthetic polymers that are used for obtaining the different kinds of synthetic resins as base material for the preparation of adhesives, varnishes and paints.

Synthetic polymers.

Synthetic polymers are divided into addition polymers and condensation:

Addition synthetic polymers for artistic purposes, consist of: polyvinyl resins, polyacrylic resins and polyketonic resins.

Polyvinyl resins. Are obtained by the copolymerization of polyvinyl chloride or acetate and may be presented in different ways. It will be of our interest polyvinyl acetate in aqueous dispersion for been the most used for artistic purposes.

As for its most important features we can highlight:

- If they increase their degree of polymerization offer greater viscosity, elasticity and resistance.
- In solid state resins can be dissolved in alcohol, benzene, ketones and acetates.
- They are transparent films with high brightness and exceptional adhesion, resistant to cracking, extremely strong and elastic.
- Can be used as a pigment binder for paint preparation, and as a strengthener of stability in the reintegration of the paint layer in restoration. For its high adhesive strength, offer great results as a binder for load materials for the preparation of fillers, pigmented or not, applied as paint layer.
- Protection against ultraviolet rays, a good stability to light.
- Resistant to aging and reversibility. Resistance to attack by microorganisms.
- Good binder for the preparation of painting because of their high and fast binding power.

Polyacrylic resins.

As for its most important features may be highlighted:

- It is fast drying time.
- Can be used for various purposes in different technical processes of painting.
- They are high gloss transparent films, very little colored, can be considered almost colorless.
- The film is fast drying up, hard, highly elastic, has exceptional adhesion and is highly resistant to cracking and peeling.

Polyketonic resins. Ketonic resins have been developed in the arts and the restoration improvements over those used previously.

Synthetic polymers of condensation.

Condensation synthetic polymers have been used by its characteristics to the preparation of paints and varnishes; they are the most important for their application for artistic purposes. Phenol-formaldehyde resins, urea-

formaldehyde and formaldehyde melarnina. They are normally used in coating for interior panels and decorative purposes. Similarly, alkyd resins despite having relatively recently used in the arts, are presented together with the acrylic resin as one of the greatest proliferation have had. Its main features are:

- They are very resistant to heat, moisture and saline environments. Are unaffected by the microorganisms so that their conservation and aging are very good.
- Offer high resistance to chemicals agents. Can be cleaned with petroleum, turpentine, oil, alcohols, water and even with dilute acids and salt solutions.
- They dry quickly at room temperature.
- They adhere securely on the different surfaces: fabric, wood, metal, glass and artificial and synthetic surfaces, without having to apply any type of primer.
- The application of paint or varnish prepared with alkyd resins can be made by any method: roller, spray, airbrush, brush, spatula, etc.
- The mechanical properties, mainly hardness and flexibility are very high.

Other synthetic polymers by condensation as polyester resins, polyamide resins, polyurethane, polystyrene and epoxy have undoubtedly allowed pictorial innovations, especially in the manufacture of new pictorial supports lighter, inert, stable, and even aesthetic inputs as adding new textures and even transparency.

Characteristics of thermoplastic and thermostable synthetic resins.

The main features of thermoplastic and thermostable synthetic resins are:

- The films formed are fast drying, tough, very elastic, have exceptional adherence and are very resistant to cracking and peeling.
- Form transparent films of high brightness, almost colorless, except alkyd, which present some more yellowing, but in any case is less than that of the natural resins.
- Have good resistance to acids, alkalis, oxidizing agents, oils and organic solvents.
- They are immune to moisture and biological agents.
- Depending on the type of resin may be soluble in water, oils and aromatic compounds.
- They are resistant to aging and some of them have good reversibility.

- They are used as coatings of different surfaces, and for the preparation of paints, mediums and finishing varnishes. With high concentrations of resin can also be used as pasta, mixed with oil paints, alone or with a load material used to obtain strong fillings, low yellowing, fast drying, not crack or have wrinkles.
- They are resistant to light and can be applied practically on any support. You can use it outdoors with guarantees, being very resistant to environmental agents.

7.1.3. OLEORESINS AND BALSAMS.

Oleoresins and balms are chemically very complex, natural origin, coming, like resins, from the natural exudation or by artificial incisions, of certain types of trees. One of the most important characteristics of oleoresins and balsams is that they are distinguishable from the glues, or gums, being soluble in whole or in part, alcohol, oils and essences, and insoluble in water.

On the use of oleoresins and balsams with pictorial purposes are data, often confused, in a big number of treaties of different times and places. In fact, they are the same thing. The term "balsam" is used primarily when these products have medical applications. In the field of painting procedures, the main application of these products is as an additive of plasticizing properties which is used for the preparation of varnishes, mediums or diluents in various painting techniques, primarily mixed or fats. The incorporation of oleoresins or balsams in these materials makes the brush become more fluid and provide a very smooth finish without brush marks or spatula and a glassy appearance of enamel.

Today, as happens with natural glues and resins, their use has been greatly reduced, having been replaced largely by synthetic products that offer greater advantages and guarantees of implementation and maintenance.

7.1.3.1. Oleoresins.

The types of oleoresins most important are: turpentine, elemis, thy, aramy, frankincense and boswellia, among others.

Of these oleoresins, only a few such as Venice turpentine, Strasbourg, etc., have been used for artistic purposes. For that reason we will focus only on them.

Venice's turpentine

It is obtained from the high mountain larch through incisions in the bark. Pleasant odor and a yellowish or light reddish. Its fluidity depends on the amount of essential oils containing. When pure has a good dissolving power. Mixed with linseed oil, walnut or poppy, thickened in the sun, provides a transparent surface, faded, very steamy, with no trace of brushstrokes and with a glazed and beautiful feature. The old masters such as Rubens, Van Dyck and Lucas Jordan, among others, used it with very good aesthetic results.

Strasbourg's turpentine

Strasbourg Turpentine offers features very similar to that of Venice.

Balsam of copaiba

With the name of balsam of copaiba is grouped a large number of balsams and resins that tend to blackening, and other disturbances that can cause significant damage in the artwork.

Turpentine or Canada balsam

Present characteristics and properties similar to those of the above products.

7.1.3.2. Balsams.

Balsams are substances like oleoresins, are also insoluble in water and contain volatile oils which, upon evaporation, make them to become thick and resinous, leaving a viscous substance that generates, upon drying, a brittle film. Of the balsams are few references. Palomino when referring to benzoin varnish quotes a product with that name and that probably refers to balsam of benzoin.

Characteristics of the oleoresins and balms.

Its main features are:

- The forming film is medium-fast drying, medium hard to soft and very elastic, and have good adhesion, high gloss transparent, and optically variable coloring. Darkens with age.
- They are soluble in oils and aromatic compounds.
- They have a good reversibility and, if mixed with drying oils considerably increase their resistance to solvents normally used in the arts.

Stability and aging.

While balsams and oleoresins have been used throughout history, not provide sufficient guarantees to use them for artistic products that can replace existing advantage.

Handling precautions of oleoresins and balsams.

High toxicity. Follow the safety instructions contained in the UT 2.

7.1.4. GUMS.

The term "gum" is used, in general terms, to define all those substances which come from the exudation of various trees, especially fruit, and that common denominator being soluble in water and insoluble in alcohols, oils and essences. Along with the glues, and like these, the gums have been used since ancient times as an adhesive and as a binder. While natural animal glues are used preferably for carrying out the majority of primers for pictorial supports, the use of gums priority has been, as a binder, for a number of techniques belonging to the group procedures to water. Today, with the exception of arabic and tragacanth gum, the others have fallen almost into disuse for artistic purposes.

Most important types of gums.

Arabic gum. This type the best for artistic purposes is called Senegal. Arabic. gum is primarily used for the preparation of watercolors and tempera.

Cherry and other fruit trees gum. Cherry gum has been the most widely used for the preparation of temples and, basically, as constituent of different types of emulsions.

Tragacanth gum. Tragacanth gum is used for the preparation of pastel colors.

Sarcocola. It is an almost transparent rubber flowing through the bark of a shrub native to Arabia, similar to black hawthorn.

Characteristics of the gums.

- Gums are used as a binder for the preparation of tempera, watercolor and pastel colors.

- Gums are soluble in water when dried and once formed the film. Are insoluble in oils and solvents. For this reason, gum temperas can be used as underlying layer, which then be painted with technical fats.
- They are very resistant to mechanical action.
- All natural gum dries quickly, but slightly slower than the glues. As glues, gums offer guarantees good conservation if the process followed was the recommended one.
- They behave like glues.
- Everything said about glues is applicable to gums.

7.1.5. OILS.

The use of oils for artistic purposes, and in particular the drying oils, is very old. They were used primarily as a binder and as varnish, alone or boiled with different types of resins and balsams. Linseed oil with walnut oil and poppy are cited almost as the only binders for oil painting, but also mentioned others, like lavender or pine nuts. The oil used for artistic purposes, which ranks first in importance, is the linseed oil.

The natural state of oils is liquid at room temperature, are insoluble in water and soluble in alcohol and hydrocarbons. Oils used in painting are drying and form a film, relatively elastic, in a short time after having been extended in a thin layer.

Requirements of an oil that is to be used for artistic purposes.

The most important requirements for an oil to be used for artistic purposes are:

- The oil should dry in a short time.
- After drying, the oil must keep their transparency.
- Must shrink slightly during the drying process and over time.
- It is important that changes as little as possible the color of the pigment, either immediately after the drying of the paint or over time.
- It is also essential that, once dry, the oil retains some elasticity.

Types of drying oils.

Sorted in descending order according to their drying ability and widespread use, are: linseed, walnut, poppy, pine nuts, of eleococa, soy, hemp, safflower or other.

Linseed oil.

Flaxseed oil or linseed oil is obtained from the seeds of flax, *Linum usitatissimum*, small, very bright and mahogany color. Linseed oil, with regard to the oils used for artistic purposes, ranks first in importance for good drying qualities, while its high degree of interlocking and plasticity after drying. It has the disadvantage of yellowing, however, if subjected to natural light is clarified. Linseed oil is the one that offers better results for the preparation of emulsions with egg tempera, so easy it is to emulsify and its rapid drying, which allows repainting in a few hours. If the emulsion is to be prepared with casein, blacks long after a few days.

Nut oil.

It is obtained by pressing of walnuts (of *Juglans regia*) fully ripe. It is used raw for mixing oil colors, after the different processes of filtration and purification, however; significantly improve its properties when subjected to sun-thickened or thickened vacuum. The walnut oil is lighter than linseed and more fluid, for that reason supports more pigment and is used mainly for mixing white and blue. Also used for the preparation of varnishes. Yellows less than the linseed, but become rancid quickly on contact with air. It has a slower drying than linseed, for that reason and for its lack of consistency is not advisable to use it in lower layers or for the preparation of emulsions.

Poppies oil.

It is obtained by cold pressing the seeds of the opium poppy (*Papaver somniferum*). Drying takes longer than linseed and walnuts, yellows fewer and cracks more. Poppy oil provides excellent properties, especially as a binder, for the preparation of commercial oil colors that will be packaged in tubes, especially for the mixing of white colors, and to balance the drying time between fast drying and slow drying colors.

Safflower oil.

Safflower oil is obtained by pressing the seeds of safflower (*Carthamus tinctorius*). Currently, its use has spread among manufacturers specializing in the preparation of colors and varnishes for artists to be a drying oil that can substitute linseed oil, and in fact the case today.

Pine oil.

It is extracted from pine cones collected from the pine (*Pinus pinea*). According to Palomino, highlights as an excellent binder for whites and blues as well as by slow drying.

Process optimization for painting oils.

Oils discoloration by exposure to sunlight.

The simplest method of bleaching oils involves exposing the action of sunlight in a closed container, colorless glass.

Decolorization of the oils by chemical.

It is totally undesirable for artistic purposes. The bottom line is that we use good oil; it is well purified and free of foreign elements, that is more important than the fact that oil is more or less discolored.

Thickening and modification of the drying capacity of oils.

The Flemish painters of the seventeenth century and also the Dutch, used very thick oil with a consistency similar to honey, which contributed to the paint surface get a textural apparency very attractive plastically, while mysterious. Undoubtedly Rembrandt was certainly the artist who took more out of this material. Matteric texture in the paintings of Rembrandt is dense, very elaborate and fresh at the same time. Also Juan Jusepe Rivera "The Españaoleto" which uses a thick matter with wich gets a very matteric modeling which allowed him to reproduce the texture of old skin.

The most important methods for thickening and modification of the drying capacity of the oils are:

- Thickened by the sun.
- Vacuum thickened or stand oil.
- Cooked over an open fire.
- Changing the drying capacity by chemical means, essentially adding drying.

Sun-thickened oil.

The method, which Cennini mentions, for their production is the same for all oils and is as follows:

1. On a plate or glass dish put a thin film of an inch or two at most, linseed oil, preferably, or any other drying oil, but always of the highest quality and obtained by cold pressing, the first pressing.
2. It is covered container with a glass plate from falling dust or dirt, but on a glass supporting small blocks apart to allow air to circulate through the container and facilitating in this way, oxidation of the oil.
3. Done everything as instructed, put in a place out of the sun as long as possible.
4. Daily oil is stirred with a spatula to avoid formation of the solid film of linoxyn on the surface.
5. This operation is repeated until the oil takes a honey-like consistency, which is ready for storage and use.
6. There can not been given rules on how long the oil should be exposed to sunlight, as this will depend on the thickness of the oil layer and the intensity of the sun, and daily time of exposure.
7. After the preparation of oil stored in tightly closed glass jars and ensuring they are always full.
8. This circumstance is important to keep in mind because, if not met, the air in the container continues to act as an oxidant on oil, which will take place on it a solid layer will thicken and will override the oil.

The sun-thickened oil dries very quickly, and with a certain brightness, to be in an advanced oxidation process, is very elastic and has more interlocking and yellows significantly less than the crude oil. This type of sun-thickened oil was widely used by the great masters of the past, as evidenced by the numerous facts and recipes that appear in almost all technical treatises of all ages and schools. In summary, we believe that linseed oil thickened in the sun offers a number of advantages that make it irreplaceable in the art of oil painting.

Vacuum thickened oil or stand-oil.

Is an oil obtained by cooking in containers in which a vacuum has been made, usually linseed oil is used. This oil is very similar in its properties and its applications to sun-thickened oil. Therefore be used with any security, both mediums for the preparation of emulsions and to the mixing of the oil paints.

Boiled oils.

They are obtained by cooking oil over low heat and open, deposited in a glazed earthenware vessel, usually with additions of driers. The

most used oil is linseed oil, but also can be used any other drying oil that meets the requirements listed above. These oils tend to darkening, formation of cracks and wrinkles and premature aging of the paint layer. May be they are considered less secure. It has been widely used for the preparation of mediums, emulsions and for mixing of the oil paints. These types of oils are considered by some writers, like Pacheco and Palomino, as driers.

Stability and aging.

Drying oils obtained from the first cold pressing are very stable and its aging is also very good. These oils dry very well, forming a flexible and resilient film over time.

Hazards and precautions in handling.

The only precaution to be taken into account is that it is a material that can burn, so it is advisable to manipulate away from fire sources and store it safely.

7.1.6. WAX.

The use of beeswax as a binder for paint is one of the oldest known, was employed by the Egyptians, Greeks and Romans for the realization of his paintings, as is recorded in the writings of classical authors (Pliny, Vitruvius). Re-emerged in the seventeenth century, been one of the greatest exponents of this revival the Spanish Jesuit Abbé exiled in Italy Vincente Requeno, who rebuilt the classical method based solely on the interpretation of classical texts. The Count de Caylus, a contemporary of Requeno, studied and promoted the development of this technique on the basis of modern chemistry of their time to their experiences, achieving methods that deviated from those discussed by classical authors and advocated by Requeno. In fact, the treaties of these authors seem more elaborate as demonstrations of their knowledge and scholarship on classical texts, which in the spirit of implementing this ancient procedure. García de la Huerta wrote a treatise which is actually the result of a careful study of the work of Requeno, expanding and enriching multitude of data, while specific improvements proposed for it by exposing the methods that had undergone to experimentation. Currently, the use of wax as a binder to prepare for artistic painting, although not so widespread, has been well received by some relevant contemporary artists and a number of young artists.

Most important types of waxes according to their origin.

The most important types of waxes that can be found currently on the market are: animal, vegetable, mineral and synthetic origin.

Waxes of animal origin.

Beeswax

The bees wax virgin is working best for artistic purposes and is the main binder that intervenes in Encaustic painting in any of its methods, suitably purified and bleached. The main binder used in this procedure it is beeswax. Some features can be summarized as:

- In general, the beeswax is composed of hydrocarbons, alcohols and palmitic and cerotic acids.
- The wax softens at 38 ° C and melts between 60 and 65 ° C.
- The molten wax is soluble in turpentine, white spirit, benzene and fatty oils, among other solvents. Is insoluble in water, and does not undergo any structural changes in its presence.
- It is resistant to light and inert to the action of acids, does not oxidizes.
- One of the more stable organic substances known.
- Used for the manufacture of paints and as a matting agent in the preparation of artistic glazes.
- It is very flammable.

Vegetable waxes.

Vegetable waxes such as carnauba wax or candelilla wax, are not relevant to their use for artistic purposes.

Mineral waxes.

The raw materials used to obtain mineral waxes most important are: Oil, microcrystalline wax, paraffin, raw asphalt, coal, lignite, peat: montan wax, ozokerite or mineral wax, and ceresin.

Paraffin wax.

The wax is obtained from petroleum distillation with the aid of solvents and by complex methods. For the preparation of encaustic wax painting use is not advisable because, by having a very low melt index, is too soft

the resulting paint film and because yellows much. In any case is a wax used by so important contemporaneous artists as José María Sicilia.

Hazards and precautions in handling waxes.

The waxes cannot be considered as such a dangerous material. However, it should take some precautions to prevent possible accidents that may cause the other materials, especially solvents, by themselves or by the action of heat on them, which are necessary for the various operations of preparing and implementing encaustic painting. As to the precautions we refer to those indicated in the T.U. 2.

7.2. SICCATIVES AND PLASTICIZERS : DEFINITION, FUNCTION, AND CLASIFICATION.

Siccatives.

Siccatives are typically oily solutions that incorporates lead, cobalt or manganese metal salts, which added to the oil colors or any other fatty procedure decrease drying time depending on the added amount and composition.

Most important types of siccatives.

The most commonly used for artistic purposes are the metal oxides: litharge, red lead, zinc oxide, lead peroxide. The most common brand names are: drier of Courtrai (lead and manganese), cobalt drier (cobalt), drier of Harlem (formalinferenic resin, linseed oil and white spirit). For its use is very important to take precautions, following the guidelines above for solvents and other similar products on inhalation, absorption, ingestion and inflammation. In the case of using them, get in small amounts, since they produce blackening, wrinkles and deep cracklings, especially if applied on layers that are very dry. Other products include drying oils azarcon cooked. Oils seen before, as well as the addition of resins, could be considered the safest in use. If you want a faster drying can add a small amount of mastic varnish, dammar or, better yet, new synthetic alkyd or keto resins to these oils, with which you can knead the colors, ensuring that the mixture is very rich in pigment.

Plasticizers.

A plasticizer is a substance that when added to a pictorial material such as varnishes, lacquers and paints, give as a result a flexible product, resistant and easy to handle.

The fundamental objective of plasticizers is that of providing the film of paint or varnish, of some plastic characteristics to facilitate their handling and application, so as to eliminate the drawbacks pointed when starting the drying process.

Features.

- The main features of the plasticizers are:
- The film use to be fast drying.
- The film has a medium hard to soft, very elastic and with a good grip.
- They are soluble in oils and aromatic compounds.
- When driers are mixed with oils significantly increase their resistance to solvents normally used in the arts.
- Used primarily for the preparation of paints, mediums and finishing varnishes.

Requirements.

- Film forming should have a uniform drying.
- Be as inert as possible.
- Plasticizers incorporated into the layers of paint and varnish should form transparent films with the lowest possible brightness.
- The film should be as colorless as possible.
- The plasticizers should be soluble in oils and aromatic compounds.
- The films that involved should have a good reversibility.

Types of plasticizers.

Venice turpentine, Strasbourg and the balsam of copaiba are plasticizers that are most frequently found in ancient treaties and recipes. Today the number has increased significantly plasticizers and their properties and applications. Although manufacturers of materials for artists continue currently marketing it, its use in the field of pictorial creation (not in the restoration) has become very small and have been replaced largely by new plasticizers derivatives of organic chemistry synthesis, which offer better performance and is superseded to the balsams and oleoresins.

7.3. SOLVENTS OR DILUENTS: DEFINITION, FUNCTIONS AND CLASIFICATION.

A solvent is a substance which permits dispersion of another substance in this, molecular or ionic level. I.e. it is the dispersing medium of the solution. Normally, the solvent provides the physical state of dissolution,

so that it is said that the solvent is the component of a solution that is in the same physical state thereof. Usually, it is also the component that is found in greater proportion. Destinated o facilitate the extension, dissolution some times, of the binder, serves to fluidize and are usually volatile, or disappear more or less totally by evaporation. Here are the main types of diluents.

- Water: Used in paintings called "to the water". Must be free of sulfur that could damage the pigments.
- Alcohol: solvent is typical of the resins. Under three groups: methyl, ethyl and amyl.
- Turpentine (spirits of turpentine): It is obtained by steam distillation of pine resin, rosin is the residue that has solvent properties, plasticizers and siccatives.
- Acetone (propanone): Colorless. Dissolved resins, fats, gums, etc.
- Benzene (petrol): Colorless. If pure is insoluble in water. It is a good solvent for oils and fats.
- White spirit: Obtained by distillation of a little part of petroleum.

The solvent or diluent for drying oil paints is generally turpentine (a mixture of cyclic hydrocarbons) or a mixture of hydrocarbons derived from petroleum which volatilizes properly. The solvent for most of the organic binders is an alcohol, a ketone or an ester.

7.4. BIOGRAPHY AND WEB LINKS.

BALAY Robert, SHEEHY Eugene Paul. *The Artist's Handbook of Materials and Techniques*. American Library Association [ISBN 0-670-83701-6](#), University of Michigan (1992). (In english).

DOERNER, Max. *The Materials of the Artist and Their Use in Painting: With Notes on the Techniques of the Old Masters*. Ed. Harcourt Brace Jovanovich. [ISBN 015158169X](#), [9780151581696](#) University of California, 1984(In english)