From the Dirt to the Skin
A Fundamental Presentation

A Study of Pigment

by

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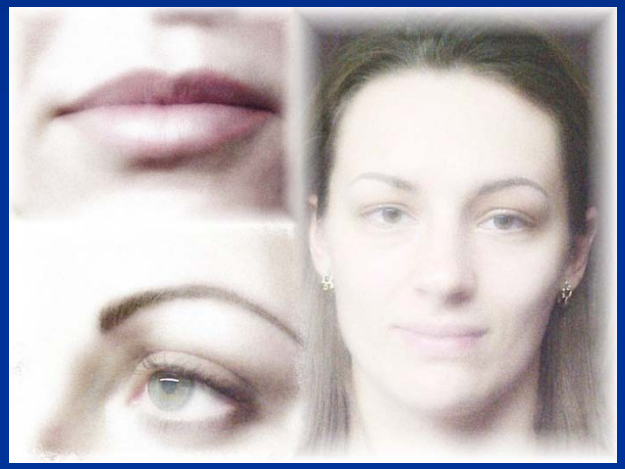
Permanent Cosmetics In Reverse



Earth's Minerals as a Colorant Source

- Earth's colored minerals have been used constantly throughout human history.

Earth's Minerals as a Colorant Source

Two examples of ochre

Blue

Black

- Used by all civilizations, earths colors lend themselves to a wide range of uses from decorating the body to painting a wall.

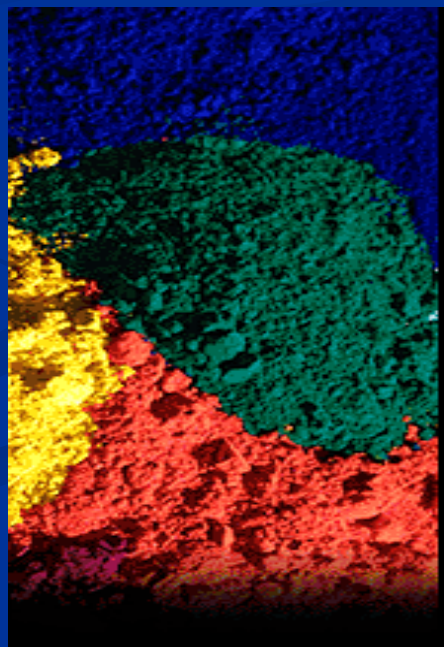
Natural and Synthetic Pigments and Dyes









Different Colored Particulates

- This "pile" of colored particulates represents the gamut of colorant powders.
- Inorganic, organic, dyes – pigment and dyes colorant powders.
- Some of these powders are natural (not chemically altered,) some are synthetic (chemically produced.)

Colorants

Pill colorants

Food colorants

Cosmetic colorants

Permanent cosmetic colorants

- Regardless of the product, colorants used for food, drugs, and cosmetics are derived from the FDA's list by reputable manufactures.
- Whether taking a pill, eating a steak, applying traditional makeup, or performing permanent cosmetics, the FDA's color additive (colorant) listing is the source.

FDA Color Additive Lists

- The FDA refers to their approved list for safe colors as "color additives." This term is synonymous with "colorants." Don't let the two different words cause confusion.

- All color additives (colorants) approved by the FDA for use in foods, drugs, and cosmetics are listed on three tables.

- Colorants approved for use in foods are on table 1.
- Colorants approved for use in drugs are on table 2.
- Colorants approved for use in cosmetics are on table 3.

FDA Color Additive (Colorant) Approved Listings

Each table has two general categories:

1. Color additives (colorants) exempt from certification

2. Color additives (colorants) subject to certification

FDA's Approved Color Additive (Colorant) Listings

- When these tables are compared, the drug and cosmetic's charts are identical with the exception of an acid violet #43.

- Other than this one exception, there is *no difference* between pharmaceutical (drug) grade color additives (colorants) and cosmetic grade color additives (colorants.)

The Permanent Cosmetic Standard for Safe Colorants

- Reputable pigment manufacturers use the FDA's food, drug, and cosmetic color additive listings as a standard for safe colorants.
- These products, which include both pigments, and dyes (inorganics, natural organics and synthetic chemical organics,) represent a unique and special category of colorants.
- These colorants have historically been subject to stringent regulatory requirements and legislative scrutiny.

Colorants

- Color additives (colorants) for food, drug, and cosmetic uses encompass many colorants of both natural pigments and dyes, and synthetic pigments and dyes.

A Study of Terminology - Pigments

- The Dry Color Manufacturers Association (DCMA) defines a pigment as:
- A colored, black, white, or fluorescent particulate organic or inorganic solid.
- These solids are usually insoluble in, and essentially physically and chemically unaffected by, the vehicle or substrate into which it is incorporated.

A Study of Terminology - Dyes

- Dyes are soluble colored compounds suspended in a medium.

Pigments and Dyes Review

- Pigments are insoluble. They are not affected by what is mixed into them. They do not dissolve.

- Dyes are soluble. They are affected by what is mixed into them. They dissolve into another substance. Dyes have a propensity to temporarily stain the skin they are put into.

Characteristics of Dye Content - Eyebrow Procedures

- If you consistently see a harsh stain-like image of the eyebrow design many years after the original procedure, likely a dye was included in the formula.

Characteristics of a Pigment - Eyebrow Procedures

After original procedures healed,
Eyebrows and eyeliner.

- With some allowance for skin undertone variances over time and the right pigment having been applied to the right undertone, pigments in general should fade to a lighter version of the original color.

Two and one half years later

Characteristics of a Pigment - Eyebrow Procedures

- This is not to say that all undesirable residual eyebrow pigment is a result of a dye product in the formulation.. Usually it is not.

- The *possibility* of a dye product being responsible is only one of several possible causes. A few others are:

  - an inferior quality pigment.
  - a change over time of skin undertone (to a cooler typed skin undertone.)

Characteristics of a Pigment - Eyebrow Procedures

- Overworking the tissue and causing scar tissue which results in a cooler undertone affecting the implanted pigment appearance.
- A warm pigment was applied to a warm skin undertone or a cool pigment to a cool undertone resulting in unnatural fading properties.

Inorganic Pigment Colorants

A Study of Terminology – Inorganic Pigment Colorants

- The definition of an inorganic pigment colorant is:
  - Naturally mined or synthetic (chemical) colorant such as metallic oxide, sulfide, and other salts.

INORGANIC PIGMENT

- Iron Oxides
- Titanium Dioxide
- Extender Pigments
- Ultramarine Pigments
- Manganese Violet
- Mixed Metal Oxide Pigments
- Fluorescent Pigments

Scientific Examples of Inorganic Pigment Colorants

- Iron oxides– has iron in its composition
- Titanium dioxides– has titanium in its composition
- Ultramarine – has an aluminum salt in its composition
- Manganese violet – has manganese in its composition

Practical Examples of Inorganic Pigments

- Iron oxide – Derma International 10C Covida Brown (raw umber) eyebrow pigment
- Titanium dioxide – Derma Internation #19 White manufacturing mixing pigment
- Ultramarine – Derma International #14D Dark Blue for eyeliner
- Manganese violet – Derma International 27M Magenta for lip color mixing

Exempt from Certification

- Under the color Additives Amendments of 1960, the Commissioner of the Food and Drug Administration has the authority to exempt color additives from the batch certification process .
- This is an action taken when he or she believes certification of a colorant is *not required* to protect the public health.

Exempt from FDA Batch Certification

- All food, drug, and cosmetic inorganic pigments known to be used by the permanent cosmetic industry *are on* the FDA's exempt from certification color additive (colorant) list.

- Inorganic pigments known to be used by the permanent cosmetic industry, when taken from the FDA's approved color additive (colorant) listings are considered safe by the FDA and do not require batch certification.

Exempt from Certification

- Although these exempt color additives (colorants) do not require certification, they are subject to surveillance by the FDA to assure adherence to regulatory requirements.
- Material Safety Data Sheets corroborate these requirements. These are known as MSD sheets. Every pigment manufacturer should be supplying MSD Sheets to their customers.

Inorganic Iron Oxide Pigment Colorants

- The <u>ochres, rusts, browns, and reds in our rocks and sand make up the source of iron oxide pigments.</u>

IRON OXIDE PIGMENT

- **A transfer of electrons from oxygen to iron account for all the <u>ochres, rusts, browns and reds in our rocks and sand.</u>**

Mining for Inorganic Iron Oxides Colorants

Inorganic Iron Oxide Pigment Colorants

- Iron oxides hold a very important place in the pigment market because of their wide range of colors, stability, and nontoxic nature.
- By far, iron is the most common and stable of all the elements.

Inorganic Iron Oxide Pigment Colorant Classifications

Iron oxides are separated into four major classifications:

- Browns
- Reds
- Blacks
- Yellows

Inorganic Iron Oxide Pigment Colorants

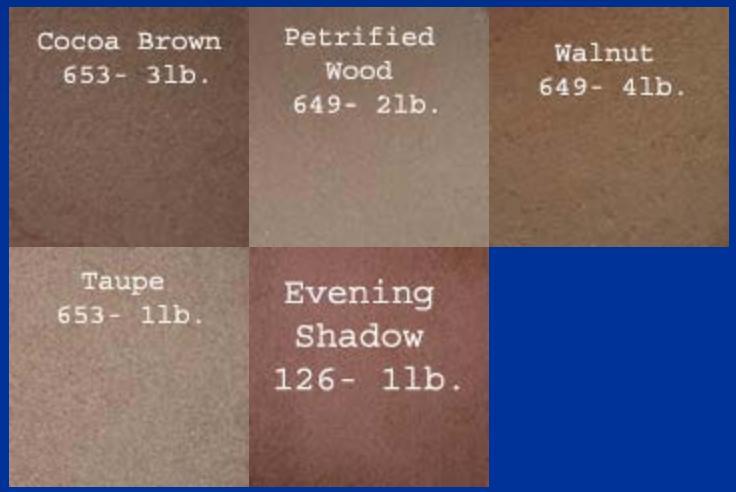
- The brown, red, black, and yellow iron oxides that are used in the Derma lab are in compliance with the FDA regulation and fall well below the heavy metal content limits.

Inorganic Iron Oxide Pigment – Browns
Pigment Brown #6 and #7
Color Index # 77499
How are They Produced?

Synthetic Brown Iron Oxides are produced by three methods:

1. Blends of red, black, and yellow.
2. Direct precipitation (remember from the reds?)
3. Controlled reduction of synthetic black. This form produces only browns at the lighter end of the brown color spectrum.

A Study of Iron Oxide Browns



Cool browns that will leave maroon/purple residual color

Warm browns are the ideal

Browns that will leave pink/orange residual color

Additives to Iron Oxide Brown Colorants

- Some browns do contain 5% carbon black.
- A brown will always ash (fade to a cooler color) as a result of the addition of carbon black.

IRON OXIDE PIGMENT

How Are They Produced?

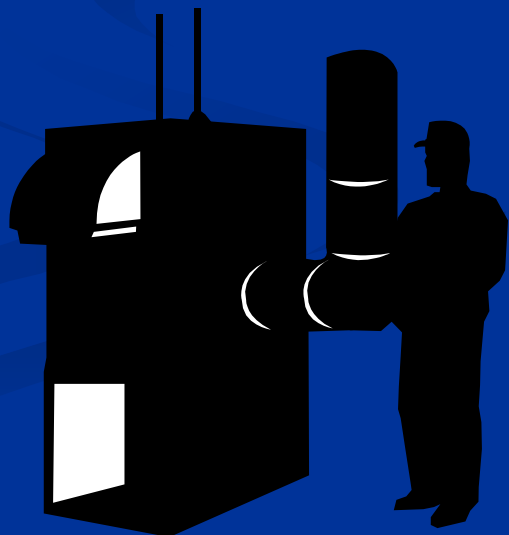
- Fe_2O_3= Iron Oxide
- $ZnO \cdot Fe_2O_3$
  = Zinc Ferrite
- $MgO \cdot Fe_2O_3$
  = Magnesium Ferrite

- Although they are technically not iron oxides, the ferrite pigments have characteristics and chemical compositions similar to synthetic iron oxides and thus can be included in the iron oxide family.
- Be aware that some brown pigments are actually Zinc and Magnesium Ferrite pigments.

Inorganic Iron Oxide Pigment – Reds
Pigment Red #101 and #102
Color Index # 77491
How are They Produced?

One of the methods to produce red iron oxide is by high temperature calcining of iron sulfate to make Fe_2O_3 (red iron oxide.)

Calcining = Roasting at very high temperatures



Inorganic Iron Oxide Pigment – Blacks Mined and Synthetically Produced

- Black iron oxide may be produced in one of two manners.
  - Mined as a natural black (magnetite)
  - Synthetically produced
    - A seed nucleus of the mined natural black is "grown" through the precipitation process.

Inorganic Iron Oxide Pigment – Blacks Mined and Synthetically Produced

- One of the earliest synthetic iron oxide developments, along with copperas reds, were precipitated black iron oxides.
- Several early patents describe methods to produce synthetic black iron oxide.
- The basic process has been improved over the years and now can consistently produce many different grades of iron oxides having *high chemical purity.*

Synthetic Black Iron Oxide
Pigment Black # 11 Color Index # 77499

- Don't confuse the artificial method of reproducing black iron oxide through the precipitation process with the chemical production of organic pigment colorants.

Inorganic Iron Oxide Pigment – Pigment Yellow #42 and #43 Color Index #77492

- The synthetic *yellow iron oxides* have a narrow particle size distribution which enhances color purity.
- It is possible to produce over 10 distinct mass color or tint variations within the particle size limits.

Fugitive Salmon Colored Eyebrows How Are They Produced?

The pigment formula contained incorrect undertones for the skin type.

Possible culprit formula:

Inorganic red-brown base (little or no brightness)

\+ organic yellow (bright and will fade faster)

= salmon/orange.

Purple Lips

Original lip formula was incorrect for the lip color it was placed into.

Blue based inorganic (little or no brightness,) +organic (bright,) lip pigments = purple lip.

Organic and Inorganic Pigment Lifespan

Titanium Dioxide
Pigment White #6 -- Color Index 77891

- Titanium Dioxide is the most important white pigment currently produced commercially.

- The pigment is used in a wide range of applications including inks, textiles, paper, paints, food, and pharmaceuticals.

Titanium Dioxide
Pigment White 6 -- Color Index 77891

- Pure titanium dioxide (TiO_2) is stable, nonvolatile, and largely insoluble.
- It is the ninth most abundant element present in the earth's crust—more common than copper, lead and tin.

TITANIUM DIOXIDE

Pigment White 6 -- Color Index 77891

- **Titanium Dioxide pigments are currently manufactured by two processes.**
- **In the older, though still widely used, sulfate process, low-grade titanium-bearing ore is reacted with sulfuric acid to produce titanyl sulfate.**
- **It is then hydrolyzed to form titanium hydroxide.**

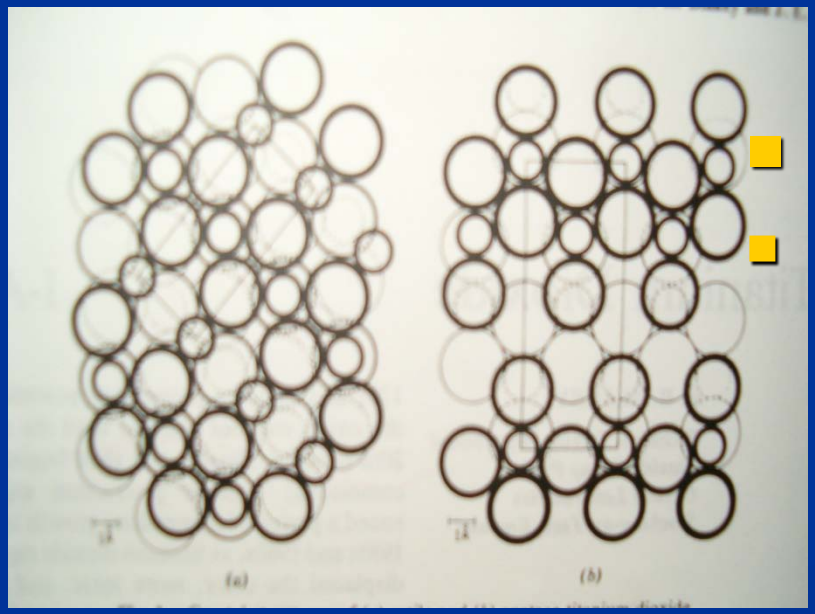
TITANIUM DIOXIDE
Pigment White 6 -- Color Index 77891

- **This hydroxide is then dehydrated during a process called calcination to produce the crystalline pigment titanium dioxide.**
- **The more modern chloride process involves the reaction of a relatively pure titanium-bearing ore with gaseous chlorine to produce titanium tetrachloride.**
- **After distillation, the tetrachloride is oxidized to produce titanium dioxide.**

TITANIUM DIOXIDE

Pigment White 6 -- Color Index 77891

Titanium Dioxide (TiO_2) is polymorphous—existing in two fundamental crystal forms:

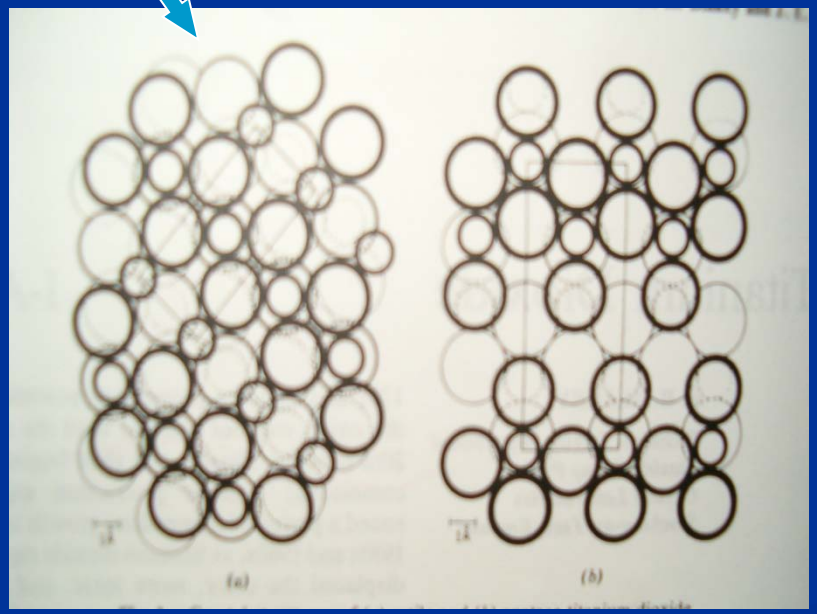


- **Tetragonal rutile**
- **Tetragonal anatase**

TITANIUM DIOXIDE

Pigment White 6 -- Color Index 77891

Rutile Crystal



The rutile crystal has a more compact structure, a higher refractive index, greater stability and higher density than the anatase form.

Titanium Dioxide
Pigment White 6 -- Color Index 77891

- Titanium Dioxide pigment has a high lightfastness (ranging between 6-8) and bleed resistance (ranging between 4-5.)

- What does lightfastness and bleed resistance mean to a permanent cosmetic professional? We shall see why a little later on.

TITANIUM DIOXIDE

Pigment White 6 -- Color Index 77891

- **There is another white pigment on the FDA accepted colorant chart - Pigment White 26 - color index 77718, also known as Magnesium Silicate.**

- **This is a TALC used in cosmetics, ceramics, paper and paint, <u>but should never be used in tattoo pigment.</u>**

EXTENDER PIGMENTS
(Mineral Fillers)

- **Mineral fillers have traditionally been perceived as cheap materials used to add bulk to a material that is much more expensive and to dilute is without losing its desired properties.**

EXTENDER PIGMENTS
(Mineral Fillers)

- **Fillers have become increasingly more sophisticated.**
- **The principal mineral fillers are calcium carbonate, kaolin (aluminum silicate), talc, and various other forms of silica.**

EXTENDER PIGMENTS
(Mineral Fillers)

- **Other fillers are barite, mica, and nonkaolin clays such as bentonite, feldspar, nepheline syenite, gypsum, vermiculite and wollastonite (calcium metasilicate.)**

EXTENDER PIGMENTS
(Mineral Fillers)

- **It should be noted that all these minerals are white, or at least off-white.**

- **It also should be noted that none of these pigments are on the FDA Approved Color Additive Chart.**

MISCELLANEOUS MIXED METAL
Oxide Pigments

- Pigment Black 12 Color Index 77543
- Pigment Brown 33 Color Index 77503
- Pigment Green 26 Color Index 77344
- Pigment Green 50 Color Index 77377

MISCELLANEOUS MIXED METAL
Oxide Pigments

- **The iron browns, both the titanates and the chromites, are produced by a calcination process.**
- **Compounds of various metals required for the particular pigment are blended together.**

MISCELLANEOUS MIXED METAL
Oxide Pigments

- **The blend is then calcined at high temperatures ranging from 800° C to 1100 ° C.**
- **These pigments are <u>not</u> on the FDA's Color Additive Chart.**

FLUORESCENT PIGMENTS

- **Not on the FDA Color Additive Charts**
- **These pigments are manufactured in several ways.**
- **One method is heating stone containing barium sulfate ($BaSO_4$) with coal producing BaS.**

FLUORESCENT PIGMENTS

- Another method is mixing a solution of zinc and cadmium sulfates and then the solution is transferred to a silica and fired at temperatures from about 700° to 1000° C.

- These pigments are absolutely NOT for tattoo procedures.

Inorganic Ultramarine Pigments Blue, Green, and Violet

- Ultramarine pigments are insoluble inorganic compounds that are available in a wide range of blue shades, green shades, violets, and pink.

- They have been assigned the color index number 77007 and cataloged as Pigment Blue 29, Pigment Green 24, and Pigment Violet 15.

Inorganic Ultramarine Pigments Blue, Green, and Violet

- Since ultramarine pigments are nontoxic and insoluble in all solvents, their use is permitted and listed on the FDA Color Additive Chart.
- Their lightfastness ranges between 5-8, and bleed resistance ranges between 4-5.

Inorganic Manganese Violet
Pigment Violet 16 – Color Index 77742

- Manganese violet is FDA approval for cosmetic applications. It has excellent lightfastness (8) and bleed resistance (5). Although it is manufactured at relatively high temperatures, it is not a calcined product.

- Also, this red-shade violet is a perfect red shade and not easily achieved by the use of other pigments.

Black Pigments

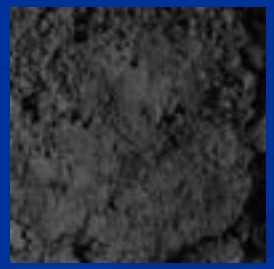
Also knows as:

- Pigment Black #11 = Iron Oxide
- Lamp Black - Carbon
- Vegetable Black - Carbon
- Furnace Black - Carbon
- Channel Black (carbon not produced any longer)
- Thermal Black- Carbon
- Bone Black - Carbon
- Ivory Black - Carbon
- Vine Black = Logwood Extract

Carbon Black Pigments

- Ivory Black

- Vine Black (Logwood)



Carbon Black Pigment

- Lamp Black

- Bone Black

Carbon Black Pigments

- Furnace Black

- Thermal Black

- Vegetable Black

Carbon Black Pigment

- These are products resulting from the partial oxidation or thermal decomposition of liquid or gaseous hydrocarbons.
- Common practice in the industry is to add a small percentage of alkali blue (Pigment Blue # 56), or the more expensive copper phthalocyanine blue to black inks.
- This increases the apparent jetness of the ink.

Black Pigment

- That is why some blacks turn bluer than others.

Black Pigment
Natural and Synthetic Black Iron Oxides

- Natural and synthetic black iron oxides are also known as:

- Pigment Black #11
- Magnetite
- Lodestone
- Magnetic iron oxide

Black Pigment
Natural and Synthetic Black Iron Oxides

- Natural Black iron oxide is ferrous ferric oxide; produced from magnetic ore.
- It is non-bleeding and relatively inert.
- Fe_3O_4 = BLACK IRON OXIDE*

* Note: This chemical formula is the same for natural and synthetic black iron oxides.

Iron Oxide Black Pigment
Natural and Synthetic

- Black exhibits excellent lightfastness.
- Compared to synthetic black iron oxide, the natural pigment grade is a grayer black, having a weaker tint strength and a larger particle size.
- The synthetic black is normally a highly desirable black and used for pigment manufacturing purposes.

Light Fastness Properties

- Lightfastness and bleed resistance of each pigment is crucial to the procedure outcome.

- Lightfastness is a logarithmic measurement, assessed on a scale of 1-8, based on the *Blue Wool Scale* and may be compared as follows:

Blue Wool Scale Rating	Description
8	Outstanding
7	Excellent
6	Very good
5	Good
4	Satisfactory
3	Fair
2	Moderate
1	Poor

Bleed Resistance Ratings

- Bleed resistance is also a logarithmic scale and is assessed on a scale of 1-5 for changes in coloration as follows:

Rating	Description	Observed Change
5	Excellent	No distinguishable discoloration
4	Very good	Very slight discoloration
3	Good	Some discoloration
2	Fair	Marked discoloration
1	Poor	Significant discoloration

Inorganic Pigment Colorant Summary

- Inorganic pigments contain metallic salts.
- Inorganic pigments do not require batch certification because the FDA does not consider inorganic pigments risky in regard to public health.
- Eyebrow raw umber, blues used for eyeliner, and white used by manufacturers for mixing purpose are all practical examples of inorganic pigments.

Natural Organic Colorants

- As a society we normally think of the word "organic" in relation to the way agricultural products such as food and fiber are grown and processed.
- Organic food production is based on a system of farming that maintains and replenishes soil fertility without the use of toxic and persistent pesticides and fertilizers (chemicals.)
- Organic foods are minimally processed without artificial ingredients, preservatives, or irradiation to maintain.

Natural Organic Colorants

- The permanent cosmetic manufacturers do not use *natural* organic colorants to manufacturer tattoo pigments.
- This also applies to the body art tattooing industry.

Natural Organic Colorants

- The most important reason that we don't tattoo with natural organic colorants is because:

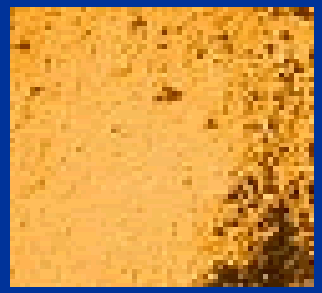
- They are ***dyes*** and they are ***soluble***.

- In order to make them insoluble, they would have to be combined with an extender pigment (alumina hydrate or barium sulphate)…….

  which makes them NOT natural any longer.

Natural Organic Colorants

Annatto
Orange #4



Turmeric
Natural Yellow #3

Cochineal Extract
Natural Red #4

Saffron
Natural Yellow #6

Carmel
Natural Brown
#10

Natural Organic Colorants

- Why are natural organic colorants not used for permanent cosmetic tattoo pigments?
  - 1. The powders are outrageously expensive and is cost prohibitive.
  - 2. The color variety is not available to supply the needed hues in demand.
    - As an example. there is only one natural organic brown – Carmel, Natural Brown #10 on the FDA color additive list for food, drugs and cosmetics.

Summary of Natural Organic Pigments

- Natural organic pigments are not used by permanent cosmetic pigment manufacturers.
- Natural organic pigments are extremely costly.
- Natural organic pigments are limited in color range offerings.

Natural Organic Colorants

- The most important reason that we don't tattoo with natural organic colorants is because:

- They are ***dyes*** and they are ***soluble***.

- In order to make them insoluble, they would have to be combined with an extender pigment or a substrate (alumina hydrate or barium sulphate)…….

  which makes them NOT natural any longer.

What This Means to Technicians

- Suppliers who advertise "organic" pigments are referring to synthetically (chemically) produced organic pigments not *natural source* organics.
- They may be (in my opinion) relying on the misconception that all organic materials are without chemical processing such as in "organically" produced aquaculture.

What This Means to Technicians

- In reality, inorganic pigments are from a natural source (the earth,) organic pigments are chemically manufactured for cost effective purposes and variety, whereas true natural organic pigments are not even used in our industry.

A Study in Terminology - Chemical Organic Pigment Colorants

- Organic pigments are intensely colored, particulate organic solids.

Chemical Organic Pigments

- Aside from the natural organics and inorganics (metallic salts pigments) today's organic pigments are synthetically made up entirely of chemicals to mimic the bright colors of natural organics.

- Most of these colors are dyes (soluble) and are combined with metallic salts to become insoluble.

The yellow synthetic powder mimic the bright yellow daisy.

The arrow and this statement are also synthetic organic colors (: -)

Chemical Organic Pigment

- They are essentially insoluble in, and physically and chemically unaffected by the vehicle, or substrate into which they are incorporated.
- Substrates are usually colorless and either alumina hydrate or a barium sulfate.

Chemical Organic Pigment

- Organic pigments are generally brighter, richer in color, and more expensive than their inorganic counterparts.
- <u>They are also typically less resistant to sunlight, humidity, and chemicals.</u>

Chemical Organic Pigment

- Chemical organic pigments are characterized as either *Toners* or *Lakes* by the U.S. International Trade Commission.

Chemical Organic Pigment

- A TONER is an organic pigment that is free of inorganic pigment or extenders.
- It is undiluted organic pigment with maximum tinting strength.
- Toner pigments are insoluble.

Chemical Organic Pigment

- A LAKE is an organic pigment composed essentially of a soluble dye that has been combined with an inorganic or organic extender.

- Lake pigments then become insoluble.

LAKES

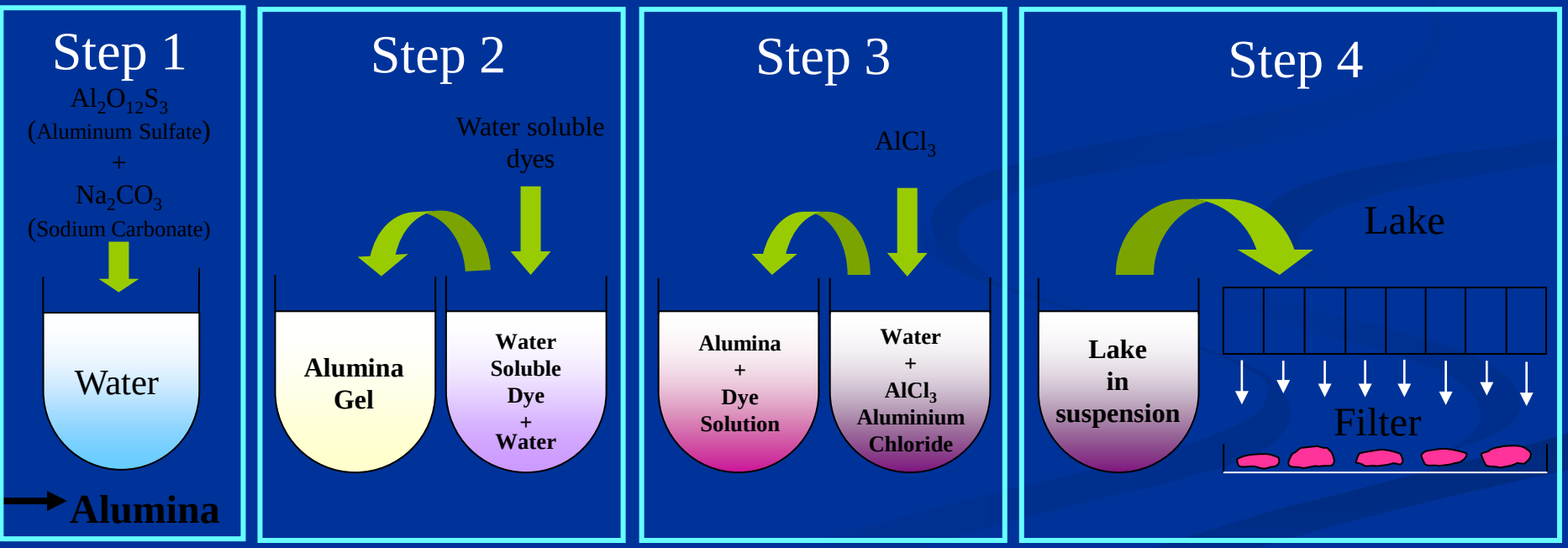
Example

- **Substrate** : Alumina hydrate

$$Al_2(SO_4)_3 + Na_2CO_3 + H_2O \longrightarrow CO_2 + Na_2SO_4 + Al_2O_3, H_2O + 2SO_3$$

- **Cation** : Al^{3+}

$$3RSO_3Na + AlCl_3 \longrightarrow Al(RSO_3)_3 + 3\ NaCl$$



LAKES

Manufacturing

Substrates : Alumina hydrate, Barium sulfate, Aluminum benzoate, Algae extract ...

Colors : - Water soluble dyes
- natural or synthetic dyes
- Widely used in foods/drugs/cosmetics, following US/JAPAN/EU regulations

Cations : - Aluminum salt (chloride, sulfate...)
- Calcium salt (chloride)
- Barium salt
- Iron salt

LAKES

Definition

Water soluble dyes adsorbed onto insoluble substrate

Converted into insoluble metallic salts (Al, Ba, Ca...)

Properties

Very bright shades

Moderate tinting strength (depending on dye content)

Low coverage (good transparency)

Light stability (usually poor)

Chemical stability (moderate)

Heat stability (=100°C max)

Chemical Organic Pigment

- In addition to acids, alkalis, inorganic salts, and rosin, the key raw materials in organic pigments are:

- petroleum based with:
  - benzene,toluene and xylene as the major building blocks.

Certification

- All food, drug, and cosmetic chemical organic pigments and dyes *are not on* the exempt from certification list.
- They are subject to certification.

Chemical Organics are all Subject to FDA Batch Certification

- Synthetic chemical colorants are required to undergo a batch certification process by the FDA.
- Samples of each manufactured batch are submitted to the Color Certification Branch of the FDA for their chemical analysis and confirmation that the submitted sample meets published analytical requirements.

What This Means to Technicians

- Chemical (synthetically produced) organics and dyes are considered more risky and require FDA batch certificaton.

CHEMICAL ORGANIC PIGMENT

Chemical organic pigments can be divided into six distinct chemical categories:

- Monoazo pigments:
  - This group contains all the Naphthol Reds, Lithol and Rubine Reds, Hansa Yellows and Oranges, Tartrazine Lake Yellows, Nickel Azo Yellows, and Pryazoloquinazolone Oranges and Reds.

CHEMCIAL ORGANIC PIGMENT

Disazo pigments:

- This group contains all the Diarylide Yellows and Oranges, the Pyrazolone Reds and Oranges, and the Condensation Yellows, Reds, Browns, and Oranges.

CHEMICAL ORGANIC PIGMENT

Phthalocyanine pigments:

- **This group contains all the Phthalocyanine Blues and Greens, and all the Isoindoline-Based Yellows, Oranges, and Browns.**

CHEMICAL ORGANIC PIGMENT

Quinacridone pigments:

- **This group contains all the Di-chloro Golds, Magentas, Yellows, Violet Blues, and Red/Yellows**

CHEMICAL ORGANIC PIGMENT

Acid and basic dye pigments:

- This group contains Acid Blues, Acid Greens, Acid Reds, and Acid Yellows.
- Triphenyl Methane and Diphenyl Methane bases are used in basic dye pigments for violets, magentas, blues, greens, reds.
- These dyes are usually part of a mixture of coprecipitated dyes.

In Conclusion

- There are many different processes that pigments are derived from which affect the healed color of the procedure.
- Many common problems associated with permanent cosmetics could be avoided if technicians would take the time to investigate and learn more about the pigments they use.

Ask Questions
Investigate - Always