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Ziatype Printing Kit Instructions

Your kit contains:

- (1) 25 ml Lithium Palladium Solution
- (1) 25 ml Ferric Ammonium Oxalate Solution (a.k.a Ammonium Ferric Oxalate, AFO, FAO)
- (1) 25 ml 40% Sodium Tungstate
- (1) 10 ml 5% Gold Chloride
- (1) 25 ml 1% Ammonium Dichromate
- (1) 250 gms EDTA clearing agent
- (1) 250 gms Sodium Bisulfite (for clearing)

You will also need the following items not included in your kit:

- Paper – a good 100% rag art paper with a fairly hard surface
- A brush or coating rod
- An ultraviolet light source – you can use the sun, UV CFL bulbs or a UV exposure box
- A negative as large as the desired image
- A split back print frame

History of the Ziatype

The Ziatype was developed in the Labs of Bostick & Sullivan in 1997. Richard Sullivan was looking for a better way to control color and contrast in a palladium or platinum/palladium printing system. About 20 years prior to then, Richard has tried Guiseppe Pizzighelli's Printing Out Process (POP) developed in the late 1800's without much success. In the mid 1980's, Dr. Michael Ware developed a variation of Pizzighelli's POP process which has enjoyed a loyal but small following.

This process is also a variation of Pizzighelli's process. It uses lithium (or cesium) palladium chloride as the primary metal and ferric ammonium oxalate for the iron compound. In the Pizzighelli and Ware versions, color and contrast are interlocked and controlled largely by humidity. In the Ziatype, the color and contrast are controlled chemically as well as in part by humidity, making a more controllable and flexible printing system.

B&S are continually striving to improve our products. This Ziatype kit is our new expanded kit designed for greater color variations.

Origins of the Ziatype Name

The Ziatype was named for the ancient New Mexico Anasazi pueblo peoples symbol for the sun. The Zia is the familiar circular image with 4 sets of 4 rays seen on the flag and license plates of New Mexico. To quote Richard Sullivan: "It seemed appropriate as our business is located in New Mexico and I had been using the sun to expose my prints."

The advantages of the Ziatype:

- A POP process, i.e. printing out system. Images can be evaluated as they print. In most cases, the first print will be successful. Far fewer underexposed or overexposed prints.
- Greater printing speed when compared to platinum and palladium.
- Greater color control. You can "dial in" various shades of cool tone, warm tone, blue black, brown black, red brown, purple, and grays.

- No developer needed. Just water.
- Cold Neutral black made with pure palladium.
- You can have lots of fun with split tones!

SAFETY NOTES

ALL CHEMICALS SHOULD BE USED WITH CAUTION AND KEPT OUT OF REACH OF CHILDREN. WEAR GLOVES WHEN HANDLING ALL CHEMICALS.

When using a hair dryer to dry your paper, tiny particles of emulsion may be blown into the air. If inhaled, the dust could be harmful. It is advised to wear a dust mask when drying prints with a hair dryer.

Notes on the Kit Chemicals

Lithium Palladium-

Lithium Palladium is a dark brown color and will last almost indefinitely. It does not oxidize or age. Be very careful not to contaminate with ferric ammonium oxalate or any other chemicals and always use glass containers, never metal as the palladium will plate out on the container. Refrigeration is not necessary for these solutions. Lithium Palladium is manufactured in house by our chemist Dana Sullivan.

Ferric Ammonium Oxalate-

Ferric Ammonium Oxalate is the chemical in your emulsion mix that is sensitive to light. It is a green color and will last up to 2-3 years.

40% Sodium Tungstate-

Sodium Tungstate is a clear solution and has a shelf life of approximately 5 years.. It adds a warm tone to the print and also reduces contrast.

5% Gold Chloride-

Gold is a yellow orange color and will last almost indefinitely. . Gold will increase contrast (increasing contrast always increases exposure time) and give you split tones. Depending on the ratios used with palladium and sodium tungstate, you can get pink, purple, blue, and sometimes green split tones. Gold Chloride is manufactured in house by our chemist Dana Sullivan.

1% Ammonium Dichromate-

Ammonium Dichromate is a dark orange color and has a shelf life of approximately 5 years. It darkens in color over time. **It is a known carcinogenic, ALWAYS wear gloves when working with this chemical.** Ammonium Dichromate increases contrast nearly twice as much as the gold does and gives a cooler tone print. Use sparingly, one drop will go a long way. Has been noted to increase grain and exposure time.

EDTA Clearing Agent and Sodium Bisulfite

Use these two powders together and add to water. Use 2 tablespoons of each to 1 quart of water. This is not a critical measurement; less will just take longer to clear, more will clear faster.

Some Basics

Your Negative

To begin with, you need a negative the size of the image you wish to make. Any size from 2 1/4 up will do. Small negatives make beautiful jewel-like prints. The negative should have a density range of 1.35 to 1.50. This will give a print with a full rich tonal range.

Inkjet Digital Negatives

Excellent Digital Negatives can be made from almost any digital image file. Negatives can be made from scanned images or RAW digital files from your DSLR. Several excellent guides to making negatives can be found online. Please check out our online resource for making digital negatives: <https://www.photo-historica.com/digitalnegatives>

Large Format Negatives

You can use in-camera negatives for this process as well! If this is the route you are going, we recommend shooting on readily available films like Ilford HP5 and Ilford FP4. Develop your film in a high contrast developer like D-19, or Pyro based developers like Rollo Pyro or Pyrocat-HD, all of which can be found for sale on our website: www.bostick-sullivan.com.

Workspace Lighting

We recommend you coat under dim fluorescent room lighting with no uv and then let the coated paper dry in the dark. Incipient fogging may compress the midtone values, it is very important that the drying emulsion be in the dark in between coating and exposure.

Emulsion

For a basic 8x10 Ziatype print, start with 20 drops of ferric ammonium oxalate and 20 drops of lithium palladium. This is your base starting point to make a neutral tone Ziatype. This will make a nice cool neutral black print while the emulsion is wet. If the paper dries out, you will get a warmer tone print.

****We recommend a drop of tween 20 (surfactant) with your emulsion to help soak the chemistry in more evenly. It also helps decrease brush streaks. Works with most papers except for the Arches Platine.****

Notes on Color and Split Tones

The Ziatype system was designed so that color and contrast are chemically controlled. Changes in the paper humidity can affect both color and contrast. The Ziatype worker needs only to devise a working method that is fairly consistent and produces coated paper with close to the same humidity level. Once that is achieved, color and contrast can be easily controlled.

Color Additives

Different Colors and Tones vary with paper, humidity level, and the chemicals you choose to add into the mix. **See Drop Count Chart on page 7.**

- Grays, blues, and purple split tones can be obtained by **replacing** any portion of the lithium palladium solution in the emulsion mix with a 5% gold chloride solution. Gold will also increase the contrast. You can use a little bit to give your print a boost or use more to get split tones. Please see drop chart on following page.

- If you want a warm brown tone, you can either use Cesium Palladium instead of Lithium Palladium entirely, add a few drops of Sodium Tungstate to your emulsion, or let the emulsion dry longer. Sodium tungstate will add a warm tone to your print as well as decrease the contrast.
- To increase contrast and keep the color tone very cool, you can add 1-2 drops of 1% ammonium dichromate. Ammonium Dichromate increases contrast, grain, and exposure time. Use slowly, building up the contrast 1 drop at a time.

***Please note, Gold Chloride cannot be used with Cesium Palladium.**

Ziatype Drop Count Formulas

Amount of Drops for emulsion per size:

4x5 print- 10-15 drops total

5x7 print- 15-20 drops total

6x9 print- 30-35 drops total

8x10 print- 40-45 drops total

The Chart on the following page is courtesy of Richard Sullivan and Carl Weese, example drop counts of how to get different colors and contrast levels. **These are starting points to start with for a 5x7 print.**

Abbreviation symbols:

FAO (AFO)- ferric ammonium oxalate, also written as ammonium ferric oxalate.

LFO- Lithium ferric oxalate

CsPd- Cesium Palladium

Tn- Sodium Tungstate

LiPd- Lithium Palladium

ad- Ammonium Dichromate

FAO (AFO)	LFO	LiPd	CsPd	Gold	Tn	Color	Contrast
12		12				Neutral slate Grey Black	low
12			12* warm			Warm brown	low
12		10		2		cool	medium
12		8		4		Very cool	high
12		4		8		purple/lavender	Very high
12		9		3	2	green/blue-blue black	low/medium
12		11		6		blue/blue black/purple	medium/high contrast
12		12			2	Slightly warm sepia	medium/low
12		12			3	Very warm sepia	low
	12	12				Red warm	medium
6	6	12				warm	low

Drying and Humidification

****Humidity is very important for Ziatype. The room needs to be around at least 50% humidity in order to produce consistent prints that don't dry out too fast on you.****

The Ziatype process depends on humidity in the paper to allow the development to occur during the exposure. The process is quite flexible so working practices among printer may vary. Beginning Ziatype Printers should follow this outline first.

One Step Drying

This is the best method to obtain a true black. First coat your paper with the measured amount of emulsion (see drop chart on page 10). Let the print sit for two or three minutes. Using a hair dryer with a cold air setting, blow dry till the surface of the paper is just dry. The paper should not crackle when snapped or bent back and forth gently but quickly. It should sound a little “dead”. In no case should the paper be wet enough to transfer any emulsion to a negative. The Paper is now ready to print.

Sidenote from Richard’s research:

“Carl Weese and I have been working closely and sharing our research information on the Ziatype process. He has perfected a method that is almost foolproof.

The basic trick is to run your darkroom at 50-65% humidity with your room temperature at 65° F or above. You will need a humidity and temperature gage. I need to run a fairly large humidifier due to the exceptionally dry atmosphere here in Santa Fe. We are also at 7000 feet altitude., which doesn’t help much either. When I am in a hurry and the humidity is low, I run hot water in my 16-foot darkroom sink and when Bostick (Melody) isn’t around to complain, I spray some water on the floor as well. Carl is in Connecticut and only needs a small electrostatic drugstore humidifier to get his up to the recommended level. I suspect those in Key West, Florida may need a dehumidifier to get to the 50-65% level.

Once your darkroom is set to the right relative humidity and heat range, the process is simple.

- *Coat your paper.*
- *Let is sit for 2 minutes to soak in.*
- *Dry for 1 minute under a cool air stream; a small clip on fan will do nicely. Tlme will vary depending on fan and print size.*

What is important is consistency. Once you get a routine that produces prints you like, just repeat the humidity and drying times. Everything else like color control and contrast control will then be chemically dependent.

Two step drying and Humidification

This method will produce black to black-brown prints with Lithium Palladium.

First coat with a brush or glass rod and let the coated paper sit for a few minutes as in the One Step Method.

Dry the paper thoroughly on both sides. To humidify, take the print and move it back side down about 6 inches over the spout of a humidifier. (A standard ultrasound “sick room” humidifier works best) Occasionally turn it over and humidify the front but be very careful to not get any splotches from water drops. Try to get an even coating of the paper with the steam. An 8x10 piece will take one-two minutes to properly humidify on both sides. A good rule of thumb is to listen to the crackle of the paper. Snap the paper a little and listen. When starting out, it will sound very crackly, as humidity builds, it will sound more dull.

Preparing for Exposure

A good split back contact printing frame will be necessary in order to check by inspection the exposing print.

Take two pieces of mylar/acetate that are the same size as your paper or at least are larger than your coated area and sandwich the paper between the two. The back one will trap humidity in the back of the print while the top piece will protect your negative. (If using a Krystal Seal sleeve on your negative, you just need one piece of acetate in addition for the back side of the paper.)

****We have noticed that due to the necessity of the paper needing to be wet and the use of acetate sheets while exposing, that fall out spots or blurry spots in your print are much more common. The paper is basically drying and moving while exposing. You may need to use 3 or 4 pieces of a thick backing paper to put between the acetate and the back of the print frame to ensure as much contact as possible. ****

If you decide to use Acetate/Mylar, assemble the components in this order:
Glass, negative, mylar/acetate (if negative is not in Krystal Seal), coated paper,
mylar/acetate, backing paper if needed, frame back.

Exposure

Use either a standard UV light bank or sunlight. Ziatype is traditionally 2-3 stops faster than traditional developing out platinum and palladium. Ziatype is a printing out process, you can evaluate exposure while the print is exposing. Exposure should continue until the print looks right, and there is the desired detail in your highlights. It will appear yellow in the highlights but over all the exposure will be correct.

Wet Processing

You will need at least three baths set up in your darkroom space. One for developing (water), one for clearing (EDTA and Sodium Bisulfite), and a final wash bath. If limited space, Two trays would do, one for water and one for clearing.

After exposing, immerse your exposed print in running water for 2 minutes.

Next, immerse in your clearing bath for 10-15 minutes. The clearing bath removes the ferric ammonium oxalate from your print. There should be no yellowing in the print otherwise it is not fully cleared. **To make clearing bath, use 1-2 tablespoons of each EDTA clearing agent and Sodium Bisulfite to 1.5 liters of water.** (It is best to use distilled water when you can. Most tap water will be just fine for your wash baths, however sometimes hard water can cause problems, be sure to make a few test prints.

Finally, do a final wash in wash for about 10 minutes. Blot with paper towel and hang to dry or dry on screens. You can flatten with a dry mount press or a clothing iron.

Making The Print (Overview)

****Reminder:** Humidity is very important for Ziatype. The room needs to be around at least 50% humidity in order to produce consistent prints that don't dry out too fast on you.**

1. Select a good 100% rag or cotton paper. We recommend Bergger Cot 320, Arches Platine, Revere Platinum, Hahnemuhle Platinum Rag, and Japanese Kozo papers.
2. Count out the number of drops for all printing solutions into the same small plastic or glass container (about the size of a whiskey shot glass).
3. Place the paper on a table top or coating board. Lay your negative, or a mask the same size as your negative over your paper, then faintly mark the borders or corners of your image area in light pencil. This gives you a guide for the area to be coated.
4. Quickly pour the coating solution across the center of the paper and rapidly spread it as evenly as possible with a **wet** brush. Bring your solution out to the 4 corners you marked and then work on evenly spreading the emulsion within those marks first. Once inside the marks is evenly coated, spread any extra solution past the marks to create your signature "brush strokes". You want to coat until all the puddle and bubbles of solution is gone and then stop. There is a sweet spot of the right amount of emulsion. Too little in one area and the emulsion will be too thin and overexpose too quickly. Too much and it will come off in the wash. The right amount of emulsion with the right exposure time will give you a beautiful dmax. If you over brush, you'll see streaks and coating marks in your final print.
5. Ziatype requires humidity in the paper to get the POP affect and to have a cool tone. Practice which humidification method from above and the amount of dry time you need to get your desired results you are looking for. Let dry for 5 minutes, 7 minutes, 10 minutes etc. before exposing. Be sure to keep track of the results. Timing dry time is a very helpful tool for consistency in printing. You want the back of the paper to feel cold (meaning that it is still wet) but the top of the paper to feel almost dry. If you are in a humid environment, you might want to use a hair dryer on the top side of the paper to dry it off. If you are in a dry environment, it is not recommended to use a hairdryer unless you aim to get warm prints. Wet emulsion=cool tone, dry emulsion=warm tone. Please be sure that you do let your coated paper dry for at least three minutes. The emulsion needs to soak in and settle otherwise it will be too wet and splotchiness will occur as well as emulsion lift.
6. Place the negative (we recommend place your negative in a Krystal Seal clear acetate bag, it will protect your negative from any wetness the emulsion may still have) on top of the coated portion of the paper and place it in a split-back contact printing frame.
7. Expose the paper using sunlight, a suntan type mercury vapor lamp, or UV Exposure Unit. The artificial light sources should be placed 3 to 4 inches above the paper or higher if using Nuarc type screen printing unit. Printing time will vary depending on your light source, the density of your negative, and the paper used. Using a sun lamp to expose a 4x5 negative will take about 3 to 8 minutes. Dense negatives can run a half hour or longer.
8. After exposure, develop the print immediately in running water. Do not use metal trays for developing the print as this will adversely affect the print. Pour water quickly over the print, pouring rapidly enough to break any air bubbles that may form on the surface.

You can do this by pouring water from a pitcher and at the same time tilting and sloshing the contents of the tray over the print. You can also tilt the tray up with one hand while your other hand slides it the print into the water and you let the tray drop to slosh the water over the whole print quickly. The print will develop immediately. Development is complete within a few minutes. Recommended minimum development time is 2 minutes.

9. Drain off excess water off the print and then soak in 1-2 successive baths of clearing agent: mix 2 tablespoons of both EDTA and Sodium Bisulfite to 1 liter/quart water, 10 minutes in each bath or 10-15 minutes in one bath. Fresh clearing agent will clear up to a 20-25 8x10 prints. Water hardness will sometimes affect clearing time. The clearing process removes the ferric oxalate from the print. If the print shows any yellowing in the highlights, it is not being properly cleared. Increase the concentration of the clearing agent or increase the time in the bath. Throw away the clearing bath when finished.
10. Finally, wash for 1/2 hour in gently flowing water. Dry, flatten, mount or mat in your preferred manner.



Check out our website to order any and all of your alt process supplies!

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