

THE BOOK OF ALTERNATIVE PHOTOGRAPHIC PROCESSES: 2nd Edition
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2008

SAMPLE - CHAPTER 2
THE SALTED PAPER PROCESS

[Fig 2 – 1 here](#), (France Scully Osterman, *Light Pours In*, 2002 - waxed salt print from 8 x 10 neg / H. Greenberg Gallery)

OVERVIEW & EXPECTATIONS

The Salted Paper, and the calotype chapter that preceded it, share a homologous history, largely because the inspiration behind both processes was William Henry Fox Talbot (1800-1877). He was also the person who took 200 years of assorted scientific clues regarding light, metal, salt, and the camera obscura and solved a significant portion of the puzzle. For that reason, the two chapters share a combined narrative and they are written with the intention that you will connect them as a single account in the development of salted paper photography.

This chapter will feature “a little history” of the investigations of chemists and scientists who preceded Talbot, including Schulze, Hellot, Scheele, Wedgwood, and Davy. William Henry Fox Talbot, however, plays the leading role in this account of the development of the salted paper process, as he did in devising the *art of fixing shadows* through photogenic drawings and the calotype process ... the first chemically developed latent image and the first light sensitive, silver-based, negative to positive paper imaging system. This set the stage for the future of photography in which the negative could be used as a matrix to reproduce an image multiple times. The chapter will also illustrate how Talbot’s discovery, and work, fit into the context of photography’s beginning and it’s future impact upon world cultures.

The chemistry and formulas for salted paper will be revealed and you will learn variations of sizing and salting formulas. Also described are variations of silver nitrate sensitizing formulas, application techniques, and guidelines for how the prepared paper is exposed and processed. You will also learn a number of toning options along with fixing and final washing considerations. My advice to you, should you want to get a good idea of the path Fox Talbot explored, is to go back a chapter and begin by learning how to make a calotype.

[ICON 1 here, \(A Little History\)](#)

A LITTLE HISTORY

Fox Talbot Gets Married

The salted paper process owes its existence to several hundred years of very clever men and women studying the surprising, and assorted, relationships between light and chemistry. The actual process, and concept, made its unique debut in the imagination of William Henry Fox Talbot while he was on his honeymoon in 1833. Talbot, his new bride, Constance, and his new toy, a *camera lucida*, traveled to Lake Como, Italy, to celebrate the beginning of their life together. While attempting to make a decent drawing of the lake (*which is truly beautiful and well worth the effort of attempting a drawing*) with his *camera lucida*, (Fig 2-4), Talbot confronted, head-on, his utter lack of talent for rendering. At this point he considered the possibility of how charming it might be to permanently capture the images he was seeing in a more perfect manner and to return home and impress his friends and neighbors. When the honeymoon concluded, Talbot, his new bride, and the useless camera lucida returned to England and he set to work on a solution for his inspiration... a burning desire for vacation pics. In 1834 he came up with the beginnings of a significant discovery.

[Fig 2 - 2 here, William Henry Fox Talbot, Camera Lucida Drawing, Italy, 1833](#)

William Hyde Wollaston's Camera Lucida

In 1806, William Hyde Wollaston (1766-1828) invented the *camera lucida*, a drawing and tracing instrument welcomed by many English gentlemen and women who were not only expected to be scholars and intellectuals but also to possess the skill to render an object with a pencil in a lifelike manner... something Talbot could not do very well even with the aid of the *camera lucida*. It should be noted that Sir John Herschel was quite good with the device... very good actually.

A *camera lucida* is composed of a series of interrelated parts including an eye-level glass prism held by a rod and connected to a drawing surface. All the operator had to do was look through the prism, and the image before the "artist" was visible at both eye and drawing board levels simultaneously. The operator's task at that point was to "*trace*" the projected image on the drawing board to achieve a realistic graphic interpretation of the subject. Unfortunately, or perhaps fortunately, the device was not an easy one for Talbot to use, and it was his difficulty mastering it that drove him to seek a way to make his holiday images in another, and more perfect, way.

But First... Schulze, Scheele, Wedgwood & Davy

But first ... in 1802, 31 years before Constance and William went on their honeymoon, Thomas Wedgwood and his friend, Sir Humphry Davy, made what may have been the first silver sensitized *photogram*. Wedgwood, as mentioned in an earlier chapter, was familiar with the scientific investigations of Johann Heinrich Schulze (1687-1744) who, in 1725, accidentally discovered the darkening effects of light on silver when he mixed silver contaminated nitric acid with chalk (*calcium carbonate*), creating silver carbonate. He was attempting to make a phosphorescent compound associated with the study of alchemy and called "aluminous stone" or Baldewein's Phosphor. Curious about why his results turned a deep violet when exposed to sunlight; eventually he figured out that it was caused by contamination of the acid solution by silver.

Schulze was aware that the silver nitrate in his lab had turned dark in its glass bottle... except for where the bottle's label on the jar covered the chemical. This prompted Schulze to conduct experiments on the light sensitive properties of silver

salts. He did this by first filling up jars with a mixture of silver nitrate and chalk. He then got to work cutting out, and adhering (with bees wax), paper alphabet letters to the outside of the silver nitrate jars. Regarding his investigations he wrote, "... *I often wrote names and whole sentences on paper and carefully cut away the inked parts with a sharp knife. Thus I struck the paper thus perforated on the glass with wax. It was not long before the sun's rays, where they hit the glass through the cut-out parts of the paper, wrote each word or sentence on the chalk precipitate so exactly and distinctly that many who were curious about the experiment but ignorant of its nature took occasion to attribute the thing to some sort of trick.*"

A very interesting side note regarding Schulze's experiments and silver nitrate's sensitivity using letter stencils... In 1737, French chemist, Jean Hellot (1685-1766) recommended the use of a dilute silver nitrate solution as an invisible ink that could be utilized by spies in the course of their espionage. According to Hellot, the message to be delivered by the spy would be written using silver nitrate. Later, having reached the intended eyes, the message could be made legible by exposing it to sunlight where upon the color of the secret message would turn purple, then brown, and finally black.

A short time later, Swedish chemist (pharmacist) Carl Wilhelm Scheele (1742-1786), published a book entitled, *Chemical Observations and Experiments on Air and Fire* (1777). In it, Scheele worked with his newfound knowledge of how the blue - violet end of the spectrum had a noticeable impact on a compound of silver and chlorine (*silver chloride*) through the chemical act of salt to metal reduction. Scheele's findings were later confirmed by Jean Senebier (1742-1809), who re-confirmed the sensitivity of silver chloride to blue-violet rays, noting that darkening took a scant 15 seconds versus the 20 minutes it would take to achieve the same effect if the rays were solely from the red end of the spectrum.

Just for your interest, in a publication titled, *Mémoires physico-chimiques sur l'influence de la lumière solaire*, (Genève 1782, vol. III), Senebier's experiments are described; they reveal muriate of silver's (*silver chloride*) sensitivity to the various

bands of the light spectrum. Times required to darken muriate of silver by the rays of the sun: red = 20 min., orange = 12 min., yellow = 5 min. & 30 sec., green = 37 sec., blue = 29 seconds, violet = 15 seconds. This knowledge had a significant impact on Sir Humphry Davy when he and Thomas Wedgwood began experimenting with silver nitrate on white leather 20 years later.

Scheele eventually gave up his occupation as a pharmacist for the rarified life of a university professor so that he could dedicate himself to revelation and discovery. Among the gems... an observation that silver chloride could be dissolved by ammonia but that darkened (exposed) metallic silver was impervious to it. This employed knowledge allowed him to preserve his experiments with exposed silver chloride, on sheets of paper, by bathing them in an ammonia bath... a method of fixing / clearing the print that was ignored for years! Armed with the knowledge of Senebier's and Scheele's work, (with the exception of overlooking Scheele's ammonia fixing bath), Wedgwood and Davy commenced coating paper, glass, and bleached white leather with silver nitrate solutions and laying stencils and other object on these surfaces in sunlight.

You may recall from an earlier "A Little History" segment how, in 1793, Davy had been told by Joseph Priestly about some experiments being conducted by Elizabeth Fulhame and how those efforts eventually became the foundation of her 1794 self published book, *An Essay on Combustion, with a View to a new Art of Dying And Painting, wherein the Phlogistic and Antiphlogistic Hypotheses are Proved Erroneous*. In this early research, Fulhame had been seeking a way to impregnate, and stain, fabrics with precious metals such as gold. She hypothesized that this might be possible with the influence of water and light and her research brought her to the conclusion that water played the major role in catalytic reactions as both the *reducing* and *oxidizing* agent. She also noted that following those actions the water was always restored to its original state. Fulhame suggested that if one were to take advantage of the phenomena of silver and light interaction that this might be employed by cartographers as a technique to create maps. My assumption is that Davy, being a very intelligent and curious scientist, put all of these influences together when he went into collaboration with Wedgwood.

During the photogram exposures made by Davy and Wedgwood, the silver salt sensitizer turned a gray, purple brown (*the same colors that Talbot achieved in his photogenic drawings preserved with salt water*), and eventually, black in the areas open to exposure. Their "*Sunprints*" required only a simple water wash to remain visible and were successful enough that Wedgwood and Davy formalized their discovery ... which of course exposed the paradox that the light that they needed to make an image would also destroy that image if it could not be stabilized. Undeterred, Wedgwood and Davy exhibited their stenciled photograms by candlelight, thus permitting their work to be acknowledged. Although there is evidence that a few of these prints were still visible into the late 1800's there are none, that I am aware of, in existence today. Eventually, Wedgwood and Davy published their discoveries in a manuscript titled: *An Account of a method of Copying paintings Upon Glass and Making Profiles by the Agency of Light Upon Nitrate of Silver* (1802).

By the early 1840s, amateur artists and chemists were employing photogram techniques with simultaneous creative and practical scientific intentions. Notable projects underway during this period were Sir John Herschel's Anothotypes created with the juices of flowers and sunlight; Anna Atkins' cyanotype studies of algae (*a process she presumably learned from Herschel who lived down the road, and who had invented the process*); Mongo Ponton's work with potassium dichromate as a light sensitizing solution for his "*shadowgraphs*" (which would lead to the gum bichromate process); and William Henry Fox Talbot's efforts with his photogenic drawings and later, calotype paper negatives. And after that short history excursion we are now back to Talbot's significant discovery in 1834.

In January of that year, Talbot began to experiment with the ideas and inspirations generated on his honeymoon trip to Lake Como. Using his knowledge of past silver salt experimentations he proceeded to create precise photogram "tracings" of flowers, leaves, feathers and lace on salted and silver nitrate sensitized stationary. He called his discovery "*the art of photogenic drawing.*"

In Talbot's earliest photogenic drawing exercises, he coated a fine piece of gelatin-sized stationery in a weak solution of common table salt (*sodium chloride*). The paper Talbot used was typical of the majority of quality stationery manufactured in the 1800's and intentionally sized and infused with gelatin, and / or other natural organic binders such as albumen (*egg whites*) and whey (*a high protein by-product of cheese making*), in order to enhance the sheet strength of the paper. English made papers were traditionally surface sized with gelatin while French papermakers employed starch for the same purpose.

After the salted stationery had dried, Talbot applied a second coating of a 6% - 8% silver nitrate solution... or stronger. This idea wasn't a completely serendipitous inspiration, as we have seen there is evidence of a fairly well worn path leading to the moment. When the silver nitrate coating had dried, a light sensitive compound of silver chloride had precipitated within the fibers of the paper. What Talbot was to surmise later was that the silver chloride will provide only a wispy rendition without the impurities within the paper to absorb the chlorine formed during the compounding of silver and sodium chloride. It is the excess of silver nitrate that facilitates the reaction.

[Fig: 2 - 3 here](#) (William Henry Fox Talbot, *Photogenic Drawing of a Leaf*, 1839)

These *Sciagraphs*, or *Photogenic Drawings*, that Talbot made during his experiments were semi-preserved with a bath of saturated salted water, although, as Talbot noted, "*we shall find that its [regarding his exposed paper] sensibility is greatly diminished, and, in some cases, seems quite extinct.*" Talbot went on to write that if that same piece of paper was then to be washed with an additional coating of silver nitrate it would become sensitive once again – indeed, even more sensitive than the first time. Excited by the idea of creating an even faster exposure, Talbot noted that the proportions of salt and silver were critical and that in some cases the silver chloride was *disposed to darken of itself* without any exposure to light at all. Eventually, he got to the point that he could alternate between percentages, and numbers, of washes of salt and

silver nitrate to the critical point where the paper would be ideal for rapid exposure in the camera obscura.

His method of selecting which piece of sensitized paper to use was an interesting one. He would prepare several large sheets in the manner described, cut off small samples, and number both. He would then lay the test samples out in a line in very diffused light for 15 minutes. The sample paper that showed the greatest tendency to change, under the influence of that low light, was the winner of the test and Talbot would proceed to use its larger companion sheet (the one with the corresponding number) for his camera obscura exposure.

It is interesting to point out several things at this juncture in the process. First, in Talbot's initial attempts to "fix" his *photogenic drawings* he used Scheele's ammonia fixing bath from 1777 but with, as he wrote, "*imperfect success.*" Talbot then recalled a remark by Sir Humphry Davy in which Davy indicated that his experiments with the iodide of silver (*actually a sub-iodide*) showed that chemical to be more sensitive than silver chloride in producing a light sensitive reaction.

During a subsequent residence in Geneva, in 1834, Talbot tried working with Davy's information and discovered that in his own experiments the opposite was true and that Davy's silver iodide formula was not sensitive to light in the least. Talbot immediately began to use this knowledge as a way to *fix*, and stabilize, his silver chloride photogenic drawing images by dipping them in a very dilute bath of iodide of potassium. In this way, an iodide of silver was formed making a fixing bath that would render the print, "*absolutely unalterable by sunshine.*"

[Fig 2 - 4 here](#), Carol Panaro-Smith & James Hajicek, *Earth Veg 2*, 2005

During the "*brilliant summer of 1835*" Talbot returned to his original goal of making pictures in camera and created the first camera-made paper negative that could be used to generate multiple positive photographic prints. (See Fig: 4-3, *Latticed*

Window at Lacock Abbey (with the Camera Obscura, August 1835). Following his discovery, Talbot wrote a charming description of this experience in his 1839 paper to the Royal Society, *Some Account of the Art of Photogenic Drawing*. He wrote, "In the summer of 1835 I made in this way a great number of representations of my house in the country... and this building I believe to be the first that was ever yet known to have drawn its own picture."

The year 1839 was a big one for photography and the first months were really chaotic. On the 7th of January, Daguerre's "invention" of photography was delivered, to the Academie des Sciences in Paris by Daguerre's friend, Dominique François Arago. Talbot immediately wrote a letter to Arago, not realizing that the two techniques were quite different, informing him that it was he, not Daguerre, who had invented this image-making process.

You may recall that the French Ministry of Finance clerk, Hippolyte Bayard, had shown his own invention of photography, direct positive images on sensitized paper, to the same Monsieur Arago just three months earlier. But Arago had already invested too much of his reputation in Daguerre, so Bayard was told to be quiet and was subsequently ignored. On the 25th of that same month, Michael Faraday (1791-1867), the discoverer of *electro-magnetism*, showed Talbot's work to the members of the Royal Institution. On the 31st, Talbot unveiled his salted paper "photogenic drawings" to the Royal Society in London and read from his paper *Some Account of the Art of Photogenic Drawing or the Process by Which Natural Objects may be Made to Delineate Themselves Without the Aid of an Artist's Pencil*.

Fig: 2 – 5 here (Charles Nègre – *The Vampire (Henri Le Secq) at Notre Dame Cathedral, 1853*)

Mr. Talbot's Ferns Are Fixed by Mr. Herschel

Talbot's friend, Sir John Herschel, became very interested in all of this commotion and wrote a letter to Talbot using the word "*photography*" for the very first

time. Then, on the 1st of February, Talbot dropped in on Herschel for tea and learned of Herschel's knowledge of the fixing abilities of sodium hyposulphite of soda (*sodium thiosulfate*), a fact that Herschel had actually realized some 20 years earlier.

In a letter written by Maggie Herschel to her son, Alexander Herschel, in February 1872, she wrote. "*I remember very well the visit... to Slough of Mr Fox Talbot, who came to shew [sic] to Herschel his beautiful little picture of ferns and Laces taken by his new process – when something was said about the difficulty of fixing the pictures. Herschel said, 'let me have this one for a few minutes,' and after a short time he returned to give the picture to Mr. Talbot saying, 'I think that you will find that fixed' – this was the beginning of hyposulphate of soda fixing.*"

[Fig 2 – 6 here](#), (Dan Estabrook, #9, Euphoria, 2004 – salt and ink)

With Herschel's consent, Talbot described this last piece of the photographic puzzle. When Daguerre heard the news, he immediately embraced the chemical for use in his own work, thus solving one of his biggest problems. On February 8, 1841, Talbot placed a restrictive patent on his calotype discovery nearly putting the brakes on the new "photographic" medium.

The effects of Talbot's patent were relatively short lived however, due to the enthusiasm of other scientists for making pictures and to the advent of Blanquart-Evrard's albumen technique and its integration with Frederick Scott Archer's wet-collodion glass plate negative process in 1851. It is interesting to note that Talbot eventually realized that he had not perfected an art form but had certainly commenced one, and it is Talbot's salted paper process that led directly to our modern silver halide based photography.

[ICON -2 here](#), (Table Set-Up)

GELATIN SALTING, CHEMISTRY & FORMULAS

In 1835 Fox Talbot had no need to size his papers with gelatin because the fine stationery of that time was manufactured with gelatin and other organic binders in the rag fibers. In my workshops and classes I have found that a simple gelatin sizing is an easy way to enhance the quality, contrast and tonalities of the salted image. This may be less than a pure approach to the process but it beats being frustrated by the inevitable dry-down that occurs in salted paper. Don't size automatically. Try many different kinds of papers and you may get lucky. If not, and it is more and more likely that that will be the case, try gelatin sizing with one of the salting formulas that follow and evaluate your degree of success. If you run into a problem, there's more than a good chance it can be fixed with attention to detail and simple gelatin sizing. In the salted paper process, the paper is initially coated with a gelatin or starch, and salt (*sodium chloride*) solution. Here are several formulas and we'll begin with my favorite.

TABLE & SINK SET UP FOR GELATIN SALTING PAPER

Gelatin Salting #1

(Yields a reddish - purple salt print without toning)

- 8 g gelatin

(Knox gelatin from the grocery is OK / photo grade is better, i.e. Maco - LPE410 or Bostick & Sullivan's photo grade)

- 18 g sodium citrate
- 20 g ammonium chloride
- 1 liter (1000 ml) of distilled water
- Electric kettle for heating water
- Several clean plastic beakers
- Clean trays for salt soaking the paper: 1 large and 1 small
- Clothesline for hanging salted paper
- Zip Lock bag for paper storage

I use this sizing formula almost exclusively and find it especially successful when used with classes or workshops with a large number of people. Remember this important rule of gelatin sizing... keep your gelatin warm at all times.

Gelatin Salting #2

(Yields a blue - purple salt print without toning)

- 8 g gelatin (*Knox gelatin from the grocery is OK / photo grade is better, i.e. Maco - LPE410 or Bostick & Sullivan's photo grade*)
- 18 g sodium citrate
- 20 g sodium chloride
- 1 liter (1000 ml) of distilled water
- Electric kettle for heating water
- Several clean plastic beakers
- Clean trays for salt soaking the paper: 1 large and 1 small
- Clothesline for hanging salted paper
- Zip Lock bag for storage

Contrast Control in Sizing for Gelatin Salting #1 & #2

Employing a slightly weaker salting solution can increase contrast. Increasing the amount of sodium citrate in your gelatin / starch sizing solution will reduce contrast, whereas decreasing the amount of sodium citrate, or eliminating it altogether, will increase the contrast. Make adjustment in very small increments.

Gelatin Salting Step Sequence

Step #1 - Begin by soaking the gelatin, in a clean plastic beaker, in half of the water at room temperature for 15 to 20 minutes. This period of time is referred to as the "bloom" time. The bloom number of your gelatin will inform you as to its hardness. Knox gelatin has a low bloom number and is considered "soft." Photo grade gelatin has a higher bloom number and is harder.

After the bloom, add the remaining 500 ml of distilled water and heat the solution to 100° F. I find that the easiest method of doing this is to create a double-boiler like system where you have a very clean plastic beaker to hold your sizing solution and this is set into a larger container holding water warm enough to maintain a 100 degree constant temperature.

Step #2 - When the gelatin and water mix is at temperature, slowly add the sodium citrate and ammonium chloride and stir slowly into solution.

Step #3 - Prepare a "double-boiler" tray set up where a smaller tray (large enough for your paper) is filled with the warm gelatin and salts... see each formula for specifics. This smaller tray is set into a larger tray filled with very hot water. The smaller tray floats on the hot water in the larger tray keeping the gelatin warm during the sizing. If the gelatin cools, it hardens... just like a gelatin dessert.

The purpose of the gelatin sizing is to prevent the silver nitrate from sinking too deeply into the paper. As well, it helps eliminate a muddy looking image after dry down. The primary difference between Gelatin Formula #1 and #2 is an ammonium chloride / sodium chloride swap. The use of ammonium chloride will result in a little better contrast and a reddish - purple tonality. If, on the other hand, you wish to lessen the contrast, or have a print that is blue – purple, then you should consider the Gelatin Salting Emulsion #2 with sodium chloride formula.

Step #4 – Gently feed your paper, a sheet at a time, into the tray of warmed gelatin salted solution. I like to put about 10 sheets of paper into the gelatin at a time and slowly sort through the stack being sure to immerse each sheet completely.

Step #5 - After 3 to 5 minutes, remove the paper from the warm gelatin solution and hang each sheet on a line, with clothespins, to dry. After the first minute or so, flip the papers upside down on the line to prevent the gelatin from hardening on the lower half of the hanging paper. This will help ensure an even coverage. When the paper is dry,

flatten it in a dry mount press at a low temperature, raising and lowering the platen so as not to burn the gelatin. If you don't have a dry mount press, don't worry about it.

[Fig: 2 – 7 here](#), (Allyson Fauver, Salt #10, 2005)

Fauver's Gelatin Salting Formula

- 20 g citric acid
- 20 g Kosher salt (*Sodium Chloride - Morton's Kosher*)
- 4 g Knox gelatin (or photo grade gelatin)
- 1000 ml distilled water

This formula is one used by Allyson Fauver who is one of the best salted paper printers I know. Allyson's images are known for the brilliantly deep reds she achieves and by her traditional use of salt as a fixing bath. Notice that there is no sodium citrate in her formula. Begin by making sure everything you will be using ... beakers, stirrers, trays, etc. are meticulously clean.

Step #1 - In a 1000 ml beaker, sprinkle the gelatin into 200 ml of cold distilled water and let it stand for 15 minutes.

Step #2 - Dissolve the sodium chloride (Kosher Salt) and citric acid in 700 ml of distilled water that you have heated to a 100° degree constant temperature

Step #3 - Pour the sodium chloride / citric acid solution into the gelatin solution, and add hot (distilled) water to make a total volume of 1000 ml. Place the beaker, double boiler style, in a larger beaker of hot water and stir well until the gelatin is fully dissolved.

Step #4 – Continue the gelatin salting sequence as detailed above.

Allyson's Deep Red

Allyson's deep red coloration is due to her post exposure work on the print. She washes her images in a 3% salted bath (a 30 g of Kosher salt to 1000 ml of distilled water solution) for 5 - 6 minutes. This bath changes the color of the print to a dark red / brownish orange.

Next, the wet print is then re-exposed to UV light. As the print is unfixed at this point, the new salt bath essentially washes the print in a new and different silver chloride / salt solution, and this second exposure brings out lavender in the highlights and results, after drying, in a deep rust red / lavender duo-toned print. The older the sodium chloride salt rinse bath the more dramatic the color shift to lavender. The print is then washed in running water for 15 minutes and hung to dry in a dark environment. After drying, if you hot press the paper, the color will darken additionally.

Allyson doesn't mention these variations to her technique but I'll toss them in here as I think it may help make the print more stable. While you are experimenting, try adding 10 g of citric acid to the sensitizer solution. This will lower the pH and this step is often a benefit. Also after washing, try toning your print for 30 minutes in a gold / borax toner. Finally, in answer to the obvious question of why she hasn't included a fixing step in her process ... it's quite simple. Fox Talbot's earliest salted paper prints were unfixed and the technique Allyson is using is a form of tribute to the mystique and alchemy of the work that could only be appreciated by candlelight. Her prints, as were Talbot's, are stabilized, but unfixed. "They are, she writes, by their nature and my intent, changeable. Ephemeral, both physically, and emotionally. A reflection of our own beauty, fragility, and mystery."

[Fig 2 - 8 here](#), (Niles Lund, Portrait of Christopher, 2004 - salt print)

[ICON -2 here](#), (Table Set-Up)

TABLE SET UP FOR SENSITIZING SALTED PAPER

Clean dark brown glass bottle for silver nitrate solution. (*See below for several sensitizer formulas that will be suitable for your printing needs.*)

Clean paper for the table surface

Salted & labeled paper for coating (see instructions in text for salting)

New hake brush (labeled Salted Paper)

Clean distilled water in a beaker

Clean beaker for silver nitrate sensitizer coating

Pencil

Hair dryer

Contact printing frame

Negative for contact printing

SILVER NITRATE SENSITIZING SALTED PAPER

When your salted paper has dried sufficiently it is time to sensitize it with a solution of silver nitrate. Up to this point, the completion of the salting stage, your paper has not been light sensitive. The coating of silver nitrate will change this situation and it is necessary to conduct this next stage of your salted paper preparation under a very low light level.

Begin by preparing the silver nitrate solution and be very careful with this chemical. I'm going to give you three different silver nitrate formulas. The first is a simple and basic one that you use directly. The other uses citric acid as a preservative and extends the time that you can use the paper should you not be printing immediately. In any case, both standard formulas will do the job. The third formula is one that I use at high altitude. *Before you begin, be sure to read this:*

Silver Nitrate: *Read This*

Silver nitrate appears as a colorless and odorless crystal and discolors on exposure to light. Silver nitrate is highly corrosive. Silver nitrate can cause severe skin and eye problems and is particularly destructive to mucous membranes and the upper

respiratory tract. It is the primary silver salt found in photographic emulsions, alternative processes (i.e., van dyke, salted paper, etc.), and intensifiers. Silver nitrate will discolor your skin as it binds with the proteins in the epidermal layer of it... the stain will go away. It may cause blindness if it gets into your eyes and it is caustic so do not touch your face when working with it. If you get silver nitrate on your skin you may experience redness, pain, and burning. Upon exposure, wash the area well with repeated rinses of water. Rubbing the area of exposure with sodium chloride (table salt) will help lessen damage to a degree and will also help with stain removal. If you get silver nitrate in your eyes immediately flush with copious amounts of water and continue flushing while medical attention is summoned.

Black silver nitrate stains on counters can be eliminated by washing the stained area with a solution of 2 teaspoons of sodium bisulfite in a quart of water. Be cautious of the sulfur dioxide gas that will be created by this act of cleansing. Silver nitrate is a very strong oxidizer. It will combust and forms an explosive precipitate if allowed to come into contact with any ammonia compounds, i.e., ammonium hydroxide (the strong concentration of ammonia used in mordantage). Never mix silver nitrate with metals such as aluminum or zinc. Use all safety precautions especially by wearing gloves and goggles or safety glasses when working with this chemical.

That said, I have discolored my skin for a few decades now without pain, burning, or any other negative effects. Students, no matter how careful they are, and unless they decide to wear nitrile gloves, inevitably get a brown spot or two from silver nitrate solution on their fingers during coating and so far, not a single person has been damaged in any way. Just be aware that silver nitrate can be dangerous if you don't respect it.

Here's another bit of silver nitrate information you might want to keep in mind... silver nitrate isn't very light sensitive all by itself but as soon as it gets together with an organic binder such as dust, gelatin, starch and the like it becomes light sensitive.

ICON – 3 here (Measuring Chemistry)

Standard 10% Silver Nitrate Sensitizer Formula:

This traditional formula makes a 10 % sensitizer solution. Add the 10 g of silver nitrate to the 100 ml of warmed distilled water and stir gently with a non-metallic stirrer until it is dissolved into solution. You can make any concentration that you like and many salted paper printers prefer a less aggressive concentration of 6% with which they double coat their paper.

- 10 g silver nitrate
- 100 ml of distilled water

Standard 10% Silver Nitrate & Citric Acid Sensitizer Formula:

I prefer this solution formula to the standard mix above, especially if I am experiencing highlight problems or do not intend to print immediately... the citric acid makes the solution more acidic, lowers the pH of the sensitizer, and acts as a preservative. Mix the 10 g of silver nitrate into the 50 ml of warm distilled water and carefully pour the solution into a clean dark glass container with a plastic cap. Then mix 5 g of citric acid into the remaining 50 ml of warm distilled water and add it to the silver nitrate solution in the dark glass container.

- 100 ml of distilled water
- 10 g of silver nitrate
- 5 g citric acid (*this lowers the pH and makes it more acidic*)

High Altitude / No Humidity 20% Salted Paper Sensitizer Formula:

This formula is an option if you happen to be working in Aspen, Santa Fe, or Machu Picchu. Interestingly enough, I've started to use this mix at all altitudes and like it a lot... as long as your coating to exposure time is very short. Notice that the citric acid

is also in this sensitizer mix, lowering the pH and extending the time I can have before exposure.

- 100 ml of distilled water
- 20 g of silver nitrate
- 5 g citric acid
- Mix the 10 g of silver nitrate into the 50 ml of warm distilled water and carefully pour the solution into a clean dark glass container.
- Then mix 5 g of citric acid into the remaining 50 ml of warm distilled water and add it to the silver nitrate solution in the dark glass container.

Sensitizing Considerations

As a rule, try to use the freshly sensitized paper as soon as you can. Salted paper dislikes humidity and in humid conditions the paper will begin to discolor in a few hours. If this is the environment you are printing in, try using the silver nitrate #2 formula due to the addition of citric acid. In dry, dark, and cool conditions the addition of the citric acid may preserve the sensitized paper for a day or two.

Be careful not to apply heat (*when blow-drying*) to the newly sensitized paper because that temperature change will cause a loss of sensitivity. If you do use a hairdryer be sure that it is set on a cool setting and blow on the backside of the coated paper for the majority of the drying time making sure that your paper is totally dry before exposing. Blow-drying on the backside of the coated paper also helps draw the sensitizer into the paper's fibers. Moisture in the paper will cause staining and generally poor quality so you might want to consider having a dry mount press, set at a low temperature, nearby for removing any residual moisture immediately prior to printing. If using a press, make sure that the time the platen and the paper are together is very brief. Open and close the press rapidly and you'll see the moisture escape out of the back of the press.

If you see a speckled print, with black or brown spots, reminding you of Niépce's view from the window at Gras perhaps, you could be experiencing a variety of maladies. The most common are... the paper is contaminated in some way; the paper is the wrong one for the process; the silver nitrate application brush has been compromised and not thoroughly washed between coatings; the silver nitrate (if you are dipping the brush) has gone bad due to this contamination; or the paper was moist when you exposed it; you are not using distilled water; kosher salt hasn't been added to the first wash bath, and so forth... this list can get quite lengthy.

Very often the problem is simply related to the brush not being cleaned well. What has happened is that the brush has picked up salted gelatin and dust from repeated applications of silver nitrate sensitizer when brushing across the paper's surface. Then, when a second coating is performed, and the brush is dipped again into the silver nitrate, the solution becomes contaminated. My best advice is to use a shot glass with a drop count (approximately 22 drops for a 4 x 5 inch negative) of fresh silver nitrate for each print. You could also use a glass coating rod (refer to the platinum / palladium chapter for the technique) or new foam brush for each new application.

If you are having problems, change one thing at a time. My first move would be to re-mix the silver nitrate solution, adding the citric acid, and try again. My second change would be to go to the drop count in the shot glass versus the dipping of the brush into a beaker of silver nitrate. Third, I would change papers. Fourth, I would make absolutely sure that my paper was bone dry before exposing and I would do almost my entire exposure in open shade to cut down on building up heat (resulting in moisture) in the contact frame.

[Fig 2 - 9 here](#), (Margaret Adams, Dress, 2000 - salt print and salt print w/ potassium dichromate added)

Contrast Enhancement

One of the easiest methods of affecting the contrast of your salted paper print is to alter the initial wash-development bath. To increase the contrast, as well as to change the color of the image to a reddish brown, simply add 3 – 5 drops of a 10% potassium dichromate solution (*100 g potassium dichromate to a liter of distilled water*) to 1000 ml of distilled water. Then heat this solution in a microwave oven in a plastic beaker or use a double boiler like tray set-up. The warmer the solution, the stronger the change to contrast and color and the less likely you will experience salted paper speckling.

You can also increase the contrast of your print by adding a drop or two of a 1% to 5% solution of potassium dichromate solution to every 28 ml of the sensitizer. This will also result in a color change to reddish brown that is similar to the gold / borax toner described later. (*A 5% solution is made by dissolving 5 g of potassium dichromate in 100 ml of distilled water.*) If you elect to add some potassium dichromate to the solution, warm it up first so that it will incorporate with the silver nitrate more efficiently. This will also help reduce the “speckling” that occasionally shows up on the print when a dichromate is added.

This last technique, of adding to the sensitizer, is more aggressive than adding potassium dichromate to your wash-development and I would recommend other approaches to contrast adjustments before this one. A simple solution is to simply perform your entire exposure in the shade and then have your first wash be a 5-minute one in distilled water with no salt added. The next adjustment I would consider would be making a new digital negative with adequate contrast for the process.

ICON – 4 here ([Coating Paper](#))

Coating Salted Paper

I have often taught this process using a common beaker of silver nitrate and having the students lightly dip a clean brush into it and proceed to coat their paper. Most of the time this method is perfectly fine but occasionally there are contamination problems. As mentioned above, the easiest fix for this issue is to make an individual

drop count in a shot glass for each print that you do. Consult the Platinum / Palladium and Ziatype chapters for drop count charts and technique.

If you are going to dip a brush, it is less expensive, in the long run, to use a new, and fresh, foam brush for coating each print... seriously. This lesson has taken me a long time to learn but it is good advice. As much as I love the romantic look of the hake brush strokes, the frequency of contamination, even when you are meticulously clean in your working process, is nearly unavoidable with salted paper.

A third method of coating is the traditional floating of the salted paper on a volume of silver nitrate in a tray. If you opt for this technique, consider using a Pyrex baking dish as it is easy to clean. The traditional method is to float the paper in the silver nitrate solution for 15 to 30 seconds being sure not to get any emulsion on the "back" of the paper. The easiest way to *float* successfully is to bend up the 4 side edges on your paper (*just like in albumen coating*) so that you create a little origami like "serving tray". The folded edges of the "serving tray" can be trimmed off after the process is complete and this almost eliminates the problem of getting silver nitrate on the back of the paper.

Coating is performed in very subdued light. Sensitize the sized paper by floating, brushing (foam brush), or glass rod coating, applying 1 to 2 coats of your silver nitrate solution. If you are double coating, dry thoroughly between coats. The more silver nitrate in the formula, as Talbot discovered, the more sensitive the solution. This means that you can increase the silver nitrate amount in the previous silver nitrate formulas to make a more light-sensitive solution. However, this doesn't mean loading up on a big concentration in one coating. Multiple low concentration coatings work better.

If floating is too difficult for you I suggest using a new cheap foam brush or glass rod method. Always mark the front of your coated paper with an "S" (*for silver or sensitized*) because the formula tends to be quite difficult to see in low light conditions. In both brush and rod coating, allow your newly sensitized paper to sit still in the dark for a few minutes before drying or hanging it up.

Be sure to use distilled water because normal tap water will almost always cause one problem or another due to the mineral concentration or the pipes that the water flows through. If you use a hake brush to coat then be sure to wash it with distilled water between applications.

[Fig: 2 – 10 here](#) (Dan Estabrook, #1. Shortness of Breath (Nine Symptoms))

PAPER: PRINTING SALTED PAPER

For the salted paper process, I recommend using a quality 100% rag paper with a smooth surface such as Bergger's Cot 320, Crane's Platinotype, Arches' Platine, Crane's Kid Finish, Arches Acquarelle, Arches Grain Satine, or Bienfang 360. Another paper that has come to my attention lately is called Weston Diploma Parchment and it is available through the Butler & Dearden Paper Service in Boylston, Massachusetts. You will, of course, determine which is best for you according to the intentions of your image.

When using a lighter weight paper you will generally experience a salted paper image that exhibits a greater degree of clarity and tonal resonance. The reason for this is that the process is going to be taking place on a gelatin sized paper and the best results will come from a delicate technique with a delicate application and restrained printing.

As a place to start, your negative should be high in contrast with a D-max in the 1.5 to 2.0 neighborhood. This is a moderately dense and contrasty negative that would generally be suitable for a conventional silver paper of grade 0. When making negatives for the salted paper process try to make the best negative possible and then overdevelop it by 50%. If you are going to be making a digital negative then seek a curve profile that increases the contrast and density.

[Fig 2 -11 here](#), Salted Paper Curve Profile Example

[ICON – 5 here](#) (Contact Frame)

Exposure Times

Once you are ready to expose your sensitized paper, place your negative, and bone-dry sensitized paper in a hinged, contact printing frame so that the light will penetrate the glass, right-reading negative, and sensitized paper in that order. Go outside and place your printing frame in light shade but not directly facing the sunlight. You will notice that the paper begins to darken immediately and subsequently eases off. In my experience, sunlight will expose an average negative well in 6 – 12 minutes but will likely block shadow details in the darkest values. A UV exposure unit will provide a good exposure in 7 – 12 minutes. Again, the darkest shadows will tend to block unless you filter the exposure with a translucent sheet such as Pictorico OHP. My recommendation for the best exposure strategy is to use a combination of sun and shade for 6 – 12 minutes. Do the majority of your exposure in the shade and then hit it with some direct sunlight at the end of the exposure to intensify the darks in the image. This technique will yield the best contrast potential with the best density and detail in the shadows.

As mentioned, it is generally best to face your contact printing frame away from the direct sun, or keep it in the shade, so that you can better control your exposure and contrast. Negatives low in density or contrast should be printed in this manner for greater contrast. Contrast can also be slightly increased by placing a sheet of tissue or vellum over the glass during exposure to slow the pace of the exposure. I will add here that printing salted paper in cold weather, or in a cold and dry environment, is difficult. Although this is a bit of an irritation if you live in places where there is an actual winter it does open up the possibility of one benefit... storing sensitized paper in the freezer where it will stay viable for about a week if you're fortunate.

ICON – 6 here, (Checking the Exposure)

Examine the progress of the exposure at different times during the printing in the same manner you would with other printing-out processes when using a contact-

printing frame. Look at your paper in a very low light area so as not to fog the image. The printed-out image should be allowed to go quite deep: highlights should appear much denser than you will want in the final image and shadows will become almost a metallic bronze color. You may lose a minimum of 2 to 4 steps on a calibrated gray scale step tablet after all of the processing has been completed but there are some things that you can do at this stage to reduce that depreciation.

[ICON – 7 here, \(Sink Set-Up\)](#)

SINK SET UP FOR SALTED PAPER

Tray #1: 3% salting bath Mix: 30 g of kosher salt to 1 liter of distilled water. Add 1% citric acid (10 g) to the salted bath liter. Agitate for about 1 minute.

Tray #2: Optional Toning Baths: Toning must be done BEFORE fixing the print. Toning baths will alter the image color and often aid in the archival properties of the print. Please refer to the text for specific salted paper toner formulas and times.

Tray #3: 10% Sodium Thiosulfate fixing bath

Mix: 100 g sodium thiosulfate to 1 liter distilled water and 2 ml household strength ammonia

Tray # 3 - Optional: Sel d'or Toner / Fixer Monobath Formula:

Mix: 500 ml water to 75 g sodium thiosulfate, 1-teaspoon bicarbonate of soda and 3 grains of gold chloride (*Use a 30 ml Stock Solution*)*

* Stock Gold Solution for Sel d'or Toner / Fixer Mix: 154 ml distilled water to 1 g gold chloride (1 gram = 15.43 grains)

Tray #4: Hypo Clearing Bath:

Mix: 1% solution of sodium sulfite (10 g to 1000 ml water)

Tray #5: Final wash for 20-30 minutes

PROCESSING SALTED PAPER

Salt Wash Bath

This first bath in the processing sequence consists of a slightly acidic salt bath whose purpose is to precipitate the free (or excess) silver by producing silver chloride. If you have no salt in this bath you will not be removing the free silver and this will create problems with toning, as the gold will not adhere to the silver unless the free silver nitrate has been eliminated. Following your exposure, immerse your print in this bath of salted water that has been made slightly acidic, lowering its pH, with the addition of citric acid.

- 10 g citric acid
- 30 g kosher salt
- 1000 ml distilled water

Immerse your print in this solution under low to moderate light, and agitate slowly for about 5 minutes.

Following this step, move your print to a tray filled with fresh water and gently agitate. Repeat the fresh water exchange with a separate tray of fresh water 2 to 3 times and then move on to the normal washing stage that follows. One more thing... If you forget to remove your print from the salted bath you will notice that your print will begin to fade a bit. The stronger the salt solution the more fade you'll see. This could be a way to clear your highlights in a desperate situation.

Washing the Print

After the pre-wash salt bath, immerse your print for 15 minutes in clean running water, making exchanges on a regular basis. This bath clears out the remaining free,

unexposed, silver. If you do not wash the print well, subsequent toning and fixing will not work adequately and your final image may be flat and muddy in appearance. You will also notice a host of salted paper problems with one of the most common being little dark spots.

Continue to rinse the print until all of the milkiness in the water has disappeared. If you have a black plastic tray this will help. The paper is still slightly sensitive to UV light so be careful. Also, do not be shocked by the color of the image when it is placed in the water wash. It will shift toward red and the print will lighten considerably. Hot water will also accelerate the highlight clearing and may result in a more reddish brown shift if your water is alkaline.

[Fig: 2 – 12 here](#) (Christopher James, Sarah, Maine – 2000- gold toned salted paper print)

SALTED PAPER TONING FORMULAS: PRIOR TO FIX

If you go directly to the fixer after the wash stage your print will be reddish brown. A toning step is not necessary if this is a color decision you've made for your image.

Toning the print following the wash cycles, and prior to the fixing bath, allows you to select from a palette of colors that range from red to purple to blue-brown and smokey-black. Toning will also increase the longevity of your image. The following toning formulas are for you to experiment with and will provide you with an assortment of tonalities, hues, and contrasts. The first toner example is made with gold chloride and borax, and it yields a warm reddish color. The ammonium thiocyanate toner will yield a more blue shift in the highlights and mid tones but depending upon time, will often leave your reds alone. The Gold 231 will often result in a smokey black with highlight shifts to cool rather than the original warmth. Each toner will react differently depending upon freshness and intensity of the toner, paper you are toning, temperature of the toner, success of your washing cycles, and a host of other alt pro gremlins that

may decide to visit your print. Experiment and do not invest even a portion of your self worth in the success of the toner. Have fun with it and see what happens.

Gold-Borax Toner (*warm / reddish color*)

- 800 ml distilled water at 100°
- 6 g borax
- 12 ml 1% gold chloride solution

Dissolve the borax in the distilled water and add the prepared 1% gold chloride to the solution. Gold chloride in a pre-mixed state can be purchased from most chemical suppliers. Toning will take 15 – 30 minutes depending on the tone you are seeking. Generally, the color of the image becomes cooler the longer you have the print immersed in the solution. Keep in mind that a dry print looks cooler than a wet print. Prepare this toning solution at least an hour before use and work with it at room temperature. If you find the toning less than active, add or replenish the toner with additional gold chloride solution. One way to be economical about gold chloride is to trim off any parts of your paper that you will eventually over-mat. This will cause less of the gold to be absorbed by the paper. For a black tonality, check out the gold-borax combination with platinum toner in this section. Note that this formula is very similar to the gold-borax albumen toner except that it is half as concentrated.

If you are seeking a **deep burgundy** color then try the gold borax toner for 30 minutes followed, after a rinse, by the 30 minute gold ammonium thiocyanate toner.

Fig: 2 – 13 here, ([Mark Osterman, Catching Blanks](#), - waxed salt print from 8 x 10 collodion neg. / H. Greenberg Gallery)

Gold-Ammonium Thiocyanate Toner: Standard Salt

(*Blue / gray tonality*)

- 800 ml distilled water
- 25 g ammonium thiocyanate

- 2 g tartaric acid
- 5 g sodium chloride
- 20 ml 1 % gold chloride
- Distilled water to make 1 liter (1000 ml)

Tone in the same manner as you do with the gold-borax formula. This toner will give you much colder values and an immersion of 6 - 15 minutes in a fresh ammonium thiocyanate toning bath will yield blue-gray tonalities. This toner does not keep well so only mix the amount that you intend to use during a single working session... about 8 prints. If you use a thiocyanate toner be aware that the sodium thiosulfate fixing bath may precipitate sulfur. If this is a problem, and you will know it by the aroma, you can easily fix the problem by adding 5 g of sodium sulfite to the sodium thiosulfate fixer formula and replace the fixer every 4 to 5 prints.

Gold-thiocyanate toner is particularly compatible with platinum toner and a range of colors, from warm red to slate gray to sepia, can be achieved by adjusting the times of the salt print in each toner and in the sequence they are used.

Gold-Ammonium Thiocyanate Toner II: POP Formula (Bostick & Sullivan Pre-Mixed Solution A & B)

(Blue / gray tonality)

• **Stock Solution A**

- 10 g ammonium thiocyanate
- 500 ml distilled water at 120 ° F

Combine the ingredients into a uniform solution, store in a clean plastic or glass bottle and allow the solution to sit for 8-12 hours before use.

• **Stock Solution B**

- 1 g gold chloride
- 500 ml of distilled water at 70 ° F

To use: Mix 50 ml of Stock A with 50 ml of Stock B and 900 ml of distilled water. The toner is good for about 8 prints before it begins to wear out. When you need to replenish the solution simply keep what is in your toning tray and add 50 ml Stock A and 50 ml Stock B to it. The toning time is subjective and usually between 10 and 30 minutes. The longer you tone the cooler the mid tones and highlights.

Gold - Sodium Acetate Toner (*sepia to deep burgundy*)

- 800 ml distilled water at 95° F to 100° F
- 20 g sodium acetate
- 20 ml 1% gold chloride solution (*order it prepared; see resources*)
- Distilled water to make 1 liter (1000 ml)

This toner, like the others, is used prior to the fixing bath. Begin by immersing the print in the distilled water pre-wash and salt pre-wash baths. Prepare your toner and see that its temperature is in the 65° F to 75° F range. Place your print in the toner and inspect it closely for the changes. Do not over-tone the print with the gold-acetate toner or you will get an overall yellow cast. It is a decent idea to do a test print for a few minutes and see if you like it. Gold acetate toning can be employed in a double toning sequence with the gold borax toner to get a black tonality. Be sure to wash the print well between the two toners if you are performing the split. After toning, rinse and continue the process with the fixer and final wash.

Palladium Toner

(*Reddish brown to slate gray*)

- 450 ml distilled water
- 2.5 ml sodium chloropalladite (15% solution)
- 2.5 g sodium chloride (sea salt)
- 2.5 g citric acid
- Distilled water to make a solution of 500 ml

This palladium toner will alter a salted silver nitrate sensitizer (*with a little potassium dichromate for a contrast boost*) from a traditional reddish brown salt print to a slate gray. It's quite nice but different from its companion toner (platinum). The sodium chloropalladite can be ordered in a prepared state and can also be used for your palladium printing.

Begin your toning process by pre-washing your print in the recommended salt pre-washes and then rinse the print in running water for 15 minutes. After the wash, immerse the print in the palladium toner until you are pleased with the results. After toning, continue the process with the fixer and final wash stages.

Platinum Toners

(Warm sepia / reddish brown / yellow / gray)

I'll give you two options for salted paper platinum toning. The first is a traditional salted paper platinum formula. The second is a similarly constructed formula but one that is designed to work with printing-out process papers; you'll find it repeated in the POP Chapter. Platinum toner is a little more expensive due to the cost of the potassium chloroplatinite (20% solution) but like the palladium, it can also be used for platinum printing or as an additive for palladium printing. Some very nice tonalities can be realized by two-stage toning combinations such as platinum toner and gold-thiocyanate toner. I'll provide you with the POP platinum-gold-thiocyanate formula as well. Gold-thiocyanate toner is particularly compatible with platinum toner and a range of colors, from warm red to slate gray to sepia, can be achieved by adjusting the times of the print in each toner and in the sequence that they are used. As with all toning, in every process, experimentation will often yield some lovely results... and then drive you crazy when you try to repeat the color on a different day.

[Fig: 2 – 14 here](#), (Jesseca Ferguson, *Finis*, 2003 – salted paper)

Platinum Toner #1

- 450 ml distilled water
- 1.5 ml potassium chloroplatinite (*20% solution pre-mix*)
- 2.5 g citric acid
- 2.5 g sodium chloride (sea salt)
- Distilled water to make 500 ml

Begin your toning process by pre-washing your print in the distilled water and salt pre-wash baths and then rinse the print for 15 minutes in fresh running water. After the wash, immerse the print in the platinum toner until you are pleased with the results. After toning continue with the fixer and final wash stages.

POP Platinum Toner #2

(Neutral black-sepia)

Bostick & Sullivan makes a prepared POP platinum toner using potassium chloroplatinite #3. The kit includes:

- 10 g citric acid
- 10 ml potassium chloroplatinite #3 (20%)
- 1 empty 1000 ml plastic container for storage of the solution

To make the platinum toning solution, measure out 10 g of the citric acid on a gram scale and dissolve it in 1000 ml of room temperature distilled water. This will result in a 1% solution of citric acid.

To the citric acid solution, add 7 to 15 drops of the potassium chloroplatinite #3. The more drops added to the citric acid solution the faster the toning and the faster you will run out of this very precious mix. You may wish to add fewer drops to allow time to subjectively inspect your toning progress. *Platinum toner does not have to be discarded after use it simply wears out.* If you feel that its effectiveness and speed are not what they used to be, then simply add 5-10 more drops of the potassium chloroplatinite #3.

To use: It's best to over-expose your salt print by 15%. Go through the pre-wash and salted pre-wash bath sequence and then rinse your print in fresh water for 15 minutes. Then, place the print in a clean tray and immediately pour the platinum toner over its entire surface. Agitate the tray continuously during the toning process. The toner will make itself evident first in the deeper shadow areas of the print and then work its way through the sequential tonal stages from dark to light. A short toning time will result in a warmer print and a longer toning period will yield blacks and a cooler image. When you are content with the coloration, rinse the print for 5 minutes and proceed to the fixing stage.

POP Platinum-Gold-Thiocyanate Split Toner

After your pre-wash sequence you can achieve a wonderful gold-platinum split toned POP print by partially gold toning the print (*a short toning time in the gold-thiocyanate toner*), rinsing the print for 5 minutes, and then immersing the print in the platinum toner until you like what you see. The darker values will be purple-sepia in the shadows following the gold toner, while the highlights and lighter mid-tones will tone a cool-blue-black in the platinum. Always be sure to first tone with the gold because the citric acid in the platinum toner will be unkind to the gold toner.

Black-Gray Toning

Add 3 drops of a warm 5% potassium dichromate solution to every 28 ml of the silver nitrate sensitizer; coat and expose the print in a normal manner. Following exposure, proceed through the distilled and salted water pre-wash sequence. This salted pre-wash is quite necessary here so don't overlook it. Then, tone the print in the gold-borax toner for 5 minutes and wash it in clear running water for 15 minutes. Following the wash, tone the print in the platinum toner for 5 to 15 minutes followed by a wash of 30 minutes. Rinse the print in fresh water for 10 minutes and then move on to the fix and final wash.

FIXING THE SALTED PAPER PRINT

Standard 10 % Sodium Thiosulfate Fixing Bath for Salted paper

Prepare 2 separate fixing trays and into each one add a liter of 10% sodium thiosulfate fix solution detailed below. Fix prints, un-toned or toned for 30 to 60 seconds in each bath. Do not over-fix.

- 1 liter distilled water (1000 ml) *
- 100 g sodium thiosulfate
- 2 g sodium bicarbonate OR 2 ml of ammonia *

* Be sure to use only distilled water for your fixing bath to avoid bleaching down the road.

* The addition of either the sodium bicarbonate or ammonia makes the solution slightly alkaline. This will reduce the *bleaching* effect of the fixer but will not affect the color or contrast of the image.

You may go directly to the fixer after the toning and your image will become lighter the longer it stays in the solution. *Do not over-fix the print and certainly for no longer than a minute.*

SEL d'OR TONER / FIXER MONOBATH FOR SALT

Sel d'or Toner / Fixer Monobath

Several years after the Daguerreotype process was announced a French physicist, by the name of Hippolyte Fizeau, introduced an important process change, called sel d'or (salt of gold), that gave Daguerreotypists a way to intensify and tone their work. Sometime between 1847 and 1855 the technique was applied to paper prints, i.e., calotype, salted paper, albumen, etc.

For many years, in the mid-19th century, sel d'or gold toning was commonly incorporated into the albumen and salted paper processes. Although it was quite difficult to predict whether the technique would improve, or fade, the print the

single bath toner / fixer was widely practiced. When an albumen or salted paper print was immersed in the sel d'or toner / fixer monobath the image color would lighten (orange-brown) and then reconstitute itself to either a cool sienna, purple, or blue-black. The final image color is based upon the depth of the printing, the toning formula, and the length of time the print is in the toning solution. . It is recommended that you print deeply if you intend to use this technique.

The sel d'or toner is a toning-fixing monobath and is constituted by mixing a solution of gold chloride into a solution of sodium thiosulfate and a little bicarbonate of soda, to make the solution a bit to alkaline. Using it allows the photographer to tone and fix their print in a single bath. Again, it is unpredictable and the following formula is more "kitchen-sink" than lab. Toning - fixing time is approximately 4 minutes following the wash stage.

Sel d'or Toner / Fixer Formula

500 ml water

75 g sodium thiosulfate

1-teaspoon bicarbonate of soda

3 grains of gold chloride (Use a 30 ml Stock Solution)*

Stock Gold Solution for Sel d'or toner / fixer

154 ml distilled water

1 g gold chloride (1 gram = 15.43 grains)

Take your 1-gram ampule (*a sealed glass capsule containing a liquid*) of gold chloride and drop it into a bottle containing 154 ml distilled water. (*Leave the glass ampule there*) Because 1 gram equals 15.4 grains, and you mixed this amount with 154 ml distilled water. Every time you need 1 grain of gold chloride for a formula all you need do is add 10 ml of the gold stock solution.

1% SODIUM SULFITE CLEARING BATH OPTION

Use a 1% solution of sodium sulfite following the fixer to shorten your final washing time. To make it, add 10 g of sodium sulfite to each 1000 ml of distilled water.

FINAL WASH & COMMENT

If you can possibly do this it is a good idea to do your final wash, or at least the beginning minutes of your final wash, with distilled water. Wash your images for 20 to 30 minutes after the fixing stage. You can reduce this time if you elect to use the sodium sulfite mix above. Be very, very careful not to rub the print surface during the wash because the delicacy of the process depends on the surface of the print as well as the rendering of the negative. Following the "dry-down" you will notice that your image has darkened and that some of your contrast has been lost. I often force dry a print to see an approximation of what I will have at the end of the process.

Salted paper, like Van Dyke, has always been labeled as an unreliable process that will eventually fade and break your heart. This is true if you have casual lab skills or if you have been subjected to misinformation when learning the techniques. Most of the time, however, it is simply a matter of working clean and paying attention to the process. Salt prints will fade if there is residual thiosulfate left in the paper. Another reason that early salt prints faded was that they were rinsed and fixed in non-distilled water. As far back as the beginning of this process it was known that even small amounts of muriatic acid (hydrochloric acid) in well water reacts with simple nitrates and will cause your print to bleach out.

One other element to help insure the longevity of your salted paper print is to tone it with one of the gold toners... this works well as long as you have maintained decent work habits during the process. Salted paper printing is a lot of fun to do but it is loaded with little traps that will drive you nuts if you're not paying attention. Whatever you do, please approach this process, and all of the others that are in the book, with a sense of adventure and don't take the success of your work too seriously while you're learning. Remember, every living creature learns through the process of play... so please have fun with the process.

Fig: 2 - 15 here (Rebecca Welsh, Sunrise, Grand Canyon #2, 1995 - salt)