Blue toning with iron salts

When toning blue with iron-salts, the metallic silver is transformed into a dye called Berlin blue. Talking in terms of print permanence, this dye is sometimes more sometimes less stable than silver. The reaction to light and environmental gasses depends on the method that you use. The well known toner formulae differ not only in the intensity of the blue and blue-green they produce, but also in the colour fastness when exposed to strong light. Some of the known formulations have unacceptable disadvantages. The colours are fading and the dye diffuses into adjacent (white) areas. This is especially evident on the unexposed image border.

Basically, we have two methods to our disposal, direct and indirect toning. Toning indirectly, you have to bleach first and tone subsequently. Toning directly, bleach and toner are mixed in one bath. Both methods have advantages and disadvantages.

When toning directly, you can observe the toning process and stop it when the desired intensity is reached. Without having a lot of experience, the hue itself cannot yet be judged as the white areas are still in a yellow cast, which is produced by the ferricyanide. Only when this yellow cast is removed in after-treatment, does the picture show its final hue.

When toning indirectly, the yellow colour that comes from bleaching is completely removed by washing the print thoroughly. The image whites should be absolutely clear after toning. Some formulations, however, produce a yellow fog, especially when the acidity of the toner is not well adjusted. The bleached silver image has to be transformed completely into a colour image. If the toning process is stopped too early, because the desired image tone is already reached, the picture will darken when exposed to light. To uphold the shadows in a diluted bleach bath, does not always lead to the result that you hoped for. Sometimes solarisation effects occur on the transitions and the gloss of the surface can appear non-uniform. If the print is bleached completely it shows an intensive hue. Depending on the toner formulation that you use, density and contrast range can decrease significantly. In my opinion, this procedure is only suitable for papers with a high silver content. Especially warmtone papers with a high content of chloride-silver appear too light after toning. For that reason one recommends to overexpose the prints. If you do so to the required degree you are likely to get undifferentiated, obscure shadows. This will not be improved by toning. Therefore, I do not believe in such recommendations. Pre-toning the shadows in selenium can prevent a loss of contrast. However, when toning directly this results in a split tone. After a couple of hours in daylight this effect abates or even vanishes completely.

In the case of direct toning, another error can be detected. This concerns self made recipes as well as ready made formulations of any brand. Apart from the desired change in colour - thus the transformation of silver to prussian-blue - a blue coloured residue of oxidation falls out and deposits on both sides of the print as well as the inner walls of the trays. On RC paper this dye can be removed mechanically. On fibre based paper it accumulates due to its open surface. One manufacturer (Tetenal) explicitly indicates the problem in the instructions and recommends the use of its toner only for RC paper. Other manufacturers do without such hints and leave their users wondering. The first, the second and maybe also the fourth print come out clean, but after that, the dye that developed in the working solution of the toner contaminates the gelatine. This causes blue stains or a continuous dyeing of all white areas in the picture or of the paper base. If you only have the problem of bluish staining on the image borders, you can remove this by treating the image partially with a piece of cotton wool soaked in a mild alkali. If the contamination is finely spread all over the image surface, it is also possible to remove it, but will result in a deterioration of the hue and its intensity. When toning directly, the prints should only be handled on its edges. Any contact with your fingers before and during toning, especially with higher pressure, can lead to (toned) fingerprints.

Since iron toning was invented before RC paper was introduced, we have to raise the question what people did about this problem back then, when there was only (less suitable?) fibre based paper available. There is only one explanation: In contrast to today, knowledge about the effects within this process was there. They used formulations developed with their own acquired know-how or they used compiled and published information containing the experience of other users. Who puts in this kind of effort today, who has access to the publications of that time? Today, we trust in the blessings of the world wide web and are doomed by the fact that we find third hand information, which is shortened or even copied wrongly. Nonsense is still nonsense, even if it was passed on by many people. The know-it-all-internet type of person outshines the fertility of rabbits and for the absence of any authority like that of a moderating teacher, the blabber is

regarded as an authority just for his inflationary number of postings. Unfortunately, the reader is inclined to believe nonsense that has been copied many times and is likely to look for an explanation for failures in his own inadequacy. This might lead to him throwing in the towel and seek his well-being in Photoshop. Those who work digitally have no choice and there is even little to object about. But what is it that makes an analogue-worker, who tries to get ideal negatives for processing, present his work to the public with the notion: negative-scan toned in Photoshop? Note here, that this is not the question, if we are talking about a real life print on just any given layer. A photograph must be tangible, on whatever medium, whether pixelated or grained.

New literature to this topic is available.
Tim Rudman, The Photographer's Toning
Book Tony Worobiec and Ray Spence, Monochrome

Both books on this topic are excellently illustrated and offer a wide range of suggestions for your own work. Something that is often held back concerning example pictures is the information which paper was used. However, this can be as important as the brand of the toner or its recipe. Different papers can lead to very different results in identical toner solutions. I am not only talking about the image tone, but also about the contrast and effects of the toner on the image surface. The user asks himself, why his results are different from his expectations. Often he searches for reasons in his own work flow instead of in the material he used.

The basics

If you want to tone silver prints with iron-salts, you have to develop them absolutely free of fogging. Any fogging however fine and invisible to the eye prior to toning will be apparent after toning. You have to make sure that your darkroom light is safe for the paper and also that you use a developer that creates fog-free photographs. Usually conventional developers are suitable. You absolutely have to use an acidic stop bath before fixing, even if you use an acidic fixer. The print has to be well agitated in both stop bath and fixer. If you only use one fixing bath, the fixer ought to be freshly prepared. You are on the safe side if you fix in two baths. All silver-salt has to be completely removed from the emulsion. The toner would transform any residue into prussian- blue. It is also important to wash out all thiosulphate. Any residue of it in combination with either the bleach or the ferricyanide of the toner would act as Farmer´s Reducer. This would lead to eroded highlights. If the whites on the test strip are coated blue, a couple of causes are possible. Even if you take utmost care when processing, a grey fog can occur due to the material used. Some papers - the ones with a high silver content - can have a measurable base-fog after development. If the density of this fog is above 0.02 logD you have to expect it to take on colour. In such cases I recommend to remove this fog in highly diluted bleach (ferricyanide) with subsequent fixing for a short duration (before any toning!). To use highly diluted Farmerus Reducer for that purpose is only an option, if you want to treat only a couple of prints in it. If you dilute the reducer substance to the degree that it is suitable for this process, it would not be any stable.

One of the oldest writings about blue toning is the one by Vogel. You prepare two separate solutions using distilled water, one with 1% ammonium ferric citrate and one with 1% potassium ferricyanide. To use it you put 200ml of each solution together and add 40ml of a 10% solution of either acetic acid or citric acid. Like all direct toning substances, this toner solution has limited durability.

All iron toners require a specific amount of acid. Without acid nothing works. If the content of acid is increased above the required amount, the effect of toning increases as well. However, this also produces more of the undesired turnbull blue that does not dye the silver but the paper felt and the gelatine. To increase the acidity can be a necessity if the toner is diluted more than recommended in the instructions. As a general rule for adding acidity, it can be assumed that you can increase the initial amount of acid proportionally to the increase in volume of the working solution.

There are different opinions about the durability of blue toned photographs. From my own research into the subject, I am inclined to assume that they compare apples and oranges. It is simply wrong to conclude that blue toning is of inferior quality in terms of print permanence, just because of improper treatment by the user or because of suboptimal methods and the resulting faults. You have to note though, that hue and density can change due to strong exposure to light. This can happen, but it does not have to happen. For example, in some formulations, indirectly toned prints appear to be too light when dry, but darken down through exposure to light. This phenomenon is well known. It is better known in any case, than the fact that this phenomenon is unknown for other methods of treatment.

Indirect iron toning

Generally speaking, all references state toner and bleach together. However, it is not always mandatory to use this combination.

Toner substances:
Ferric sulphate, Ferrous sulphate, Ammonium ferric sulphate, Ammonium ferric citrate, Ferric oxalate

Acids:
Hydrochloric acid, Sulphuric acid, Nitric acid, Citric acid, Acetic acid, Oxalic acid, Tartaric acid

Bleach:
Potassium ferricyanide (potassium hexacyanoferrate) with or without addition of: sodium carbonate, ammonia, potassium oxalate

An overview of the most interesting recipes for self-mixing:

Bleach #1 - 2-10% solution of potassium ferricyanide
Bleach #2 - 40g of potassium ferricyanide, 40g of potassium oxalate on 1 litre of water
Bleach #3 - 20g of potassium ferricyanide, 100ml of a 10% solution of ammonia on 1 litre of water

All three bleach baths work quickly and sweepingly with warmtone papers. Use bleach #2 or #3 for pure bromide silver emulsions and mixed emulsions.

Important! Rinse thoroughly after bleach. It is not necessarily enough to wash only until the yellow cast has vanished. Residue of ferricyanide reacts with toner substances, resulting in a blue dye (see also direct toning) that can affect the print surface and drastically shortens the durability of the toner.

Toner #1 according to Agfa
800ml distilled water
20g ferric oxalate (toxic and expensive)
10g oxalic acid
10g potassium bromide
Add distilled water to make 1 litre of solution

Toner #2 according to Eder
700ml distilled water
1,8g or 18ml of 10% solution of ferric sulphate
(alternative: 175ml of a 10% solution of ammonia ferric sulphate)
40ml of a 15% solution of hydrochloric acid
9g or 90ml of a 10% solution of potassium bromide

Toner #3 according to Somerville
800ml distilled water
20g of ferrous sulphate
100ml of a 10% solution of hydrochloric acid
Add distilled water to make 1 litre of solution

All combinations of these bleach baths and toners result in green-blue or pure blue image colours. The outcome can vary in tint and densities. With a number of papers some combinations can result in an unpleasant yellow dyeing of the highlights. In such cases after-treatment in diluted sulphuric, citric or hydrochloric acid can be the remedy. The gelatine is decolorized but the image colour is preserved. Using 2-5 ml of a 15-20% solution of acid on 100ml of water, the highlights will clear after 2 to 3 minutes. If you want to change the green-blue tone to a pure blue or delft-blue, give the print an after-treatment in a weak alkaline bath (borax, sodium carbonate, ammonia).

Fomabrom Variant III
bleach #1 2% 2:30 minutes
Toner #1 30sec

dyeing of the gelatine cleared
in a weak sulphuric solution

Compared to the untoned print the densities of the shadows are decreased. The contrast of the print is not satisfying.

Depending on the duration, after-treatment in a weak ammonia solution changes the colour to pure blue or magenta. At first, the densities of the black areas increase. Only after longer times of treatment - starting from the highlights - the print loses saturation and density. After around 30 seconds the colour has a strong tint towards red. If you stopped the process now, the colour would shift a bit back to its original tone. If you want the print to appear as in the photo to the left, 50-60 seconds of treatment is necessary.

Fomabrom Variant III
bleach #1 2½ mins
toner #2a 30 secs

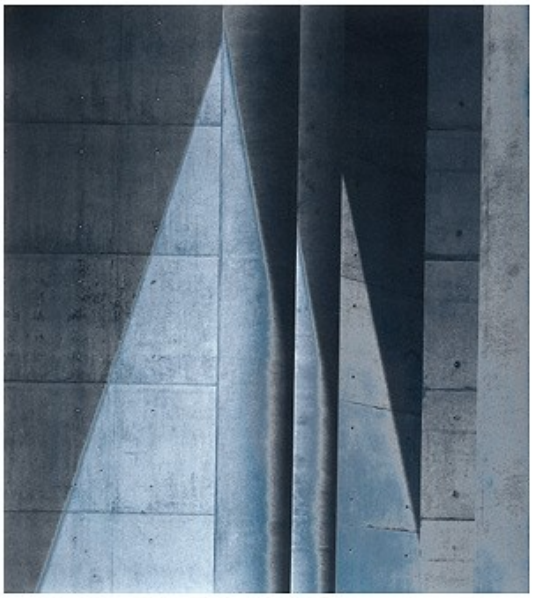
With this toner you will also get a yellow tint on both sides of the print. to the left: print cleared in sulphuric acid.

The colour of the highlights does not differ much from the example above. All in all toning resulted in a darker image with a better contrast. The surface of the print is more lacklustre in the toned areas than on the white image border.

Bleach #2 and #3 in combination with toners #1, #2 and #3 show an as strong diminishing of the image whites. Note here, that with a decreased content of iron-salt the transformation of silver to dye is incomplete. This means, the less ferric salt in the solution the more will the prints darken.

Fomabrom Variant III
bleach #2 30 secs
toner #3 ferrous sulphate 30 secs

Colour after drying: blue-green
After a couple of hours of exposure to light the print darkens and the colour shifts to a purer blue.



Somerville-Toner
(bleach #3 and toner #3)

If you bleach this paper (!) for only 30 seconds to preserve the shadows in an as deep black tone as possible (similar to sulphur toning), you get an unexpected - and here undesired - effect when toning in ferric sulphate. The shadows increase with a completely dull surface. On the transition to the mid tones you get a solarisation-effect and the highlights tone blue with a glossy surface.

A check-up in a different bleach and toner combination results in the expected effect.

Bleach #2 30 secs
Toner #2 30 secs

Using the same times of treatment as above, but in a different combination of bleach and toner, everything works as expected.

After bleaching for 30 seconds, the deep shadows remain. Toning is spotless, the brilliance is preserved and the white image border is only slightly yellow. A short bath in water that is slightly charged with citric acid will clear the whites.

According to my own test results, the Somerville-Formulation does not seem to be suitable for just any paper. Unfortunately, the writings of Somerville are not to my disposal, but they say that his publications to this topic exclusively refer to bromide silver papers. According to name Fomabrom is such a paper, but I cannot say why it does not react accordingly. When I compare its surface to that of other papers - explicitly after maltreating the gelatine with long developing times or in highly alkaline toners - it is less glossy. This is a hint to weak hardening of the gelatine, which would also explain some problems when toning. Surprisingly, the warm-toned sibling from the same manufacturer has no problems hardening at all. Even if the gelatine is treated in extreme conditions, the surface of Fomatone MG 131 emerges in a fine gloss.

Fotokemika Variocon
Adox Fine Print Vario Classic
Maco Multibrom
The neutral tone VC-bromide silver emulsion of Fotokemika gives good toning results with all formulations. It also darkens down quite a lot.

The Somerville Toner
(bleach #3 and toner#3)
right: bleached for 90 seconds
left: bleached for 30 seconds
both toned for 60 seconds
Left: the colour just after drying.

Further down below: the change after exposure to light.

Kentmere Fineprint VC
bleach #2 bleached almost completely
toner #2a ferric sulphate

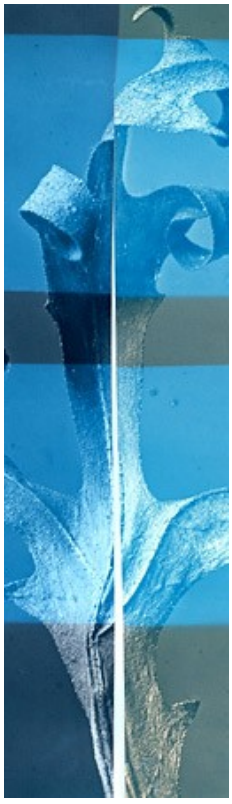
Here as well, the print darkens a little bit afterwards. Colour saturation of the highlights decreases and the shadows become deeper.

Agfa MCC
bleach #2 for 60 seconds

Toner
left #2a ferric sulphate
right #2b ammonia ferric sulphate

Top right: the content of acid is as high as specified in the instructions. Below right: acid is reduced to half. Apparently, you need a particular content of acid to fully depict high densities. An increase of the duration of toning does not change the result. The deep shadows are not reached by the toner.

It is not so important, which of the two iron-salt solutions you choose. Using the same content of acid, ferric sulphate tones a little bit more greenish than ammonia ferric sulphate.



Exposed to light, warmtone papers darken down a lot.
The test on Select Ivory (PW17) - in bleach #2

left: toned in ferrous sulphate
right: toned in ammonia ferric sulphate

The light blue stripes show the colour right after drying. These parts were covered while the test strip was exposed to direct sunlight for 3 hours.

Bromide silver paper also darkens down.
Above exposed to light, below covered.

The tone, which was originally bright blue and too light compared to the untoned print, turns considerably darker. Colour intensity decreases.

Kentmere Kentona
This paper also shows its definite colours and densities only after longer exposure to daylight.

Left: The scan just after drying.

Below left: After one hour exposure to direct sunlight.

Below right: Different combinations of bleach and toner do not lead to a substantially different effect. Only the tint changes slightly.

bleach #1 (2% 90sec) toner #1

bleach #2 (60sec) toner #1

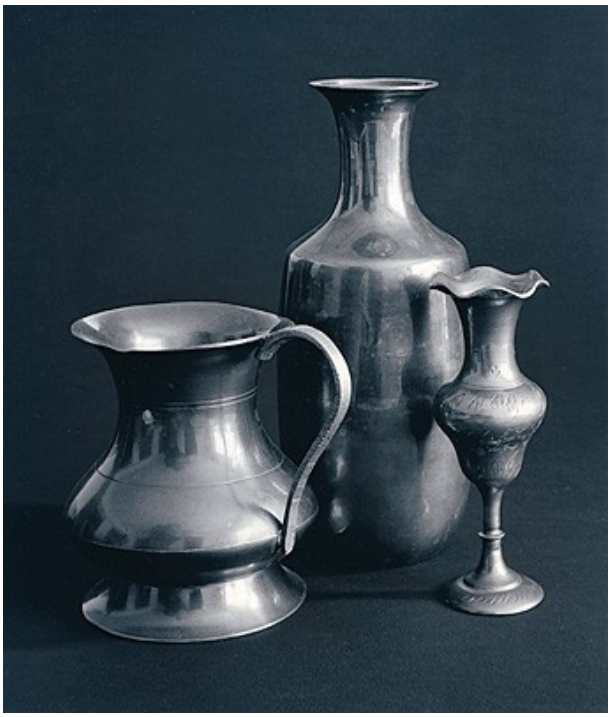
Of course, bleach #1 (pure ferricyanide) in a 2% solution works slower than the strong solutions of bleach #2 and #3. Irrespective of the concentration and with sufficient rinsing before toning, the use of bleach #1 in combination with any toner results in a slight yellowing of the whites in the picture. Apparently, adding potassium oxalate (#2) or ammonia (#3) to the bleach promotes clear whites.

For comparison: the effect of my direct toner MT7.

The range of contrast is higher. With the same density in the highlights, the shadows are darker than with indirect toning and also darker than the untoned print.

The Dmax reading supports this visual impression.
Kentmere Kentona in SE4 NEUTRAL 2min

Dmax before drying	2.15 logD
Bleach #1 / toner #1	1.93 logD
Bleach #2 / toner #1	1.99 logD
Dmax before drying	2.44 logD



Ilford MGIV tones light blue with reduced density in the shadows. It only adopts a less intense, but very pleasant colour when darkened down by exposure to light. The mid tones appear clear blue, without any trace of green and the highlights show a whiff of magenta.

Bleach #2
90 seconds of bleaching reaches only as far as the mid tones. After toning, only the bleached areas show a light blue tone. If the print is not thoroughly rinsed immediately, you can observe in the first rinse water that the toning process increases in the shadow areas that have only been slightly bleached - especially when the rinse water is slightly acidic.

Conclusion

Indirect iron toning only leads to reproducible results, if you know the characteristics of the material that you use and standardize the complete process. Any deflection from your field-tested work-flow can lead to disagreeable surprises. It may seem to be an advantage over direct iron toning that the working solutions have an almost unlimited shelf-life. However, with the effort that is put in either way, the expenses of the solutions are comparably small.

You may notice that more expensive, high-quality papers can have advantages over cheaper alternatives. Only the inexpensive Kentmere Fine Print can keep up with MCC and the papers of Ilford in terms of quality of the result of toning. If you are not after an extra satisfaction by creating your own formulations you are better off using the ready made Iron-toner MT7. If used according to instructions, you will not have to fear problems with darkening, staining and loss of gloss of the image surface.

Direct Iron toning (MT7)

Select Ivory (PW17)

"What you get is what you see." In contrast to indirect toning, the process of direct toning can be stopped once the desired colour intensity is reached. The disadvantage mentioned earlier in the introduction - the instability of a mixture of toner and bleach substances in an acidic solution - could be widely eliminated in the formulation of MT7. Fibre based paper can be toned with it just as well. Prints will not be ruined by deposits of turnbull blue.

Apart from the three substances that are necessary for the process of toning (potassium ferricyanide, ferric salt and acid), the toner comes with a stabiliser. The ratio in which the substances 1, 2 and 4 have to be mixed is given in the instructions. The dilution with water is variable. Part 3 is the stabiliser. You can add higher amounts of it. In the instructions I recommend to do so depending on the circumstances. The higher the amount of stabiliser, the longer does the toner stay acidic, but the slower will it work. If added excessively it will stop toning completely. You cannot entirely eliminate the formation of turnbull blue dye, but it appears a lot later in a solution with stabiliser than in one without. An early warning sign is a blue deposit on the inner walls of the dish. If this is still soluble, it can swash from there onto both surfaces of the print when tilting the dish.

Once the amount of these deposits increases and the colour of the toner changes to dark blue, you don't need to toss the solution away, but you can filter it. A normal coffee filter is sufficient to get out the blue dye. After use, the toner can be stored in a plastic container. You can go on using it for weeks. There will be a dark deposit on the bottom of the container, which you should try to keep there by pouring out the toner carefully. Alternatively, you can filter before using it.

The toner reaches all densities simultaneously. The transformation is quickly in low silver densities. The higher densities of the shadows take longer to be fully toned. This opens the opportunity to achieve light blue as well as slightly blue-green hues without a significant increase in contrast. It also allows us to tone by vision in a highly diluted working solution, in order to preserve the original tone values or just to achieve a very subtle colour change. A highly diluted solution allows you to observe the toning process. This is an advantage especially if you do not want to tone completely. In a strong working solution warmtone paper is completely toned after 30 seconds and bromide silver paper after 60 to 90 seconds. The speed of toning and the resulting hue can be adjusted by either the degree of dilution, by increasing the amount of stabiliser or by reducing the amount of acid.

When toning directly, if you use a strong working solution all tone values increase in density. If you make sure that the highlights are clear after developing, so that they do not absorb any dye, toning completely can prolong the curve of tone values by one zone. Doing this Dmax values can reach 2.4 logD and above.

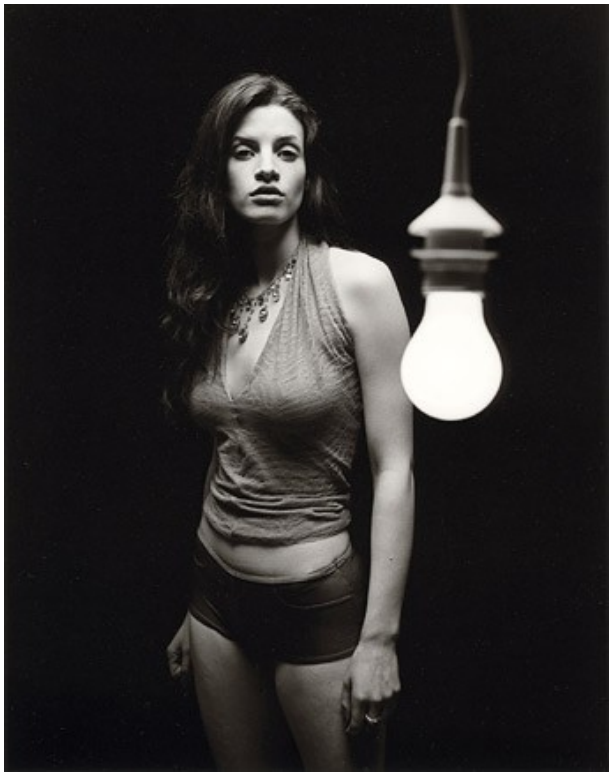
In all direct toning methods, the image whites receive a yellowish cast from the ferricyanide of the toner. This cast could be removed completely by thoroughly rinsing the print. This, however, would also attenuate the blue colouring (compare to indirect toning). Fading colours can be prevented by making the rinse water slightly acidic, but this effort is a time consuming procedure. A 1- 2% saline solution removes the yellow cast within 2 to 3 minutes. Sodium chloride-powder with sodium citrate is included in delivery of the toner. With this you can prepare a stock solution, which is to be diluted 1+9 to 1+14 for use.

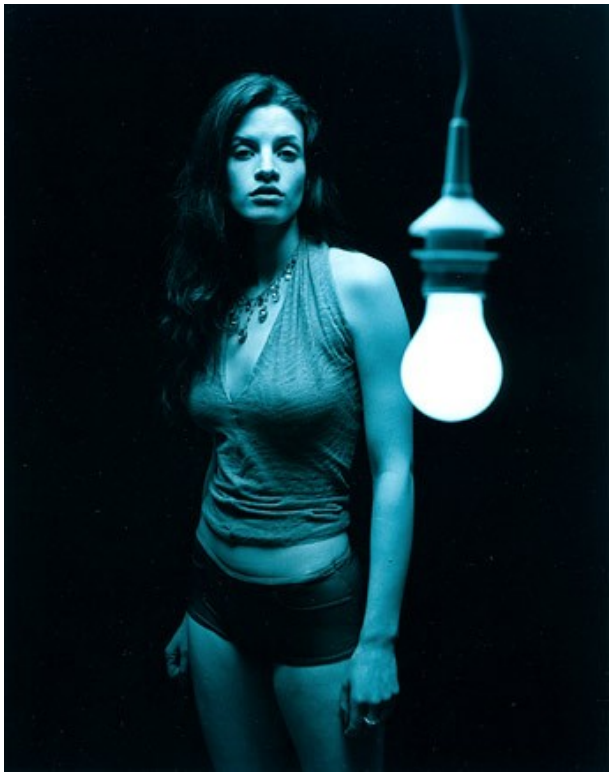
Select VC (PW14)
This is the typical light blue tone of warmtone paper in normal configuration of the toner.
You can see clearly, that the delineation in the highlights - adequate for the untoned print - is already too dense for iron toning. Prints should have brighter highlights before toning in iron.

Select VC semi-matte (PW15)
The print was split to show the effect of different toner configurations and times of toning:

left - normal configuration toned for 50 seconds

right - twice diluted, twice the amount of stabiliser, also toned for 50 seconds





Select VC (PW14)
The influence of the developer that you use is more obvious on warmtone paper than on neutral-tone paper. The warmer the initial tone the greener the toning result.

You can achieve a colour shift to delft blue by placing the print in an alkaline after-treatment bath. Whether you use borax, sodium carbonate or ammonia is less important than the content of alkalinity and the duration of the print in the bath.

50ml of ammonia (10% solution) are included in delivery of the MT7. Add between 0.5 and 1ml to 100ml of water and treat a print for 20 to 90 seconds.

You will observe an immediate colour shift towards purple. This should not make you stop treatment too soon. If you stop too early the tone can shift back towards its initial colour while rinsing. You only may have left the print in the solution for too long, if the highlights lose their colour completely - and with this their density. In the subsequent rinse water the alkalinity of the print is not instantly neutralized. Already slightly alkaline tap water can have a reducing effect on the colour after 5 minutes of rinsing. However, longer rinsing - like after fixing - is dispensable here.

If the colour faded more than expected during after-treatment or rinsing, you can regain the initial image tone with slightly reduced intensity and density by treating the print in a slightly acidic water bath. To preserve the gloss of the surface, I recommend the use of organic acids like citric- or acetic acid over mineral acids.

This example is to compare the effects of direct and indirect iron toning: both photographs are on the same paper, were bleached in oxalate bleach and toned in ammonia ferric sulphate. The one to the left was exposed to diffuse indoor daylight for 3 hours. The one to the right was exposed to 6 hours of direct sunlight. This darkening is due to incomplete conversion of the silver image to a dye image (compare to indirect toning). It has to be taken into account when toning. Even with this darkening effect, you will not reach the maximum black of a print that has been toned directly.

f you are not pleased with your toning result - irrespective of the method and formulation you used - you can redevelop the silver image in any given positive developer.

This redevelopment, however, usually comes with strong yellowing of the image whites. As is shown to the left, this does not necessarily mean that the print is lost. The yellow cast can easily be removed in an acidic bath. You can use an organic acid like (freshly prepared) acetic or citric stop bath to de-fog the print.

Already after 30 seconds of treatment, the yellow cast is cleared. A print that has been saved this way can be toned again.

MCP
toned in standard configuration
400ml of water
part 1 to part 4 10ml each

toned for 40 seconds

The hue is blue-green. The shadows are intensified.

If a pure blue tone is desired, you have to give the print extra treatment in an alkaline bath.

Toned as above + bathed in borax for 1 minute

If you want to reduce the colour saturation of warmtone paper already when toning, you can fourfold the amount of stabiliser.

400ml of water
Part 1 - 10ml
Part 2 - 10ml
Part 3 - 40ml
Part 4 - 10ml

toned for 40 seconds

Fomabrom Variant III
standard configuration
toned for 1 minute

All densities increase, especially those in the shadow areas.

After-treatment in ammonia alkaline solution for 1 minute
(2ml of a 10% solution of ammonia on 200ml of water)

Ilford MG Warmton
standard configuration

toned for 90 seconds

After-treatment in a weak ammonia alkaline solution for 2 minutes
(1ml of a 10% solution of ammonia on 400ml of water).

Configuration as above, but only toned for 30 seconds

After-treatment in an ammonia solution for 50 seconds
(2ml of a 10% solution of ammonia on 200ml of water).

Fotokemika EMAKS
Adox Nuance
toner configuration 10+10+10+10+1000ml
toned for 90 seconds

In diluted toner this paper only shows a subtle tint in the highlights
This is due to its high content of silver.

Even in standard configuration the complete transformation of the silver to dye takes longer than 2 minutes.

Fotokemika Varicon
Adox Fine Print Classic VC

Toner setting 10+10+30+10+500ml
toned for 30 seconds

Toner setting **10+10+5+10+500ml**
toned for 90 seconds 90 Sekunden

After-treatment in an alkaline solution for 60 seconds to change the tone to delft-blue (2ml of a 10% solution of ammonia on 200 ml of water).

Kentmere Fineprint VC

Left: normal development
Below for comparison: in lith development

Both prints in identical toner configuration

Left: toned for 45 seconds

Below: toned for 75 seconds

To completely tone the dense shadows of a lithprint, you need longer times of toning.

If you plan to tone your lith print in iron, you should not develop it to maximum black - as was done here. The densities of the stark lith shadows increase immensely and adjacent zones turn maximum black as well.

As it was taken in diffuse light, the negative above, would have been a better choice for a blue toned lith print.

Ilford MG IV toned for 40 seconds

Treated with a 0,2% solution of Ammonia

MCC two bath development, first bath lith
configuration 10+10+20+10+400ml, toned for 60 seconds

Toned to delft-blue in a 0.2% solution of ammonia for 75 seconds

Examples of silver gelatine papers and developers

Ilford Classic in Eco 4812,, MT7 5+5+10+5+500ml 30 seconds

Agfa MCC

MT7 witha aftertreatment in a weak Ammonia solution

Fotokemika EMAKS

MT7 witha aftertreatment in a weak Ammonia solution

Toner combinations

Combinations with other toners are possible, but the iron toner should always be used last, because the resulting dye would be weakened, or even completely removed, by the alkalinity of subsequent solutions. The only exception to this rule is lead acetate toner, which is designed to shift the blue-green image tone to a purer blue.

Pre-toning with gold
Wherever the gold toner finds little silver - i.e. in the highlight areas - the toning process is completed relatively quickly. This can be used to largely protect the area from the highlights to the midtones from further toning. So if you tone with iron blue toner after a short gold toning, the still unprotected tonal values of the shadows and mid tones will take on the typical cyan hue, while in the highlights the pure blue to magenta blue colour of the gold toning is retained.

Pre-toning with selenium
Selenium toner tones areas of high density relatively quickly, the highlights are only reached with longer toning times. So if toning is done only briefly (30 - 90 seconds) with a strong approach between 1+5 and 1+10, the iron blue toner will find little tonable silver in the shadows, while the highlights are not yet protected from other toners after the short selenium toning. Thus, after the second toner, a more or less distinct split tone may appear. Here, too, the paper used plays a role. Because of their finer silver grain, chlorine silver emulsions react much faster to selenium toner than bromine silver emulsions, and this must be taken into account when pretoning with dilution or duration.

Pretonation with sulphur
All sulphur toners (direct, without prior bleaching) act equally on all density ranges. However, the high silver densities of the shadows need a longer time to fully tone through. Depending on the paper and printing technique (conventional or lith), reddish brown or yellowish brown tones are produced.
If bleaching is done briefly before sulphur toning, for example only until the highlights disappear and only then toned, the bleached areas suddenly appear in a yellowish tone. Only when the toning time is extended will the unbleached areas also be reached by the toner.
With a short pre-toning time, more tonable metallic silver is available for the following iron blue toner. Whether the pre-toning shows a red-brown or yellow-brown result has an effect on the final result, but in any case the image colour will change towards green to yellow-green after blue toning.

Pre-toning with thiourea (MT3)
Thiourea only tones after bleaching. As a rule, only the highlights or up to the mid-tones are bleached. As a rule, only the highlights or up to the mid-tones are bleached. The image tone can be tuned by diluting the bleach and its exposure time and by toner tuning. The more alkali the toner contains, the more yellowish the bleached densities appear. After 20 to 30 seconds, toning is complete. After a short bleaching time in a strong solution (1+30 to 1+75) and a high amount of alkali in the toner, a split tone (yellow highlights and green-black shadows) will appear. If the bleach is diluted more (1+100 to 1+250) and the toner is adjusted with little alkali (e.g. toner 50ml + alkali 5 - 10ml to approx. 950ml water), the toned image appears much less colourful in a cool brown tone.

Pre-toning with MT8 copper toner
MT8 copper toner contains an acid additive like MT7 iron blue. Therefore it can be used before as well as after the iron toner.

After all pre-tonings you have to water for about 10 minutes. This is especially important after alkaline toners like selenium, sulphur and thiourea, because the following iron toner (with acid) can only work cleanly if the pH of the print is in the neutral range.

Ilford MGWT

Catechol and Blue

Toner
MT9 Gold ffor the lights
MT7 Eisen for mids and shadows

Ilford MGWT

SE6 Blue

Toner
MT1 Selenium
MT3 Vario
MT7 Iron Blue

Adox Variotone

Amidol developer

Toner
MT3 Vario
MT1 Selenium
MT7 Iron Blue

Select Sepia VC (PW14)

SE2 Warm

Toner
MT3 Vario
MT7 Iron Blue

Fomatone

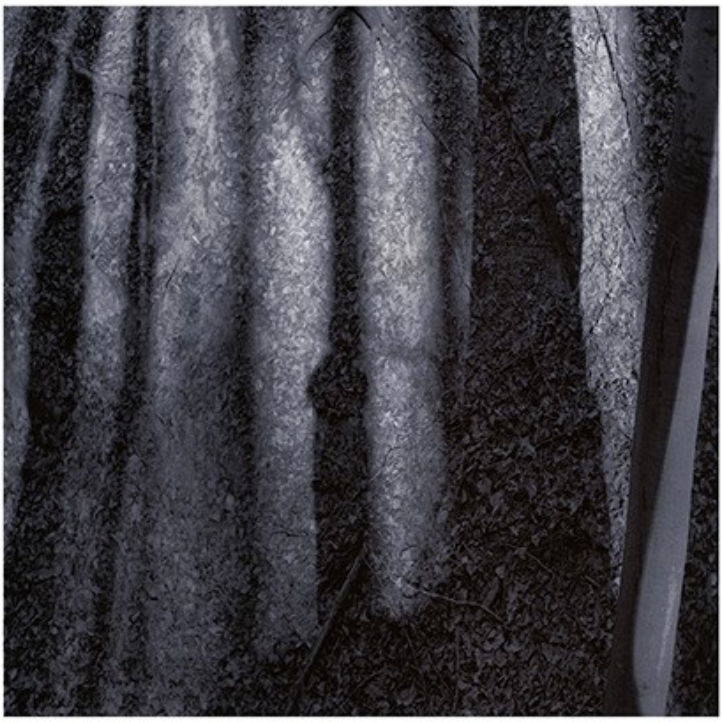
SE4 Neutral

Toner
MT1 Selenium 1+6 1 minute
MT7 Iron Blue

Kentmere Bromide

SE4 Neutral

Toner
MT1 Selenium
MT7 Iron Blue



Fomatone

SE4 Neutral

Toner
MT1 Selenium 1+10 2 minutes
MT7 Iron Blue

MCC

Toner

MT2 Carbon 1+20 1 minute
after bleach 1+100 2 minutes

followed by
MT7 Iron Blue

Fotokemika Varycon

SE6 Blue

Toner

MT4 Siena 1+50 30 seconds
Wässerung 20 Minuten

MT7 Iron Blue 8+8+20+8+600ml 45 seconds
Clearing bath 2 minutes
Ammonia 5% diluted 1+250 30 seconds
to shift to a more bluish tone

below pre-toning with MT3 Vario with different bleach dilutions and times,

followed by MT7 as above

MT3 Vario: bleach **1+40 75** seconds, toner 50+15+900ml
MT7 Iron Blue 8+8+20+8+600ml 45 seconds

MT3 Vario: bleach **1+100 2** minutes Toner 50+15+900ml
MT7 Iron Blue 8+8+20+8+600ml 45 seconds

Adox Variotone

developer Meritol

MT7 Iron Blue 10+10+20+10+500ml
1 minute,
after-treatment 0,05% Ammonia 30 seconds

Slavich Bromportrait

MT1 Selenium 1+30 40 seconds

MT7 Iron Blue 5+5+10+5+500ml
90 seconds

followed by
Ammonia 5% diluted 1+500
40 seconds

Bergger CB
(Ilford MGWT variant)

developers
Catechol and SE2 Warm

3 toners

MT1 Selenium 1+10 2 minutes
for the shades

MT3 Vario :bleach 1+200 20 seconds
Toner 50+15+900ml 30 seconds
to protect the lights

and finally
MT7 Iron Blue 5+5+12+5+400ml 40 seconds

Fomabrom Variant 111

developers
Catechol and SE2 Warm

2 toners

MT1 Selenium 1+10 2 minutes
für die Schatten

MT7 Iron Blue 5+5+12+5+400ml 40 seconds

Adox Variotone
(Ilford MGWT variant with white layer)

developers
Catechol and SE6 Bue

2 toners

MT1 Selenium 1+3 20 seconds
fat and short for the shades

MT7 Iron Blue 5+5+10+5+600ml 1 minute

Fotokemika
special paper for Lith and Bromoil

Tonung

MT3 Vario:bleach 1+60 45 Sseconds
Toner 25+7+500ml

MT7 Iron Blue
5+5+10+5+1000ml 90 seconds

Adox Variotone

MT3 Vario
bleach1+150 30 seconds
toner 25+3+500ml

MT7 Iron Blue
10+10+25+10+600 1:30 minutes

Adox Variotone

MT3 Vario
bleach 1+150 30 seconds
toner 25+7+500ml

MT7 Iron Blue
2,5+2,5+7+2,5+600ml 2:30 minutes

Adox Vario Classic

SE4 Neutral

3 toners

MT1 Selenium for the shades
1+10 2:30 minutes

MT3 Vario for the lights
bleach 1+50 20 seconds
toner setting E

MT7 Iron Blue 30 seconds
Ammonia after-treatment 30 seconds

Ilford MGWT

MT8 Copper toner

overtoned with

MT7 Iron Blue

Adox Variotone

MT1 Selenium 1+10 1 minute

MT8 Copper 40+20+20+400ml 1 minute

MT7 Iron Blue 5+5+10+5+400ml 45 seconds

The iron blue toner completely overlays the reddish copper tone. To make the copper tone visible again, the blue colour is weakened with an alkali solution.
The highlights then reappear in the copper tone.

If the copper tone is to dominate, toning is done in the other order.

MT8 Copper for lights and mid-tones
40+20+20+400ml 1:30 minutes

after that

MT7 Iron Blue for the shades
. 5+5+10+5+400 45 seconds

If the blue toner is to tone further into the mid-tone range, the time in the copper toner must be shortened.

Blue toning of Kallitypes, Lobotypes, Athenatypes, Vandykes and Salted Papers

Salted Print on Bergger Cot-320

MT14 Selenium 1+20 1 minute
for the shades

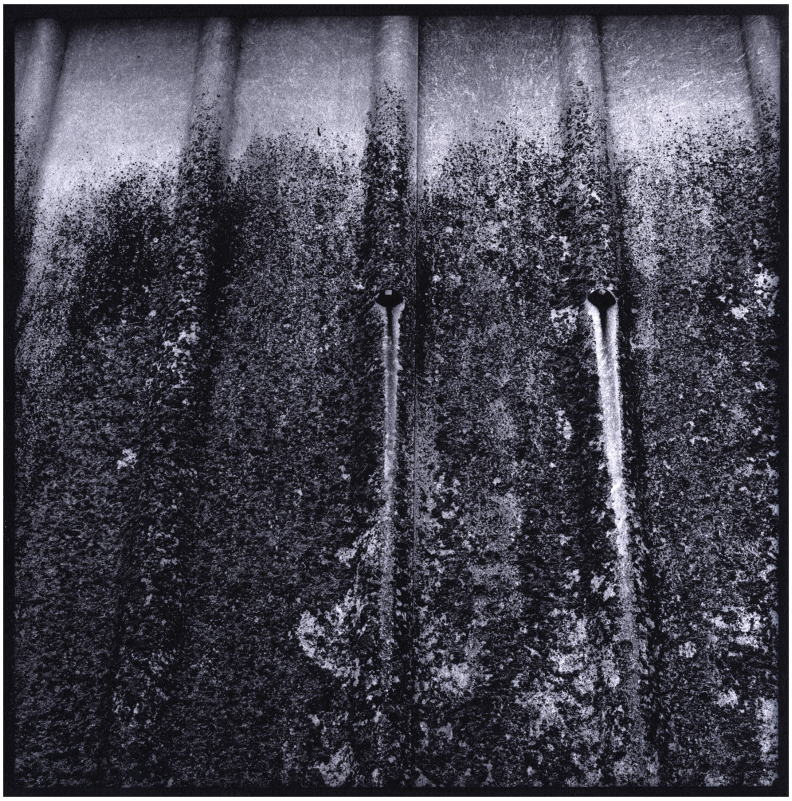
MT7 Iron Blue 5+5+10+5+400ml
1:30 minutes

Kallitype
Arches Platine
developer Sodium citrate

MT14 Selenium 1+100 2 minutes prior to fixing

and after fixing and wash

MT7 Iron Blue 10+10+30+10+600ml
3 minutes



Kallitypie
Bergger-Cot320

2 toners

MT10 Gold 4 minutes before fixing

and after fixing and wash mixed MT7 and MT8

MT7 Iron Blue 5+5+10+5+600ml
+ Copper sulfate 10% (MT8 part 2) 5ml
90 seconds

Athenatype

MT7 Iron Blue 5+5+0+5+800ml 4 minutes

followed by a weak alkali solution

Vandyke

Bergger Cot-320

Toner MT7 Iron Blue

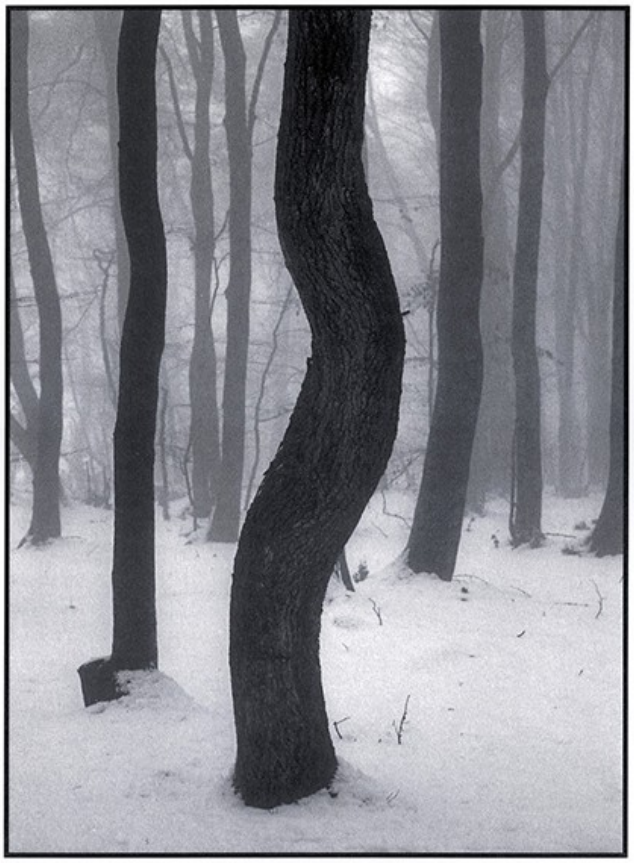
Kallitypie

Hahnemühle Platinum Rag

developer Sodium citrate

MT7 Iron Blue 3+3+6+3+500ml 2:40 minutes

followed by Lead acetate 3% 1:40 minutes



Kallitypie

Hahnemühle Platinum Rag

Developer Sodium acetate

MT7 Iron Blue 2+2+5+2+500ml 30 seconds
followed by Lead acetate 3% 20 Sseconds

Kallitypie

Hahnemühle Platinum Rag

developer Potassium citrate

MT7 Iron Bluer 2+2+6+2+500ml 1:30 minutes
followed by Lead acetate 3% 30 seconds

Kallitypie
Hahnemühle Platinum Rag

developer Sodium acetate

MT7 Iron Blue 2+2+9+2+500ml 3 minutes
followed by Lead acetate 2,5% 2:30 minutes

Kallitype
Hahnemühle Platinum Rag

developer Sodium acetate

MT3 Vario: bleach 1+150 1 minute
Toner 50+40+900ml

MT7 Iron Blue 2,5+2,5+6+2,5+500ml 1 minute

Athenatype
Hahnemühle Platinum Rag

MT7 Iron Blue 3+3+8+3+600ml

1:30 minutes

Salt Print
Bergger Cot-320

pretoning MT14 Selenium

MT7 Iron Blue

Gelatin Salt
Bergger Cot-320

MT14 Selenium 1+125 2 minutes

MT7 Iron Blue 1+1+0+1+1+500
4 minutes

Kallitype
Hahnemühle Platinum Rag

Sodium citrate developer

MT7 Iron Blue: 2+2+5+2+600ml 1:30 mins
followed by Lead acetate 1,5% 30 secs.

After a bleach containing bromide and subsequent redevelopment in SE6 Blue, the silver particles have a coarser structure, which allows selenium toning without the usual fading to unattractive yellowish colour of Kallitypes, at least, when the dilution is up to 1+30.
A later iron toning, however, does not produce a clearly recognisable split tone as with silver gelatine prints, but a continuous greenish tone due to the addition of the two colours red and cyan.
A following lead toning changes this only slightly, at least cyan is reduced, which leads to a warmer impression.

Kallitype
Bergger Cot-320
Sodium citrate developer

MT1 Selenium Toner 1+250 1 minute

Kallitype
Bergger Cot-320
Sodium citrate developer

MT1 Selenium Toner 1+250 1 minute

With a high dilution and a short time, this selenium toner reaches the lighter values (see above) of Kallitypes, but there is still enough untoned silver over the whole tonal range, to use a second toner.

MT7 Iron Blue 2+2+8+3+400ml 2 minutes

In the highlights, the effect of the selenium toner has not yet taken hold, the warm tone is replaced by the blue toner. In the shadows, the blue toner finds only a little unprotected silver, but there is still enough to increase the density and cool the hue somewhat.

Kallitype
Arches Platine
Sodium citrate developer

before fixing

MT14 Selenium toner
and
Palladium toner

after fixing

MT7 Iron Blue

Kallitypie
Hahnemühle Platinum Rag

developer
Ammonium citrate – Sodium acetate mixture

MT7 Iron Blue

Kallitype
Arches Platine

MT10 Gold toner 4 minutes

MT7 Iron Blue Toner 2 minutes

Lobotype
Hahnemühle Platinum Rag

alkaline Copper toner
followed by
MT7 Iron Blue

Kallitype
Potassium citrate developer

MT7 Iron toner 2+2+5+2+600ml 2:30 minutes
followed by Lead acetate 2,5% 20 seconds