

## Tonings with Cobalt and Iron



The combination of cobalt and iron toner is useful to create intensive monochrome image tones from violet to blue. It is also good for split toning.

With the large number of possible variants it is absolutely necessary to write down exactly what you did in terms of dilution, times of toning, times of rinsing and so on, if future results are not to be left to chance. As with all toning, the choice of paper has a huge impact on the toning result. Even the developer you use has an influence.

Included in delivery of the MT12 Cobalt Toner are:

4 concentrated solutions to prepare the Cobalt Toner

2 concentrated solutions to prepare the Ferric Sulphate Toner

200g sodium chloride to prepare a stock solution of a clearing bath (dilute 1+9 for working solution)

Alternatively or additionally to the ferric sulphate toner, you can order ferric citrate toner.

To prepare the Cobalt Toner

|                    |       |
|--------------------|-------|
| water (aqua dest.) | 400ml |
| Part 1             | 50ml  |
| Part 2             | 20ml  |
| Part 3             | 20ml  |
| Part 4             | 20ml  |

### Ferric Sulphate Toner

|                                 |       |
|---------------------------------|-------|
| water (aqua dest.)              | 400ml |
| Ferric sulphate 10% sol.        | 20ml  |
| Hydrochloric acid, 15% solution | 20ml  |

### Ammonium iron (III) citrate Toner (optional)

|                                      |       |
|--------------------------------------|-------|
| water (aqua dest.)                   | 400ml |
| Ammonium iron (III) citrate 10% sol. | 20ml  |
| Sulphuric acid, 20% solution         | 40ml  |

Cobalt toner alone does not lead to a particularly interesting image tone. Only if you tone additionally in iron, you get colour and density.

Before toning, the print has to be washed. Between toning in cobalt and toning in iron you have to rinse the print again for at least 10 minutes. This is to prevent a reaction of the bleach substance ferricyanide (part 4) with the iron toner, which would result in staining. As long as they are not contaminated with ferricyanide, both blue toners have an excellent shelf life and can be used until exhausted.

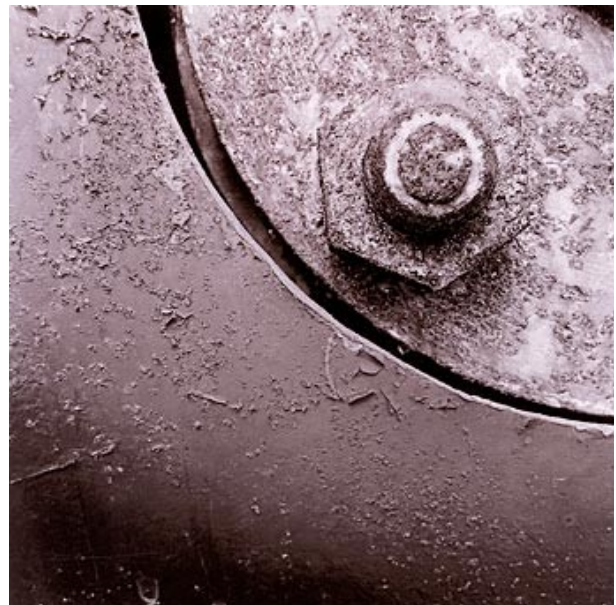
You can shorten the time of rinsing between both toners by half, if you displace the remains of ferricyanide in the emulsion in a weak common salt solution.

Unfortunately, cobalt toner can only be used for 30 to 60 minutes. You should prepare as little working solution as possible for toning. 250ml are enough to tone 24x30cm prints. If you work speedily, you can tone up to 6 or 8 prints. As soon as the toner turns cloudy and dark, it can leave deposits on the print surface. These deposits usually show first on the image borders and on the back of the print. When this happens for the first time, they can be rubbed off with a piece of cotton wool, but further toning with this exhausted working solution can be a risk.

Toning the cobalt image with ammonia ferric citrate results in a continuous monochrome tone from highlights to shadows. Using ferric sulphate can yield to two colours. If toning for longer durations ferric sulphate can lead to a continuous blue-green or blue tone.



Cobalt + Iron sulfate

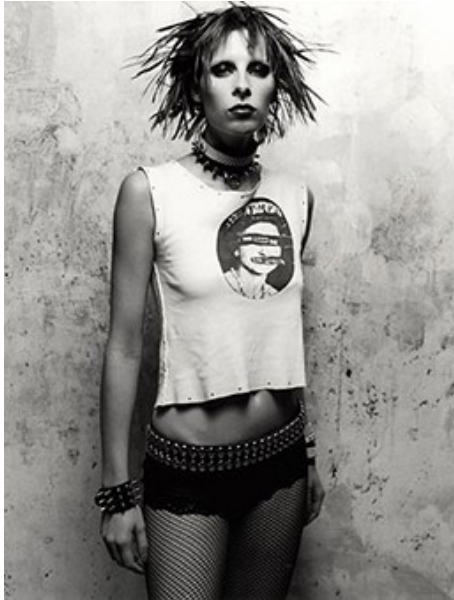


Cobalt + Iron citrate

Papier: Select VC Baryt (Forte PW14) The times of toning were the same for both prints: cobalt for 2 minutes and iron for 1 minute.

Combining cobalt toner with ferric sulphate toner offers a wider colour spectrum than with ferric citrate toner. In this combination as well, you can achieve a cooler shadow tint by a shorter time in cobalt toner.

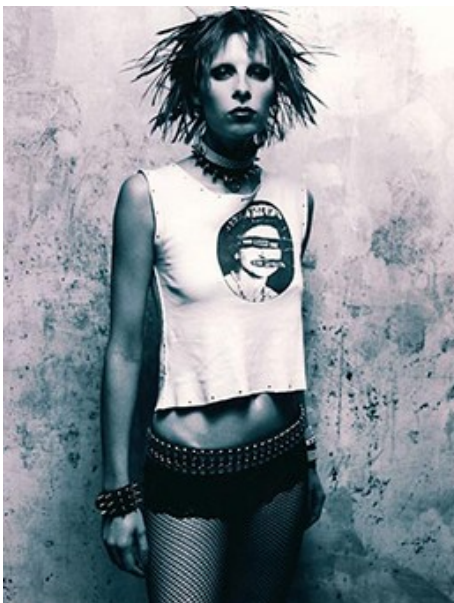
The print should stay in cobalt toner for at least 1 minute. Too short durations leave too much silver for the iron toner. The consequence would be monochrome green or blue photographs. If you extend the duration to beyond 4 minutes, however, the cobalt toner has already reached the deep shadows and two-colour prints cannot be achieved anymore. On the other side, you can overlay the cobalt image completely. The resulting blue tone is superior to all indirect blue toning in so far as its shadow areas have a much higher density. The range of contrast of the initial print is reached or even surpassed.



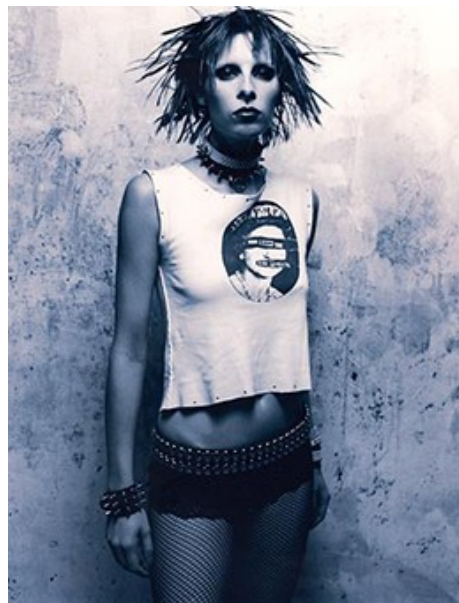
The initial print on PW14



cobalt for 2 minutes - ferric sulphate for 1:30 minutes



Cobalt 2:30 mins – Iron sulfate 1:30 mins



As above + after treatment with Ammonia



You can see clearly that extending the duration in cobalt toner leaves only the shadows for the following iron toner (same duration). Only if you doubled the time in iron toner, the dichromatic tone would change to a continuous blue. If you only want to transform the green areas to a reddish blue, treat the toned print in an alkaline solution. It does make a difference whether you use borax, sodium carbonate or ammonia. I like to use ammonia, because it works intensively towards red (here 2ml of a 10% solution in 400ml of water). Borax works more subtly to nuances of delft blue. Since it acts more slowly, it is easy to miss the right moment to stop the process. With a strong reduction in colour you also lose density.

The interaction between the two toners is always the same. Warmtone paper reacts especially colourful. In mixed emulsions with higher content of bromide silver, in pure bromide silver emulsions, and also in iodine silver emulsions the colours are more subtle.

If we will ever have warmtone emulsions available again like those once produced by Forte cannot be known today. For this process, however, we have the ordeal of choice among lots of alternatives.

The following examples were printed on Kentmere Kentona using neutral tone developer (SE4).



cobalt for 3 minutes - iron for 45 seconds



cobalt for 3 minutes - iron for 1:30 minutes

The time in cobalt toner was the same in both examples. You can see how toning in iron starts taking effect from the shadows. The increase in density (right above) is higher than with shorter time in cobalt and longer time in iron toner (left below).



cobalt 1:50 minutes - iron 3 minutes



For comparison a print directly toned to blue in MT7



You have the option to tone first in selenium or sulphur. Here an example for a combination of thiourea-, cobalt- and iron toner.

If you use thiourea to only tone the highlights and tone comparably long in cobalt, the iron toner can only intensify the cobalt image.

MT3 VarioToner  
bleach 1+80 for 30 seconds  
thiourea toner in configuration A

cobalt toner for 2½ minutes

iron toner for 1 minute

### Cobalt toning followed by iron toning

Irrespective of the paper you use, cobalt toning is not only unspectacular in terms of colour but also results in light and dull prints.



Fomabrom toned in cobalt toner for 3 mins

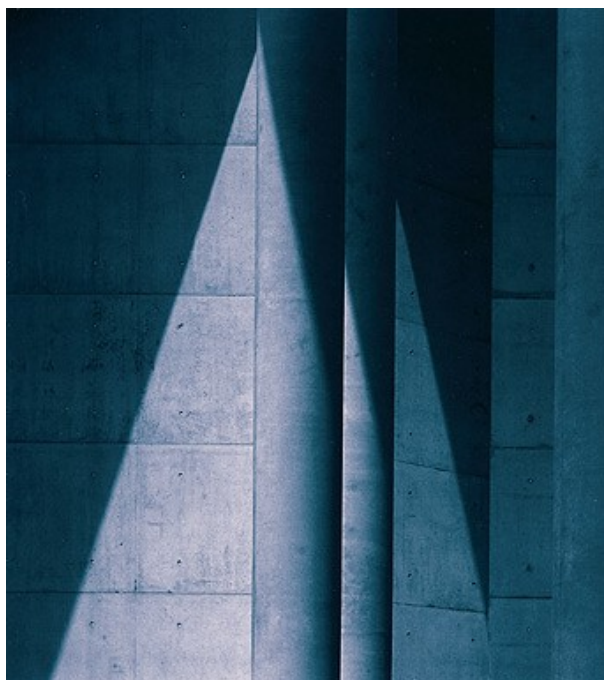


same as on the left, plus toned in ferric sulphate for 3 minutes





Ilford MGWT toned in cobalt toner for 3 minutes



same as on the left, plus toned in ferric sulphate for 3 minutes

Toning in selenium for a short time (see below) not only shifts the colour of the shadows, as was to be expected. With prior selenium toning, the darker areas show at least the same density already after 2 minutes of iron toning as they would have after 3 minutes of toning only in iron. This means you can stop now if you want the colour of the highlights to stand out. If you went on toning, the highlights would also shift to a bluer tone and the shadows would become too dense. If you desire a continuous blue tone without any whiff of green, you have to print a bit lighter.



Fomabrom selenium 1+10 1min and cobalt 3 minutes



plus toned in ferric sulphate for 3 minutes

If you want the result to be less intense in colour, you can decrease the duration of toning in cobalt and further dilute the iron toner solution.

If you want to achieve hues between magenta and violet, tone in iron for only a short time. With increased duration in iron the print turns bluer.



Polywarmtone after Cobalt toner 2 minutes



Cobalt plus Iron sulfate 3 mins followed by a weak Ammonia bath

Infrared picture Efke IR820c, ADOX Easy Print VC PE in SE6 Blue



Cobalt 30 seconds



Cobalt plus Iron toner 30 seconds



Cobalt plus Iron toner 90 seconds





**Kentmere Fine Print VC**  
developed in SE6 Blue

This neutral to cold tone emulsion can be toned to intensive colours, if you keep the print in cobalt toner for between 2 to 4 minutes and prepare the iron toner a bit stronger or with a slightly increased content of acid.



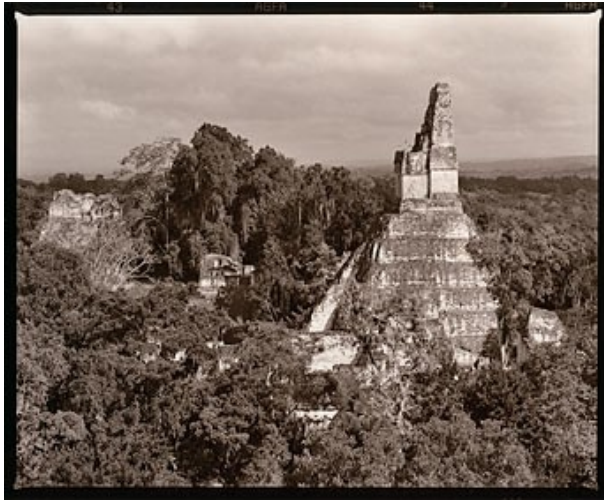
**Iford MG Warmtone**  
right the typical colour of cobalt toning  
left with additional iron toning

Toning of all sorts can also be done after intermediate drying. For some toning methods it is an advantage to dry the print in between, because the gelatine becomes more resistant.

If you dry on a screen, do not place the print with the emulsion side down, as commonly done. In all following toning methods with bleach, this could result in an imprint of the strainer, ruining the print. Do not use an drey press either. In most cases, its linens are not entirely clean.



### Selen prior to Cobalt



**Polywarmton** after Selenium 1+10 45 seconds and Cobalt

As on the left + Iron sulfate 3 minutes

If you first tone in selenium, the loss of density in cobalt toner is low. Fortes warmtone emulsions react quickly to selenium. So either tone only for a short time or use a dilution of higher than 1+10. The iron toner will not find much untuned silver, so that the blueing effect is small. Surprisingly, the iron toner only increases the shadows that have already been darkened by selenium. Even if you tone for 3 minutes, the highlights do not adapt any blue, but appear in a bright reddish-yellow tone.

### Lith and polychrome development (SE15)

The shape of the silver produced by lith development or two bath development with lith as first developer is different in highlights and shadows in terms of size and structure. As a result, split toning - meaning a colour separation of groups of tone values - can be achieved easier this way than with conventional development.



### Select VC (PW15)

two bath development in lith and siena

toned in cobalt for 1½ minutes and in ferric sulphate for 30 seconds



**Fomatone MG 132**  
 two bath development in lith and siena  
 toned in cobalt for 1:30 minutes and in  
 ferric sulphate for 30 seconds

**Cobalt and ammonium ferric citrate (MT7 all parts)**



Polychrome print (lith + siena) on Select VC



cobalt and blue toner MT7



If you first tone in cobalt and then in a normal configuration of MT7 Iron Toner (meaning with bleach substance ferricyanide), the effect on the range of densities is quite different from all other iron toning without bleach mentioned so far. Depending on the intensity of cobalt toning, if you tone in iron for a longer time a violet to magenta tone appears only in the mid tones. The highlights turn blue-grey. The shadows first show a deep blue and shift to blue- green only later. The densities continuously decrease until even the deepest blacks have switched to a blue green tone. In contrast to all toning so far with iron as second toner, the shadow densities do not increase but decrease. You can make use of this characteristic when toning polychrome prints. Polychrome prints have a high silver density in the shadows. Lith black is a lot more resistant towards the toner than the adjacent slightly lighter shadow zones. If you miss the right moment to stop the toning process, the zone I black will also turn green at some point.



Cobalt + MT7 Iron Blue



same as to the left plus MT8 Copper toner

Working with a direct iron toner naturally also brings us yellowing and with it the necessity to clear before the final wash. This is only one more step on top of all the effort that has been put into the image anyway.

The image whites, including the unexposed image border, should appear as white as before the ordeal of toning. Not every paper can stand this. A little diminishing of the whites may be tolerable, but spotting on the image borders is not.

Normally a 2% solution of sodium chloride is enough to remove these ferric salts after MT7. There is a powder for the preparation of a clearing bath included in delivery of both MT7 and MT12 (here Hydrogen sulphate) toners.



#### Select VC

Using cobalt toner for only 45 seconds gives a delicate tone to the highlights appropriate for this picture.

MT7 in a slightly stronger solution for 20 to 30 seconds only tones the mid tones.

The whites were cleared by bathing the print in a common salt solution for two minutes. To avoid a reduction of the green densities in alkaline tap water, the rinse water in the dish was slightly acidified and renewed a couple of times for rinsing. (Some drops of acetic or citric acid were added to the water.)



This print was toned slightly longer:  
cobalt for 1½ minutes and MT7 for 45 seconds

The darkest shadow zone that still shows detail - just below the sill - is dark green. The following zones are bluish and the highlights appear with little density and colour.

Clearing the image whites was not entirely successful. A delicate yellowing is still visible. To make this more obvious, I increased the saturation of the image border in Photoshop by 50%.



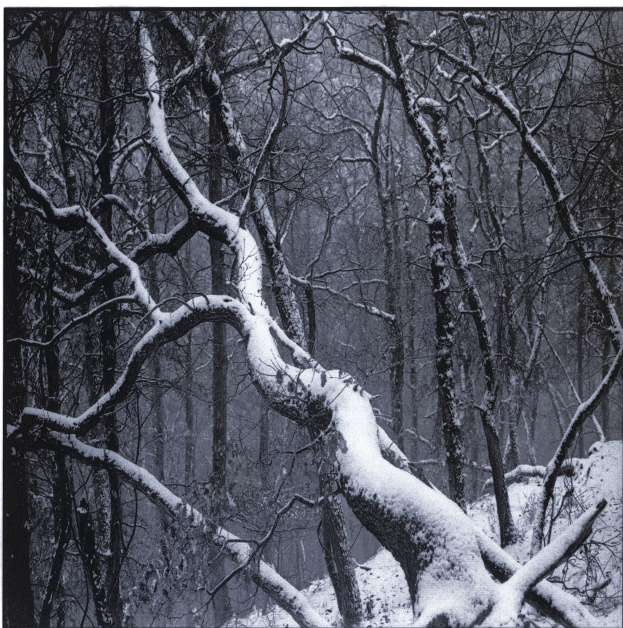
## Kallitype with Cobalt toning



Kallitype on Hahnemühle Platinum Rag, Ammoniumcitrate developer

Cobalt toner 12+9+7+4+450ml 1:30 minutes  
Iron sulfate 20ml HCl 7,5% 1ml to 450ml water 2 minutes

As on the left, but overtoned with MT7 Iron Blue Toner  
4+2+4+3+450ml 45 seconds



Hahnemühle Platinum Rag

Acetate developer

Cobalt toner 12+8+7+4+450ml 1:30 minutes

MT7 Iron Blue Toner 4+2+4+3+450ml 40 seconds,  
Lead acetate toner 40 seconds



## Lobotype with Cobalt toning



Lobotype

Hahnemühle Platinum Rag

Cobalt toner 12+8+7+4+450ml 2 minutes

MT7 Iron Blue Toner 4+2+4+3+500ml 1 minute,  
Lead acetate toner 2,5% 15 seconds

## Vandyke with Cobalt toning



Vandyke

Hahnemühle Platinum Rag

Cobalt toner 12+8+7+4+450ml 2 minutes

MT7 Iron Blue Toner 4+2+4+2+500ml 1 minute,  
Lead acetate toner 1% 15 seconds