

Siderotype Workshop Notes

New Chrysotype

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Overview of Chrysotype

Herschel's original gold-printing process of 1842, called Chrysotype, encountered problems with chemistry and cost which prevented its adoption into the photographic repertoire, as recounted in:

http://www.mikeware.co.uk/mikeware/Prints_of_Gold.html

This 'forgotten' process was revived in a novel version in 1987 by means of some sophisticated modern chemistry, making it both economic and controllable as described in:

http://www.goldbulletin.org/downloads/ware_3_39.pdf

The New Chrysotype process has tonal and surface qualities and permanence like Platino-palladiotype, but a bonus feature of beautiful muted colours controlled by the chemistry of the process.

Photographic artists should discover here a whole new palette of non-literal colour to explore in printing archivally permanent 'monochrome' images in hand-coated noble metal sensitizers:

http://www.mikeware.co.uk/mikeware/New_Chrysotype_Process.html

The New Chrysotype sensitizer solution is rather short-lived, so must be prepared a few minutes prior to coating the paper by mixing carefully-measured volumes of three stock solutions which, for brevity, will be designated as: **A. Ligand, B. Gold, and C. Iron**. Full instructions follow for preparing and mixing these solutions. The function of the Ligand solution is to bind to the gold, moderating its reactivity. The cost per print lies between platinum and palladium.

Disclaimer

It is the responsibility of the users of chemicals to inform themselves about the risks, and to take appropriate precautions in their handling. Reference should be made to the Materials Safety Data Sheets (MSDS), which are accessible online:

<http://www.ilpi.com/msds/index.html>

The author hereby denies liability for any consequent sickness, injury, damage or loss resulting from the use of the chemicals named herein.

Chemicals for Preparing New Chrysotype Sensitizer

Purity: General Purpose Reagent (GPR) grade *ca.* 98%

Substance, Formula & MSDS	Quantity
Ammonium iron(III) oxalate $(\text{NH}_4)_3[\text{Fe}(\text{C}_2\text{O}_4)_3] \cdot 3\text{H}_2\text{O}$ <i>aka ferric ammonium oxalate</i>	30 g
3,3'-Thiodipropanoic acid $\text{S}(\text{CH}_2\text{CH}_2\text{COOH})_2$ <i>aka 3,3'-thiodipropionic acid; diethyl sulphide 2,2'-dicarboxylic acid; thiodihydracrylic acid</i>	12.5 g
EITHER	
Sodium tetrachloroaurate(III) dihydrate $\text{Na}[\text{AuCl}_4] \cdot 2\text{H}_2\text{O}$ <i>aka sodium chloroaurate; sodium gold chloride</i>	5 g
OR	
Hydrogen tetrachloroaurate(III) trihydrate $\text{H}[\text{AuCl}_4] \cdot 3\text{H}_2\text{O}$ <i>aka chloroauric acid; hydrochloroauric acid; auric chloride hydrochloride; "gold chloride"</i>	5 g
EITHER	
Sodium carbonate (anhydrous) Na_2CO_3	10 g
OR	
Sodium hydrogen carbonate NaHCO_3	15 g
Water, purified (distilled, de-ionised, pharmaceutical, etc)	<i>ca.</i> 200 cc
Tween 20™ $\text{C}_{58}\text{H}_{114}\text{O}_{26}$ <i>aka polyoxyethylenesorbitanmonolaurate, polysorbate</i> Separate solution diluted to 10% or 5% v/v	0.25 cc

Meaning of Abbreviations for Solution Concentrations

X% w/v "weight per volume": X grams of solute in 100 cc of solution

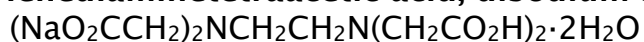
Y% v/v "volume per volume": Y cc of liquid in 100 cc of solution

Chemicals for Processing New Chrysotypes

Purity: General Purpose Reagent (GPR) grade *ca.* 98%

Developing agents One of the following:

Ethylenediaminetetraacetic acid, disodium salt



aka 1,2-Diaminoethanetetraethanoic acid, disodium salt;
Disodium EDTA; Disodium edetate

Citric acid $\text{C}(\text{OH})(\text{COOH})(\text{CH}_2\text{COOH})_2$

aka 2-Hydroxypropane-1,2,3-tricarboxylic acid

Tartaric acid $(\text{CH}(\text{OH})\text{COOH})_2$

2,3-Dihydroxybutanedioic acid; 3-hydroxymalic acid

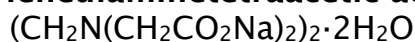
Oxalic acid $(\text{COOH})_2 \cdot 2\text{H}_2\text{O}$

aka ethanedioic acid

These 'developers' are made up as baths, *ca.* 1-2% w/v by dissolving *ca.* 10 g (one rounded 5 cc teaspoonful) in 1 litre of water at 20°C. A 1 litre bath should be used to process only a few prints 10x8 in. Don't store and re-use the bath, because it accumulates excess iron and gold salts, acquiring the ruby-red colour of nanoparticle gold which can cause staining of subsequent prints.

Clearing agents

Ethylenediaminetetraacetic acid tetrasodium salt 5% w/v 2 litres



aka 1,2-Diaminoethanetetraethanoic acid, tetrasodium salt;
Tetrasodium EDTA; tetrasodium edetate

Dissolve 100 g of the solid in 2 litres of water. Two such clearing baths are required. The capacity is *ca.* 50 10x8 in. prints per litre.

Sodium metabisulphite $\text{Na}_2\text{S}_2\text{O}_5$ 2.5% w/v

1 litre

aka sodium pyrosulphite; sodium disulphite

Dissolve 25 g of the solid (level tablespoonful) in 1 litre of water. Alternatively, sodium sulphite or sodium hydrogen sulphite (sodium bisulphite) or Kodak 'Hypoclear' powder may be used. This solution should be made up fresh for a day's printing, and not stored and re-used.

Apparatus for New Chrysotype Sensitizer

Pyrex glass beaker 100 cc

Measuring cylinder 50–100 cc

Large beaker or plastic jug 500 cc – 1 litre

Scales or chemical balance sensitive to 0.1 g

Spatula or plastic spoon

Glass stirring rods

Conical filter funnel, small *ca.* 6 cm diameter

Filter paper Whatman Grade #1 *ca.* 10 cm diameter

Washbottle filled with pure water

Brown glass bottles 3 x 50 cc

Hotplate (or bath of very hot water)

Tungsten lighting to work under, not fluorescent or daylight.

Equipment for Printing Chrysotypes

Paper

Glass coating rod

Blotting strips

Syringes, calibrated, at least 4 x 1 cc, 2 cc and 5 cc

Mixing vessel – small liqueur or ‘shot’ glass

Glass plate

Spirit level

Drafting tape or clips

Print frame

Hygrometer

Humidifier boxes – cat-litter trays with lids

UVA light source and Timer

Plastic measuring jug (2 litre) and Stirrer

Processing Dishes (5)

Tongs or plastic gloves

Drying screen or drying line and pegs

Preparation of New Chrysotype Sensitizer Solutions A, B & C

A. Ligand solution (Disodium 3,3'-thiodipropionate, 1.4 molar)

1 Weigh out 12.5 g of 3,3'-thiodipropionic acid and transfer it into a large beaker or measuring cylinder of at least 500 cc capacity.

Add ca. 30 cc of pure water to the thiodipropionic acid and stir it into a suspension with a glass rod.

(This vessel is necessarily large in order to contain the foam generated in the reaction that follows)

2 Weigh out separately 7.4 g of sodium carbonate (anhydrous powder), OR 11.8 g of sodium hydrogen carbonate.

3 Slowly add the solid sodium (hydrogen) carbonate powder, in small portions of ca. 1 g, to the suspension of thiodipropionic acid. The suspension will foam up alarmingly, but should be contained by the tall vessel. Stir well and allow the foam to subside between additions, until all the solid is added.

(The effervescence is carbon dioxide gas – this is harmless. The solution becomes cold, so may be slightly warmed in a bath of hot water to hasten the reaction.)

4 Pour the colourless solution into a measuring cylinder (50–100 cc). Make it up to a final volume of 50 cc with pure water and mix well.

(A few small residual particles do not matter and will be removed.)

5 Filter the solution through a Whatman Grade #1 filter paper directly into the stock bottle (this is a slow process because the solution is somewhat syrupy.)

Label it **New Chrysotype: Solution A Ligand**. Include the date.

(This solution should keep indefinitely, if correctly made up.)

EITHER**B.1 Gold solution** (Sodium tetrachloroaurate(III), 0.35 molar)

- 1 Carefully transfer or weigh out 5 g of sodium tetrachloroaurate(III) into a Pyrex glass beaker of 100 cc capacity.
(Use a plastic spatula or spoon – this gold salt will attack stainless steel and nickel.)
- 2 Add ca. 25 cc of pure water to the gold salt in the beaker. With gentle agitation, all the solid will dissolve easily to a yellow solution at room temperature.
(You should use some of this water to wash out and transfer any residual crystals of gold salt from your weighing bottle or vial, by means of a dropping pipette.)
- 3 Filter the solution carefully into a measuring cylinder (50–100 cc) using a small conical filter funnel and a Whatman Grade #1 filter paper.
- 4 Add pure water from the washbottle, a little at a time, to the filter-paper, allowing it to pass through to wash out most of the residual yellow solution, and to make up the final volume to exactly 36 cc in the measuring cylinder. Mix thoroughly.
- 5 Transfer the solution carefully from the measuring cylinder to the stock bottle. Label it: **New Chrysotype: Solution B: Gold**
(This solution is stable indefinitely.)

OR**B.2 Gold solution** (Sodium tetrachloroaurate(III), 0.35 molar)

If hydrogen tetrachloroaurate(III) is less expensive or more readily available than the sodium salt, the gold solution can be made from it using the following procedure for neutralizing this acid with anhydrous sodium carbonate or sodium hydrogen carbonate.

- 1 Carefully transfer or weigh out 5 g of hydrogen tetrachloroaurate(III) into a tall measuring cylinder (100 cc).
(Use a plastic spatula or spoon – this gold salt will attack stainless steel and nickel.)
- 2 Add ca. 30 cc of pure water to the measuring cylinder. With gentle agitation, all the solid will dissolve easily to a yellow solution at room temperature.
(You should use some of this water to wash out and transfer any residual crystals of gold salt from your weighing bottle or vial, by means of a dropping pipette.)

- 3 Weigh out (precisely, if possible) 0.673 g of sodium carbonate (anhydrous powder), OR 1.07 g of sodium hydrogen carbonate, using a chemical balance.
(If your balance is not this precise, the figures may be rounded up to 0.7 g or 1.1 g respectively.)
- 4 Slowly add the sodium (hydrogen) carbonate in small portions (tip of a spatula), to the solution of tetrachloroauric acid. There will be vigorous effervescence as carbon dioxide gas is evolved. The spray should be contained by the tall measuring cylinder. Swirl the solution, and continue adding the solid to completion and no further effervescence.
- 5 Add pure water from the washbottle to make up to a final volume of exactly 36 cc in the measuring cylinder, with thorough mixing.
- 6 Filter the solution carefully into the stock bottle through a small Whatman Grade #1 filter paper to minimise the loss of residual solution. Label it: **New Chrysotype Solution B: Gold.**

C. Iron solution (Ammonium iron(III) oxalate, 1.4 molar)

The following sequence of instructions should be carried out under dim tungsten lighting not fluorescent or daylight.

- 1 Weigh out 30 g of ammonium iron(III) oxalate into a small (100 cc) Pyrex glass beaker.
- 2 Add exactly 33 cc of pure water (from a measuring cylinder) and stir well to dissolve the solid.
- 3 The solution becomes cold, so gently warm the beaker in a bath of hot water (*ca.* 50°C) to assist dissolution.
- 4 The solid will dissolve within 5 minutes to form an emerald-green solution. The volume should be correct (50 cc) so it does not need to be made up.
(Any tiny residue of remaining solid may be ignored.)
- 5 Filter the solution (Whatman Grade #1 filter paper) directly into a brown storage bottle. Label it: **New Chrysotype Solution C: Iron.**
(If, after a few days, a few white needle-like crystals (probably of ammonium oxalate) have appeared, re-filter the solution to remove them. This solution is close to saturation; if cooled below 20°C for any length of time, green crystals may appear: warm gently and swirl to redissolve these. Stored at room temperature in the dark, it will keep for many years.)

Notes on the New Chrysotype Process

Choice of Paper

The best results will be obtained on unbuffered papers such as:

- 'Buxton' Handmade by Ruscombe Mill
- Weston Diploma Parchment
- Crane's Platinotype
- Atlantis Silversafe Photostore

The red tones of gold are favoured by gelatin-sized papers such as:

- Ruscombe Mill's 'Talbot' paper
- Fabriano 5
- Arches Aquarelle
- Saunders 'Waterford'

For prints up to 10x8 in. or A4 in size, a paper weight of 160 gsm (grams per square meter, g/m²) is adequate. For larger prints of A3 size, a heavier weight of 240 gsm, or more, will minimise cockling and "bellying" of the coated sheet due to the stresses set up by the hydroexpansion of the cellulose fibres in the wetted area. The sheet will contact the negative better, and be more robust in wet handling.

Choice of Sensitizer Contrast and Characteristics

In a 'standard' sensitizer, the **volume ratios** for the 3 solutions are:

$$\text{Ligand : Gold : Iron} = \text{A : B : C} = 4 : 4 : 1$$

However, to control the contrast, the ratio of ligand **A** can be varied between the limits:

$$\text{A : B : C} = 2 : 4 : 1 \text{ and } 6 : 4 : 1$$

as shown in the following Table:

Table 1. Dependence of sensitizer contrast on ligand ratio.

Ligand ratio A	2	2.5	3	4	5	6
Exposure range ΔD	2.8	2.4	2.2	2.0	1.8	1.6

The value of A will be determined by personal taste and the density range of your negative:

- Lower ligand ratios than A=4 give less stable sensitizers, which print faster, with a longer tonal range and higher D_{\max} , but they have a greater tendency to fog the highlights and to decompose before coating.
- Higher ligand ratios than A=4 give more stable sensitizers, which will print less rapidly, showing higher contrast and slightly lower D_{\max} , with clean highlights.

Mixing the Sensitizer Solutions

The volumes of the solutions to measure out are determined by the total area to be coated, *i.e.* the number and size of coatings, the nature of the paper, and the chosen ligand ratio A. As a guide, figures are set out in Table 2 for making up 10 cc of mixed sensitizer. For volumes other than 10 cc, scale these numbers accordingly, selecting the row of volume figures, **A**, **B**, **C** that corresponds with your chosen ligand ratio **A**. For example, if you find that your chosen paper requires 1.6 cc for each coating, and you wish to coat 8 sheets, then you will require $8 \times 1.6 = 12.8$ cc of sensitizer, so each figure in the appropriate row should be multiplied by 1.28 to give the volumes to be measured out.

Table 2. Volumes to make 10 cc of New Chrysotype sensitizer

Ligand Ratio A	Volume A Ligand	Volume B Gold	Volume C Iron
2	2.86 cc	5.71 cc	1.43 cc
2.5	3.33	5.33	1.34
3	3.75	5.00	1.25
4 standard	4.44	4.44	1.12
5	5.00	4.00	1.00
6	5.45	3.64	0.91

These small volumes are conveniently dispensed with graduated plastic syringes, of capacity 1, 2, and 5 cc. It is good practice to dedicate a particular syringe to each solution, with an identifying mark, to avoid cross-contamination. Although these volume figures are quoted precisely, do not be daunted by this degree of accuracy: even with a calibrated syringe, you may have to guess the second decimal place. The process is quite forgiving over a range of values.

The solutions *must* be mixed in the following sequence:

- 1 Deliver the volume **A** of **ligand** solution into the mixing vessel using a graduated syringe.
- 2 Add the volume **B** of **gold** solution, drop by drop, from another syringe, with stirring or, preferably, careful swirling of the vessel (which avoids introducing a stirring rod). Allow time between each drop (1–2 seconds) for the gold solution to decolorise.
- 3 When step 2 is complete, add the volume **C** of **iron** solution, from a third syringe, to give a very pale yellowish–green sensitizer.
- 4 Mix thoroughly using a fourth syringe, and coat the paper sheets as described below.

The stability of the made-up sensitizer solution depends on the ligand ratio and the temperature, but all solutions should last for at least 30 minutes at 20°C without perceptible decomposition, which is sufficient time to coat a batch of sheets. The mixed solution cannot be stored. Decomposition is indicated by the deposition of metallic gold, which plates the container.

Addition of Surfactant to the Sensitizer

The new chrysotype sensitizer penetrates cellulose fibres well, and absorbent papers may not require any additional surfactant (wetting agent), but some hard-sized papers, such as Buxton, may yield a better, more uniform coating if a surfactant is used.

Tween 20™ (a non-ionic surfactant) should be added to the sensitizer solution before coating to produce a final concentration of ca. 0.25%. E.g. you can add one drop (ca. 0.05 cc) of a 5% stock solution of Tween 20™ to each cc of sensitizer and mix well.

Do not add Tween to the stock sensitizer solution: it doesn't last very well, and the appropriate amount will depend upon the paper. Tween may interact unfavourably with gelatin-sized papers.

Coating

Coating by the rod method (5 or 6 'passes') will require ca. 1.5 cc of sensitizer to coat an area appropriate for a 10x8 in. print; brush coating is wasteful. Blot off any excess sensitizer which may crystallize and damage negatives. Try to "fine tune" your coating volume on the basis of experience, to avoid waste. For coating instructions see:

<http://www.mikeware.co.uk/mikeware/preparations.html>

Drying & Storage

It is simplest to let the sensitized paper dry at room temperature and ambient RH, in the dark, with good air circulation to the atmosphere, for at least an hour; this is a suitable procedure if a high RH is to be used (see below). Shorter drying times are possible, but very humid paper may damage precious silver-gelatin negatives in contact, and not lie flat.

If a low RH is to be used, allow a few minutes for the sensitizer to soak in, until the paper surface appears non-reflective, then heat-dry it with a uniform air stream at ca. 40°C for 10 minutes. After heat-drying, the coated paper may be stored in a cool, light-tight desiccator at RH 10% or less. For preference the paper should be exposed and processed on the same day that it is coated.

Regulating the Humidity of the Paper

To attain consistent results for the image colour, the water content of the sensitized paper must be controlled before exposure. Varying degrees of humidification will produce different colours in the print and different extents of printout:

- High RH (*ca.* 80% or higher) yields a nearly complete printout in fairly neutral greyscale tones, or with a hint of blue or green.
- Low RH (*ca.* 30% or lower) gives almost no printout: only the shadow tones may be faintly visible, and the image is generated mainly by development, with pinkish-brown or dull red shadows and greyish-blue high values.
- Intermediate RH values (40–70%) can provide split-toned scales, with purple and magenta shadows graduating into blue highlights, resulting from partial printout coupled with development.

Humidification can be controlled in two ways. The first is simpler, but requires more attention because the process must be timed.

Water hydration chamber (time-dependent method)

A dried paper may be humidified over pure water (100% RH) at 20°C for a timed period up to 40 minutes. If the ambient temperature is much different from 20°C, then some correction to the time is necessary for consistent results.

Salt hydration chambers (equilibrium method)

These are chambers of known, constant RH, provided by saturated solutions of specified salts. Initially, try just three, using the substances in Table 3, which will convey some idea of the range of colours. Following that, the use of other RH values will be a matter of exploration and personal taste.

Substance	Formula	RH%
Calcium chloride, anhydrous solid	CaCl ₂	9
Calcium chloride, saturated solution	CaCl ₂	45
Calcium nitrate, saturated solution	Ca(NO ₃) ₂	56
Sodium chloride, saturated solution	NaCl	76
Ammonium chloride, saturated solution	NH ₄ Cl	80

Table 3. Salts for the control of Relative Humidity atmospheres.

The box of RH 9% can also be used for the storage of coated paper. Paper should be heat-dried before placing in this box, so as not to exhaust the desiccant too quickly. The box of RH 45% can be made up using the spent calcium chloride from a 9% box, when it becomes too moist. A saturated solution is prepared, in contact with excess solid, in

each case. Hydration in these chambers requires a minimum of half an hour, but papers may be left longer. If you intend to equilibrate at high RH, the initial drying in hot air is unnecessary.

Printing Exposure and Negatives

Negatives should have a long UVA density range: see Table 1. Exposure times vary with the ligand ratio, but are generally shorter even than palladium sensitizers. Using modest UVA light sources, exposures may be only one or two minutes. With an 800 W HID UV lamp and digital negatives my exposure time is *ca.* 30 seconds. The extent of printout is nearly total at high RH values, but decreases in the drier sensitized papers, leaving 4 to 6 stops of development at the lower RH values. At the driest level there will be very little print-out at all. Bear this in mind when inspecting the intermediate image.

Controlling the Gold Image Colour

The colour of a new chrysotype print depends on four main factors: the chemistry (only one version is given here – there are others); the humidity of the coating during exposure; the sizing agent in the paper; and the ‘developer’ used in the wet-processing procedure:–

Hydration of the coating prior to exposure

The primary control of colour is the RH of the coated paper’s environment before exposure. At low values (*ca.* 10%), the colours develop up predominantly pink and reddish-brown. As the RH is raised, the dominant colour shifts through magenta, via purple (RH 45%), to a fine print-out bluish-black (RH 80%) which compares favourably with the best that the platinotype process can achieve.

Effect of the paper sizing agent

The best red and pink colours are given by papers that have been tub-sized with gelatine, e.g. Fabriano 5, Arches Aquarelle, T.H. Saunders ‘Waterford’, or Ruscombe Mill’s ‘Talbot’ paper. Alternatively you can surface-size papers yourself with gelatin. For more neutral blue-black tones and dull magentas, the papers internally sized only with Aquapel™ may be used – especially Ruscombe Mill’s ‘Buxton’ paper.

Choice of developing agent

The choice of ‘developer’ also influences the final colour, as outlined above: ranging from water through to oxalic acid. These developers act differently in conjunction with the RH. At low RH, citric acid produces pinks, and disodium EDTA browns, however at high RH citric acid produces bluish, and disodium EDTA greenish, results.

Wet Processing Procedure

1 “Steam” the print (an optional step: ‘post-hydration’) 1–2 mins

To enhance the gradation in the high values, expose the print surface uniformly to water vapour over a tray of water at *ca.* 40°C. The high values will develop fairly monochromatically, *i.e.* without strong ‘split tones’.

Then immerse the print in the following wet-processing baths, face down, with intermittent agitation:

2 Develop in a ‘one-shot’ bath (almost) up to 10 mins

Each of the following ‘developers’ has a slightly different effect in ‘fine-tuning’ the resultant colour of the gold image. Vigorous agitation is important for the first couple of minutes.

- **Water:** the least ‘energetic’ option, giving the highest apparent contrast and shortest range, due to lack of developing agent.
- **Disodium EDTA:** gives a clean result with fairly neutral tones.
- **Tartaric acid:** yields redder tones, but still fairly subdued.
- **Citric acid:** from 1 to 6 minutes can produce a long range of pink hues merging into blue highlight tones if the sensitizer was exposed at low RH. Intensity increases with time. Overlong treatment may ‘block up’ the shadows.
- **Oxalic acid:** causes the most intense and striking red/blue colour splits and the longest tonal range.

These are not the only possible choices: the main criteria for selecting a chemical for the ‘development bath’ are: a non-alkaline, non-reducing, complexing agent for ferric iron. Experiment!

3 Rinse in water half min

4 Clear #I: tetrasodium EDTA (5% w/v) 10 mins

It is economical to use ‘2-bath fixing procedure’, by replacing the #I bath by the #III bath when it is exhausted, after *ca.* 50 prints.

5 Rinse in water half min

6 Clear #II: sodium metabisulphite (2% w/v) 10 mins

Sodium sulphite or Kodak Hypoclearing Agent may be used.

7 Rinse in water half min

8 Clear #III: tetrasodium EDTA (5% w/v) 10 mins

9 Wash in gently running water 30–60 mins

10 Drain face out, on a near-vertical sheet of Perspex 10 mins

11 Dry at room temperature on a horizontal plastic mesh screen.

Summary of New Chrysotype Procedure

Step	Procedure	Time mins	Total time
1)	Pre-Humidify paper (only if storage RH<50%)	(30)	
2)	Mark up chose side for coating and number paper	1	1
3)	Dust down paper and tape up for coating	1	2
4)	Mix sensitizer (A:B:C = 4:4:1 standard) add Tween	2	4
5)	Coat paper (5 passes standard) & blot off excess	2	6
6)	Rest paper horizontally till sheen goes	4	10
7)	Dry in warm air stream (40°C)	10	20
8)	Store in anhydrous CaCl ₂ (9% RH)	Indefinite time	
9)	Humidify (100% RH @ 20°C)	up to 40	60
	or use a constant RH box	Indefinite time	
10)	Register with negative appropriate density range	2	62
11)	Expose to UVA light source	3	65
12)	“Steam” over water (100% RH @ ca. 40°C)	2	67
13)	Develop in disodium EDTA (1%) or other	10	77
14)	Rinse in running water	1	78
15)	Clear #I in tetrasodium EDTA (5%)	10	88
16)	Rinse briefly	1	89
17)	Clear #II in sodium metasilphite (2%)	10	99
18)	Rinse briefly	1	100
19)	Clear #III in tetrasodium EDTA (5%)	10	110
20)	Wash in running water	30	140
21)	Drain on vertical Perspex™ sheet	10	150
22)	Dry in air at room temperature and RH		