

F.A.Q.'s . . . frequently asked questions

A selection of general toning-related questions most frequently asked in workshops and discussion groups. For specific toner queries, consult the chapter dealing with that toner or combination of toners.

Q. Do I need to refix this print (after toning)?

A. The purpose of fixing is to remove any unused and unwanted silver halides from the print, because if left behind they are unstable and may 'print out'* or darken later. This is explained in the chapter 'What's going on?'.

This means that fixing should follow any process that generates halides and does not use or reuse them all. Common examples are:

- When a print has been treated in a rehalogenizing bleach (this replaces halides in the emulsion) and then redeveloped or toned, but 'pulled' before completion. This is commonly done when the toning process produces colours that change or evolve throughout the toning stage. FSA is one example.
- When the toner generates halides as a by-product of toning. The chloride left behind from gold toning is an example.

Full strength rapid fixers, like 'Hypam', are unnecessarily strong and aggressive in their action for post-toning fixing and may cause loss of colour in some cases. Dilute hypo is preferable.

Q. Should I use a hardening fixer or a fixer without hardener?

A. Unless there is a reason to include a hardener, a good rule of thumb is 'if in doubt, leave it out'. Hardeners can slow down the removal of fixer and its related by-products, extend washing time, reduce efficiency of washers and interfere with many toning effects. There are plenty of other things that also cause toning problems, so don't tip the odds more than you have to. Examples of when a hardener is advised in toning are:

- For some solarizing effects, notably with copper-selenium splits where a small amount of hardener can improve results.
- With hot toning processes. Often the hardener is used after toning in the latter case.

Q. Is this toner archival?

A. First, just to clarify: The term 'archival' here is used to indicate that the toning process has extended the life of the print, i.e. the toned print will outlast an otherwise identical untoned version. The fact that a toner is not archival does not necessarily imply that a toned print is particularly transient – although this can be the case. It implies that a toned print is not more stable as a result of treatment by the toner in question. This is not the same thing, and the two are sometimes confused.

The older literature commonly referred to some toners as being permanent, which are not considered so today. This particularly applies to some copper and vanadium formulas. Modern technology can use electron microscopy, accelerated ageing processes and other techniques to determine the archival status of toners. With the

deterioration of priceless prints in permanent collections, and much of the world's archive stored on film, there has been considerable research incentive in this area.

The only commonly used toners these days that are considered to be archival are polysulphides, sepia, selenium and gold. Platinum toner is also archival, but too expensive to be in common use.

Q. I am getting uneven toning (also blotches/streaks/lines etc.). Why?

A. This is a very common problem, but quite avoidable. Most causes of uneven toning, blotches, streaks and spots occur before the toning stage and can be avoided by meticulous technique. All the processing stages can contribute to this. Chemicals should be fresh. Development must be full, but not overdeveloped, and prints should be agitated gently and consistently throughout. Fixing and washing are major factors in successful toning and are dealt with in the chapters on Practical issues and Toning and processing for archival permanence. Prints left overlapping in the fixer, or in the water holding-bath, will often show lines across them when toned. Drying too may be a factor. Rapid heat-drying can cause uneven emulsion hardness, whereas drying on racks may allow drying puddles to form. These will both 'appear' during toning.

When toners are preceded by a bleach, uneven bleaching will give rise to irregular toning. This normally happens if the print is neglected in the bleach, or if the bleach is too strong for a split bleach, giving a bleach time that is too short, in which case diluting the bleach will give better control.

During the toning stage, contamination is a common reason, as is inadequate washing between stages. Impurities and particulate matter in the water may cause colour irregularities and spots, as may contact of the toner with metal vessels or utensils. Distilled or de-ionized water is cheap, and its use for making up toning solutions may resolve the problem. Nitrile gloves are advisable, as skin-print contact results in stains and blotches with some toners.

Q. Why am I getting stains when toning, and can I get rid of them?

A. What are thought to be stains may indeed be toner-related stains, or they may be other faults that are covered by the question above, which includes blotches and streaks. They may also be fog.

Toner stains are commonly all over and most obvious in the highlights and borders. Sometimes they are only noticed when the print dries. A number of toners are prone to stain under certain conditions. The common ones are selenium, polysulphides (including Brown Toner, Poly-Toner, Viradon), gold, green, copper and blue. The causes are different in each case, and yes – they can be either avoided or removed. The treatment varies with the cause. Go to the chapter for the toner in question to find the answer.

With regard to fog, this is not a toner fault, although often perceived as one. Fog is an overall tone resulting from the development of a veil of silver halide all over the print. It may be obvious, or barely visible. When perceived as a stain, it is because the toner has given colour to the fog that had previously been overlooked. Causes of fog include unsafe safelighting, old paper or excessively long or hot development. It may also arise from carrying out bleaching and toning under fluorescent lighting – especially with new tubes – or in sunlight, and as the result of exposure to a fogging agent, such as the 'rotten egg' fumes from a sulphide or polysulphide toner.

* See Glossary.

Q. Why does my toned print have a deposit or scum on it when it dries?

A. This is common after using hypo-clearing agent and also several types of toners, notably selenium, sepia, sulphide and polysulphide toners. A chalky or dusty coating is typically seen on the dry print. The cause is the formation of water-insoluble calcium and magnesium salts. The first step is to gently swab prints toned in these toners with a soft cloth in the wash and on a flat surface (not in a ribbed dish) before they have a chance to dry. If the problem persists, re-soak the print and place it in a bath of 3% acetic acid, or dilute stop bath. The chalky deposits are usually soluble in acid and a final rinse and wipe should solve the problem. This is more common in some areas than in others, due to the variability of water supplies.

An unrelated surface effect may be seen after copper toning, due to the large copper complex molecule, and blue toning when carried far. Swabbing in the wash can benefit these prints too. See the relevant chapters for details.

Q. My prints don't seem to respond at all to selenium. Am I doing something wrong or is the toner faulty?

ALSO

Q. Why is the colour I get from 'X' toner different to the one I saw exhibited/published?

A. These two common questions may be different aspects of the same thing. Different makes and types of paper vary enormously in the way they respond to toners. This difference is exploited by those who know how to use the toners, and is highlighted again and again throughout this book, to help you make the best choices for the effects you want. The first step is to try another paper with different characteristics.

Less easy to deal with is the fact that there can be significant differences in one paper, from one batch to another. Sometimes these just reflect quality control. Other times they arise from a revision of the emulsion formula. These differences are not always publicised and may not be apparent with standard processing, but may be considerable with toning. There have been several very significant permanent changes during the time I have been writing this book. I do not doubt that there are likely to be more by the time you read it.

Q. I hear that RC papers don't tone. Is this true or false?

A. This oft-perpetuated myth is unquestionably false. 'FB' and 'RC' refer to the base on which the emulsion is held. Toner react with the image-silver, which is held in the emulsion, not the base.

The myth possibly stems from the fact that for many years most RC papers were neutral to cold in tone and most warm-tone papers were of the FB variety. Neutral/cold-tone papers do not usually exhibit much colour shift in selenium toner and as selenium is possibly the most used toner, the lack of colour response became associated with RC papers. A timely lesson about jumping to conclusions – never advised with something as complex as toning. The practice of incorporating developers into the emulsion was also primarily associated with RC papers, and this can adversely affect the actions of some toners.

It is true that there are differences between the responses to toners of RC and FB papers. However, RC papers do tone, and for some toners are preferable to their FB counterparts. This is particularly true of blue and copper toners. Details will be found in the relevant chapters of this book.

Q. I have the remains of several different makes of the same type of toner left over. Is it all right to mix them together?

A. No. Different makes of a toner should never be mixed unless you are a competent chemist and know the formulation of them all. See the safe darkroom practice advice in the DIY section that precedes the formulary, 'never mix chemicals without knowing the outcome'. Different makes of the same type of toner may contain different chemicals. If you do not know in detail what is in them, you must not mix them.

Q. Is there any correlation between image colour and archival stability?

A. Yes and No. This is an 'it all depends' answer to a deceptively simple question. If the print is untoned, image colour is largely determined by grain size – smaller grains giving warmer tones. Smaller grains also present a larger surface area and are therefore slightly more vulnerable to attack and so are less 'archival'.

Toned prints have an image colour that is secondary to the toner used and this might be archival or non-archival – in some cases even quite unstable. In the case of blue toned prints, there is a clear correlation. Blue toned prints veering towards green are more stable than those veering towards purple.

Archivaly toned prints are generally toned in sulphide, thiocarbamide, polysulphide, selenium or gold. Their stability depends on how much conversion (or, in the case of gold, – plating) of the silver has taken place. So does their colour. Conversion does not need to be complete for image protection. IPI* estimated that only 65% conversion gave adequate protection for microfilm, with sulphide toning. No figure was given for paper, as this was not being researched. However, even archival toners do not all act in the same way. Selenium tones the dark tones before the highlights, which are left unprotected until the final stages, by which time a colour shift will have taken place in papers that give one. However, as with gold, some papers show very little colour response, even with total toning. Polysulphide toners, on the other hand, tone evenly throughout the tonal range and confer a high degree of protection, even with minimal toning. The answer therefore depends on which toner and paper is being used.

Q. Does it matter in which order I use toners when I want to use more than one on the same print?

A. Yes. The order usually makes a difference. Sometimes the difference may be small, as with sepia and selenium. Either way here is acceptable and will produce similar, but not identical, results as the sepia bleach used after selenium can alter the colour of the selenium toning by removing some black silver that partially masks its colour. This is more apparent with some papers than with others. With other toners the difference is huge and the order of use is vital for the effect you want. Typical examples here are metal ferrocyanide toners such as blue and copper, when used with an alkaline toner like thiocarbamide variable sepia toner. Blue, copper and some others are unstable in alkali and revert to black and white. For example, the results of sepia to blue are totally different to those of blue (normally heavily over toned) to sepia. The same may apply to selenium and blue. Examples of these will be found in the sections on multiple toning. Selenium and gold is another example, despite the fact that both are archival toners, although the reasons are different.

Q. Can ordinary household bleach be used in place of the bleach in the kit?

A. No! Household bleach is nothing like photographic bleach. It contains entirely different chemicals, and will harm the print and will not produce the desired results.

* Image Permanence Institute, see Toning & processing for archival permanence.

B. Toner search by colour

See relevant chapters for detailed descriptions.

COLOUR	TONER	COMMENTS
Browns	Selenium. Sepia. Polysulphides (incl. Viradon New, Brown Toner, Poly-Toner), Hypo-alum. Some copper toners. Nelson's Gold. FSA (amongst other colours). Tea. Coffee. Nickel. Uranium. Tin	Sepia toner browns may range from a brownish yellow through sepia to rust-brown and purple-brown Selenium browns may range from red-brown through mid-brown to purple brown-black Copper toners vary between reds and browns Tin, nickel and uranium toners are rarely used today
Reds	Copper (some). Gold (after sepia, sulphide, polysulphide). Selenium (brownish-red on some warm-tone papers and orange after post-toning bleach). FSA (incl. other colours). Uranium.	Copper toners may give reds or browns Gold on sepia may range from yellows to salmon pink and through red to purple-red Selenium colours vary, a few papers give a strong reddish hue. 'Chinese' prints, using iodine as a post-toning bleach, may have a range of colours including bright orange. Uranium is rarely used today
Blues	Iron blue toners. Gold toner on warm-tone papers (and Ilford's Cooltone), lith prints and some alt. processes. Selenium (purple blue-blacks after some bleach and redevelopment processes)	Iron blue toners may give greens, turquoise, cyan, blues and purple, depending on the paper, the formulation and the pH of the final wash Gold toner gives blues with warm-tone papers, and mauve, purples and blues on lith prints Cobalt mono-bath toners are rarely used today
Greens	Cobalt mono-bath (violet-reds) Cobalt two-bath. Sepia and blue. Vanadium (some). Titanium and blue. Iron in some formulations or if followed with acidic wash. FSA (with other colours)	Green toners based on cobalt tend to be weak and pastel. Vanadium and Titanium can give strong vivid greens when followed by an iron blue toner, but can be varied from yellow-green to blue-green. Vanadium toner can be formulated with iron to give green
Yellows	Titanium. Vanadium. Thiocarbamide (some formulations). Gold (some techniques) Strong/neat selenium on some lith prints Lead chromate and cadmium (rarely used today) Copper chloride and sodium sulphide ('golden-orange')	Vanadium toners in different formulations may give yellow, yellow-brown or green. Vanadium also acts as a strong solarizer for subsequently applied toners. Titanium may act similarly as a weaker solarizer Gold can give golden yellow after sepia with some lith prints, and a metallic yellow-gold with some redevelopment techniques
Silver/bronze	Halo-Chrome. Silver bronze mirror toner	Similar products, silver-bronze mirror product from Tetenal just discontinued. Halo-Chrome product still available
Purple-black	Selenium Gold Tin	All on cold-tone papers, also with some bleach and re-development techniques. Tin is little used today.

B. Toner search by colour – continued

DUOTONE SPLIT TONE COLOURS Expressed as light tones on dark tones. Toners in order of use.

Browns on greys and blacks	Split sepia toning	Colour of brown and level of split can be varied
Greys on browns	<ol style="list-style-type: none"> 1. Reversed split sepia 2. Selenium split toning 3. Copper split tone, copper/developer split, selenium/copper/developer split 4. FSA 	<ol style="list-style-type: none"> 1. Several methods are described 2. May be enhanced by some bleach-redevelopment techniques 3. Varies with paper and fixer used 4. Other colour splits may occur
Greys on blues	<ol style="list-style-type: none"> 1. Blue toner to borax bath 2. Zinc sol. to blue 3. Blue to dilute developer. 	<ol style="list-style-type: none"> 1. Sodium carbonate or extended washing may give similar results but split may be less convincing 2. As in 'Freeze grey' with Colorvir 3. Care, colour may disappear further in wash
Blues on browns	<ol style="list-style-type: none"> 1. Selenium to blue 2. Selenium to gold 3. Part redevelop, then sepia to blue 4. Brief blue, bleach, sepia to blue 5. Blue to sepia 	<ol style="list-style-type: none"> 1. Selenium stage must be partial (split) 2. On warm-tone prints – best on lith prints. Selenium stage must be partial (split) 3. As for reversed split sepia, followed by blue 4. Another reversed sepia/blue process 5. Requires very long blue stage. Solarizes
Browns on blues	<ol style="list-style-type: none"> 1. Blue to selenium 2. Sepia to blue 3. Blue to copper 	<ol style="list-style-type: none"> 1. Gives reverse split with some papers, but not all 2. Also gives sepia on greens – see below 3. With some toners this order will reverse colours
Pink/red/brown on blue	<ol style="list-style-type: none"> 1. Copper to blue 2. Split sepia to gold 	<ol style="list-style-type: none"> 1. Varies with make/formulae of toners 2. Gives pinks on blue or blue-greys with warm-tone papers but yellow on blue with most lith prints
Pink/brown on purple brown	Selenium to copper	Colours vary with papers and make/formula of copper.. Selenium must be partial (split)
Sepia on brown/red-brown	<ol style="list-style-type: none"> 1. Sepia to copper 2. Sepia and selenium 	<ol style="list-style-type: none"> 1. Colours of each depend on formulation and paper type 2. Colours of each depend on formulation and paper type and on order of toners
Brown/orange-brown on green	<ol style="list-style-type: none"> 1. Split sepia +/- gold, then blue 2. Long blue to sepia. Solarizes 	<ol style="list-style-type: none"> 1. Warm-tone papers and acid wash gives greener colour, cold-tone papers and alkaline wash gives blues 2. Requires very long blue stage and warm-tone paper – see above

Toner characteristics table

• In summary form. For detail consult main text.

• 'Archival' in this context means increasing the permanence of prints.

• Complex kits have many variables and are therefore omitted from this table.

• * Denotes need for good ventilation.

Toner	Direct/ indirect	Archival?	Colours given	Ease of use	Operating temperature	Contrast/ density effect	Choice of paper/process	Working life	Common problems	Remarks
*Sulphide sepia	Indirect	Yes	Sepia browns Reds when followed with gold toner	Easy but smells of rotten eggs	Room temperature	Small highlight loss. Warm-tone papers may lose shadow density	Any paper	Good	Smell. Fumes fog light- sensitive materials	Beware of fogging of nearby unused film and paper by fumes. May split tone
Variable sepia (thiocarbamide)	Indirect	Yes	Range of sepias from yellow-brown to purple- brown. Orange, salmon, reds when followed with gold toner	Easy Odourless	Room temperature	Small highlight loss. Warm-tone papers may lose shadow density	Any paper	Good	None	Odour-free sepia. Colour controlled by varying the amount of additive, also controls colours given by subsequent gold toner. May be split and reversed
*Polysulphides	Either/ both	Yes	Sepia/browns to red- browns or aubergine/browns Reds when followed with gold toner	Easy but smell of rotten eggs. Some need heating. Some may give surface scum	Either room temperature or hot	May give small initial rise in contrast. Dmax may fall with longer toning	Any paper for indirect toning after bleach. Warm-tone papers best for direct toning	Varies. Short to medium	Smell. Fumes fog light- sensitive materials. May stain in wash unless sulphite 'stop' used. If not fresh, some may become suddenly turbid causing scum on print	Beware of fogging of nearby unused film and paper by fumes. Swab surface in wash to clear deposit before drying. Caustic, wear gloves. Use strong HCA 'stop' bath
*Poly-Toner	Direct	Yes	Browns. Varied by dilution and time	Easy but smells of rotten eggs	Usually 20°C/68°F	Varies with dilution and paper type	Any paper. Stronger colour response with warm-tone papers	Long	Smell. Fumes fog light- sensitive materials. May stain in wash unless sulphite 'stop' used	Combination toner. Contains polysulphide and selenium. Use HCA before and after toning to avoid selenium and polysulphide stains
*Rapid selenium	Direct	Yes	Cold blacks, purple- blacks, browns, red- browns. Splits with some papers. Orange after bleach. Various other colours with some lith prints	Easy. Smells of ammonia	Usually room temperature. May be varied	Increases Dmax, extends tonal range. Prolonged toning reduces Dmax	Any paper but gives different results with different types	Long. Stores well. Can use to exhaustion	Smell. May give surface scum. Remove this with 3% acetic acid bath. Will stain if print acidic - avoided by use of HCA	Toxicity fears often overstated for working sol. but wear gloves. Vary dilution and paper for desired result. Strong colours neat with some lith prints. Also with post- toning iodine bleach
Selenium sulphide	Indirect	Yes	Rich deep browns	Easy to use, but must be home- made from toxic material	Room temperature	May increase Dmax – depends on paper	Any paper	Long. Stores indefinitely	No problems in use	Not available commercially as far as I know. Make from toxic selenium powder. Care!

Toner	Direct/ indirect	Archival?	Colours given	Ease of use	Operating temperature	Contrast/ density effect	Choice of paper/process	Working life	Common problems	Remarks
Gold (ready-made single solution)	Direct	Yes	Blue-black with neutral/cold papers. Blue with warm-tone papers and lith prints. Red/orange/salmon after sepia. Gold with special effects	Very easy. Odourless	Room temperature. May heat when slows down	Very small increase in Dmax and Dmin	Blues are strongest with warm-tone papers and Lith prints. Used to 'cool' neutral papers	Stores well. Moderate capacity depending on use	Expensive. May stain whites and borders when well-used. Post-toning fixing may remove this	Ideally gold toned print should be re-fixed, as halides are formed during toning. Other forms of gold toner are available see text
Blue (iron)	Either	No	Blue. Varies, slate blue-grey, green-blue, royal and navy blues, purples. Can solarize or posterize	Easy with RC papers	Room temperature	Direct forms intensify dark tones. Increases with 'recycling'	Works best with RC papers. Brighter blue with warm-tone papers	Short. Replace frequently	Stains. Clear in salt or carbonate. FB papers can be hard to clean up. Takes fingerprints easily. Over-use gives poor results	Greeny-blue and more stable in acid environments. Purple- and less stable in alkaline environments. Special effects available
Copper	Either	No	Purple-browns, browns, red, pink, mauve, duotone. Can solarize	Easy with RC papers	Room temperature	Initially increases contrast, then can reduce it. Dmax decreases with 're-cycling'	Works best with RC papers. Brighter colour with warm-tone papers	Makes vary. Some store well several days. Do not over-use	Stains are common. FB papers may stain irrevocably. Takes fingerprints easily. Over-use gives poor results	Makes vary considerably in the colours given and in reaction with other toners. Duotone and special effects available
FSA	Indirect	No	Browns, red-brown, red, ginger, yellow-green, beige, mushroom, blue-black. Duo/tri tone effects	Moderate/easy but takes some practice to get best results	Room temperature	Can cause astonishing increase in density	Works with all papers. Some idiosyncratic effects seen	Short. Needs 1 hour to mature, lasts 2-3 hours	Short working life. Density increase may take you by surprise. Compensate either in printing or in toning process	Results can be intensified very subtle according to technique. Very flexible. Works with different bleaches to give different effects
Green	Varies. There are different types of green toner	No (Some are very transient.)	Greens. Cobalt-based greens are often weak and unstable, give rich browns in sepia toner (no bleach). Vanadium greens may be vivid or subtle, from yellow-green to blue-green. Iron greens are in between	Varies with toner. Simple to use. Not always simple to get good results. Iron and vanadium better than cobalt	Room temperature	Some green (cobalt) toners lose contrast and density considerably. Others may vary	RC papers are easier with green toners. Warm-tone papers generally give better greens	Moderate. Varies with type	Staining with cobalt-based green toners. Clears in citric acid. May be contrast and density problems with some green toners	Best brightest greens come from green toners based on vanadium or titanium. Iron-based green toners are next best (my opinion) and cobalt toners difficult to use. Chromogenic toners can also give excellent results

Continued on the next

Toner	Direct/ indirect	Archival?	Colours given	Ease of use	Operating temperature	Contrast/ density effect	Choice of paper/process	Working life	Common problems	Remarks
Chromogenic toners	Indirect	No	Any colour you want	Easy but slightly more complicated	Room temperature	Can maintain density/contrast well, depending on colour and silver content (see text). Second bleach reduces Dmax but increases colour	Any paper	Moderate	Immensely flexible with endless range of colours. That's the problem!	Underrated as a toning system because of perceived complexity. It is actually a simple and flexible system delivering subtlety or strong colour in any hue
*Mirror toners	Either/ both	No	Gold or silver mirror finish. Full or duotone. Browns, pinks, lilac hues with some techniques	Moderate	Room temperature	Varies with technique and angle of viewing/lighting	Any paper. Mirror effect stronger with RC	Short 2 hours	Ammonia smell. Surface very delicate when wet, marks easily when dry. May tarnish (which can look nice)	Different. Suits small hand-held prints best. Caustic, wear gloves. One at a time. 'No touch' technique. Good ventilation. Spray surface for protection
Vanadium	Direct	No	In these commercial kits, yellow and solarizing. With other formulae, greens or yellow	Easy	Room temperature	Contrast and density initially maintained. Density falls as toning progresses	Any	Moderate	Colour not fully apparent until wash. Rinse and assess during toning. Stains, clears quickly in salt sol. Raw availability limited	Available versions in Colorvir and Palette. Strong solarizer for subsequent toners and dyes. Wonderful greens with blue toner
Titanium	Direct	No	Warm-tone effect, then sunny yellow, yellow- brown duotone, then strong yellow	Easy	Room temperature	Contrast and Dmax initially maintained. Dmax falls as toning progresses	Any	Moderate	Colour not fully apparent until wash. Rinse and assess during toning. Stains, clears quickly in salt sol. Raw availability limited	Available versions in Colorvir and Palette. Lovely warm- tone/duotones. Refix. Weaker solarizer. Very good greens with blue toner
Tea	Direct	Silver prints – no. Cyanotypes – yes.	Warm-tone. Beige. Brown, orange-brown if hot/strong, some papers. Cools cyanotype blue, duotone	Easy	Room temperature, warm or hot	No change	Any Some FB uncoated papers better	Fresh is best	Some papers, mostly RC, give blotchy white edges. Less with fresh chemicals, careful processing and fresh tea	Not actually a toner. Cheap tea works better than exotic brands. Try carbonate dehardening bath if blotchy results. Subtle is best (?) No sugar.