Chemistries

Currently I use five different color chemistries.

By way of background, I've had much experience with enzyme kinetics, which requires great control of temperatures and times, so I had an advantage over most who start color chemistry at home with being careful and planning ahead so that I never messed up timing a processing step.

E-6. I use the Kodak E-6 kit to process all my slides. It has become my primary chemistry. It's the second-trickiest process I use, but I've messed up only 4 rolls of film (when my tank broke open, but I managed to save the important shots) and a handfull of sheet film (usually when I put two sheets in the same slot). All my sheet and 120 film is processed at home, and most of my 135 is too. All pushed and pulled film is processed by me. Uses 240 mL of chemicals per step (for two rolls in a small tank) or 1L (for 18 sheets in a big tank). I can process 36 sheets per liter, or 8 rolls by reusing the chems once (and only once).

Processing instructions, 38 °C	Description	Timer setting (adjusted for 10 sec. drain)
Prewarm (dry)	Get the film and reels up to processing temp.	300 seconds
First Developer	Much like a B&W developer, develops exposed silver.	440 (550 if pushed one stop)
Rinse x4	Removes all developer which really messes up the color dev. step	20
Reversal Bath	Chemically "exposes" all the unexposed silver, and "inactivates" the already-developed silver	110
Color Developer	Develops the reversed (as we see it) image	230
Pre-bleach (conditioner)	Deactivates all developers, re-wets film	110
Bleach (Fe^{3+})	Dissolves the reversed image silver, which causes dye molecules near the silver to become colored. Dye molecules away from silver remain colorless	350
Fixer (SCN^-)	Complexes (dissolves) all silver in the film so it won't turn black later	230
Rinse x6	Removes all remaining chemicals and dye	20
Stabilizer	A wetting solution to prevent water spots, and some antibacterial agent	60

I've had good luck processing Fujichrome RMS film (MultiSpeed 100/1000) with the following first developer times: ISO 100 = 450 sec (normal E-6 time), ISO 200 = 600 sec (10 min), ISO 400 = 800 sec (13 min), ISO 800 = 1100 sec (18 min), ISO 1000 = 1200 sec (20 min).

C-41. Color negative film. I've only used the Tental mono-C41 kit, and while it is easy (only two processing steps), I've found that the enlarger filter pack required was huge (95M 120Y), and might be the result of a bad processing step. More investigation required. Uses 240 mL chemicals per step. Chemicals can be resused.

Processing instructions, 38 °C	Description	Timer Settings (adjusted for 10 sec. drain)
Prewarm (dry)	Get film up to temp.	300
Developer	Much like a B&W developer	185
Blix (Bleach-Fix)	same as in E-6, only the bleach and fix are combined into the same solution	205
Rinse x6	wash out the chemicals	20
Stabilizer	A wetting solution to prevent water spots, and some antibacterial agent	60

RA-4. Using Kodak's replenisher chemicals (which require an extra starter chemical), the process is fast. I'm using the Fuji Crystal Archive paper, and the results are beautiful. With RA chemistry you can get papers of various contrasts, a necessity for getting the negative print just right. Printing the low contrast "P" paper is easier than the higher-contrast "C" paper, but I think the high-contrast look is better for the out-of-the-studio shots I tend to take. The sharpest prints I've made, and a very fast process. Uses 130 mL chemicals per step, rinses are 250 mL.

Processing instructions, 35 °C	Description	Timer Settings (adjusted for 10 sec. drain)
Prerinse (wet)	Get paper well wetted	30
Developer	Much like a B&W developer	50
Rinse	Wash out developer	20
Blix (Bleach-Fix)	same as in E-6, only the bleach and fix are combined into the same solution	50
Rinse x3	wash out the chemicals	20

P-30. Recently I've pretty much abandoned this process, as it is much more difficult to print than the R-3/R-3000 process detailed below. Used to process Ilfochrome Classic paper (was Cibachrome), this is the smelliest chemistry I have, and the most corrosive. The bleach is especially pungent, so have good ventilation. Easily the trickiest paper to print, plan on using many pages to get the exposure and filtration correct. Currently I use only the medium-contrast RC paper, but I'm going to get the low-contrast paper to see if I can fix some high-contrast problems (resulting from my use of high-contrast Velvia and Provia slide film). Uses 150 mL chemicals per step, rinses are 150 mL. Getting the color balance right is a real trick, and sometimes I'll spend the entire day in

the darkroom trying to get one transparency to print correctly. Often skies with clouds are impossible to get right because of color crossover making the clouds an off-purple color, or if you fix the cloud color by filtrations the sky loses its blueness. And it's the most expensive chemistry out there.

Processing instructions, 30 °C	Description	Timer Settings (adjusted for 10 sec. drain)
Prerinse (wet)	Get paper well wetted	30
Developer	Much like a B&W developer	110
Rinse	Remove developer	20
Bleach	Unlike the Kodak processes, this bleach destroys dye molecules near the exposed silver	110
Fixer	Removes all silver	110
Rinse x3	Washes out all chemicals	20

R-3000. Kodak's process to print from slides. The Radiance III paper is as contrasty as Ilfochrome, but the process is cheaper and easier to use. I find that peoples faces are much easier to do than Ilfochrome, The greens are almost as intense, and blues are easier to saturate. The downside: it's not as sharp as Ilfochrome or RA-4. Uses 130 mL chemicals per step, rinses are 250 mL.

Processing instructions, 38 °C	Description	Timer Settings (adjusted for 10 sec. drain)
Prerinse (wet)	Get paper well wetted	30
First Developer	Much like a B&W developer	65
Wash x 4	Remove developer	20
Color Developer	Contains the reversal agent, exposes and develops the reversed image	230
Wash	Removes developer	30
Blix (Bleach-Fix)	same as in E-6, only the bleach and fix are combined into the same solution	110
Rinse x3	wash out the chemicals	20

I love the **R-3** chemistry, in combination with Fuji's Type-35 paper. Wonderful stuff. I find that printing Velvia is a joy with this combination! Most of the time I can get most any transparency printed very well in two tries. There is a major problem, however: R-3000 is no longer being made.

You can still get part of the chemicals from B&H photo/video, (as of January 2002) but they won't ship the color developer. Instead I have purchased the R-3 chemistry set, intended for pro labs using continuous- or roller-transport processors. The smallest R-3 set is for 12.5 gallons, but it's easy to deal with as only two components are subject to air oxidation: the 1st developer (which comes in a 4 gallon cubitainer, so if you buy a spigot you can dispense directly out of that without introducing air, so it should keep for at least a year with on-and-off usage) and Part B of the color

developer (which I divide into smaller glass bottles for long-term storage; 150 ml will go into a gallon of working solution). I bought the R-3 set from Roger Newsham at International Supplies, 1-888-IMAGE-65 ext. 250 for about $350 delivered.

Here is how R-3 works: from the concentrates you make the replenishment solutions (the concentrates will make a total of 12.5 gallons of replenisher solution while the color developer set will make 25 gallons of replenisher), see table below. The replenishment solution is used for two things: making the beginning solution, and replenishing used solutions.

Replentisher Solution	water	Part A	Part B	Part C	Dilute to:
1st Developer	1/2 gal	1216 ml	-	-	1 gallon
Color Developer	1/2 gal	152	152	304	1 gallon
Bleach/Fix (blix)	1/2 gal	585	437	-	1 gallon

To make the working solutions, you need to use the replenisher plus a little bit of starter solution, used to add the chemicals that are normally added to the solutions by the emulsion itself during processing:

Working Solution	Replenisher	Starter	Dilute to:
1st Developer	995 ml	5 ml	1 L
Color Developer	800 ml	7.5 ml	1 L
Blix	1 L	-	1 L

The real advantage of using R-3 over R-3000 is replenishment. The chemistry is meant to be reused, as long as you add some of the replenishing solution to compensate for the amount of chemicals that are used during processing. You need to collect all the processing chemicals as they come out of the processor. To replenish these used solutions, use the table below. The replenishment volumes are adjusted for loss of potency after handling.

Working Solution	Used Solution	Replenisher	Total Volume
1st Developer	500 ml	500 ml	1 L
Color Developer	500 ml	500 ml	1 L
Blix	650 ml	350 ml	1 L

Thus, once the working solution is made, you can run a liter of chemicals through the machine but only use up 340/240 ml of your replenisher solution: you can process a whole lot with a 12.5 gal set (if you manage to process enough that you never have to remake the working solutions from starters, you can process 700 16x20" or 2800 8x10" prints!). I print 16x20's most of the time (it's so easy to print that I find hat doing test 8x10's isn't worth it).

Processing instructions, 38 °C	Description	Timer Settings (adjusted for 10 sec. drain)
Prerinse (wet)	Get paper well wetted	30
First Developer	Much like a B&W developer	65
Wash x 4	Remove developer	20
Reversal Exposure	Exposes the undeveloped silver	30
Color Developer	Develops the reversed image	230
Wash	Removes developer	30
Blix (Bleach-Fix)	same as in E-6, only the bleach and fix are combined into the same solution	110
Rinse x3	wash out the chemicals	20

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