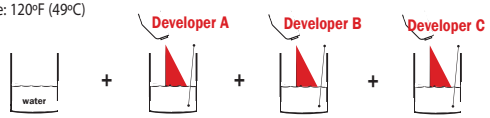
Mixing Chemicals†

Developer

- Place the recommended amount of water* into a clean glass or plastic container.
- Use a clean plastic stir stick or the TCS-1000 to circulate the liquid.
- While circulating, add the contents of the bottle marked **Developer Part A** . Mix well.
- While circulating, add the contents of the bottle marked **Developer Part B** . Mix well.
- While circulating, add the contents of the bottle marked **Developer Part C** . Mix well.

*Water Temperature: 120ºF (49ºC)



To make:

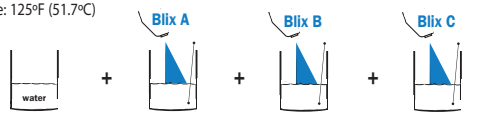
1 Pint (473ml)	10 oz. (296 ml)	4 oz. (118 ml)	1 oz. (30 ml)	1 oz. (30 ml)
1 Quart (946ml)	20 oz. (591 ml)*	8 oz. (237 ml)	2 oz. (59 ml)	2 oz. (59 ml)
1 Gallon (3.78L)	80 oz. (2.37 liters)	32 oz. (946 ml)	8 oz. (237 ml)	8 oz. (237 ml)

* Because of rounding, some metric measurements will not be exact multiples of the corresponding measurements in ounces.

Blix

- Place the recommended amount of water* into a clean glass or plastic container.
- Use a clean plastic stir stick or the TCS-1000 to circulate the liquid.
- While circulating, add the contents of the bottle marked **Blix Part A** . Mix well.
- While circulating, add the contents of the bottle marked **Blix Part B** . Mix well.
- While circulating, add the contents of the bottle marked **Blix Part C** . Mix well.

*Water Temperature: 125ºF (51.7ºC)

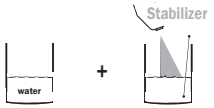


To make:

1 Pint (473ml)	9 oz. (266 ml)	4 oz. (118 ml)	1 oz. (30 ml)	2 oz. (59 ml)
1 Quart (946ml)	18 oz. (532 ml)	8 oz. (237 ml)	2 oz. (59 ml)	4 oz. (118 ml)
1 Gallon (3.78L)	72 oz. (2.13 liters)	32 oz. (946 ml)	8 oz. (236 ml)	16 oz. (473 ml)

Stabilizer/Final Rinse Bath (Optional)

- Place the recommended amount of water into a clean glass or plastic container.
- While circulating, add the contents of the bottle marked **Stabilizer** Stir well.



To make:

1 Pint (473ml)	15 oz. (444 ml)	1 oz. (30 ml)
1 Quart (946ml)	30 oz. (887 ml)	2 oz. (59 ml)
1 Gallon (3.78L)	120 oz. (3.55 liters)	8 oz. (237 ml)

† FINAL VOLUMES MAY VARY SLIGHTLY WITH NO ADVERSE EFFECTS IN PROCESSING.

* Water temperature listed will bring room temperature concentrates (72ºF) to 101.5ºF for working solution.

Mixing Notes

- Smaller amounts of the final working chemical solutions can be mixed, but careful attention must be paid to the mixing ratios.
- Use water at the temperature you want to use to develop your film. This allows for shorter warm-up time.
- Stir continuously while mixing.
- Keep everything very clean. A few drops of Blix, soap or other contaminates can destroy the developers.
- Mark your containers clearly. This will prevent confusion and processing out of order.
- Use safety glasses and rubber gloves while working with chemicals. Also wear a lab coat or other protective clothing. Do not allow children to use this kit without adult supervision.
- A "Final Rinse" of distilled water, Hexamine (fungicide) and/or Photo-flo (surfactant) may be used.
- Modern color films have "Stabilizers" in the emulsion, released through the 2-bath process.
- Film more than 20 years old may require a formalin or formaldehyde based Stabilizer preservative.

Processing Color Film

Standard Processing Steps For Rotation or Inversion Methods

For processing with a Paterson® or JOBO® type plastic tank or Nikkor® stainless tank with rotation or inversion agitation, or open tank with lift rod agitation. Rotation tanks and chemicals should be tempered in a water bath with the TCS-1000 to maintain solution temperatures. ‡*Add 2ºF to the developer before using inversions without a bath.*

		TIME	TEMP‡	AGITATION †
Step 1	Optional Pre-Soak	1 min	Developer Temp	None
Step 2	Developer	3.5 min (Push/Pull & variable processing temps below)	102ºF (39ºC)‡	Continuous for first 10 sec., then 4 lifts or 4 inversion cycles* every 30 sec. thereafter
Step 3	Bleach&Fix	8 min.	75ºF - 105ºF (24ºC - 40ºC)	Same as above
	THE REMAINING STEPS MAY BE PERFORMED IN ROOM LIGHT WITH THE TANK LID OFF			
Step 4	Wash	3 min.	75ºF - 105ºF (24ºC - 40ºC)	Running water or fill and empty tank 7 times
Step 5	Stabilizer/ Final Rinse	½ to 1 min.	Room	Agitate for first 15 sec.
Step 6	Dry	n/a	< 140ºF (60ºC)	n/a

* 1 inversion cycle = 1 back and forth rotation and/or inversion while changing diretion as shown in the graphic

† Use recommended agitation or rotary drum constant agitation may be used at recommended temperature with lower chemical volumes

‡ When not using a temperaure control bath, add +2ºF(1ºC) to the developer with the TCS-1000 before processing.

Push/Pull Processing & Variable Temperature Development Chart

For ease of use, the chart below lists development times for variable temperatures.

Step 2 Developer temp.[2]	72ºF	75ºF	80ºF	85ºF	90ºF	95ºF	102ºF[1]
Normal Development	50 min.	35 min.	21 min.	13 min.	8.5 min.	5.75 min.	3.5 min.[1]
Push[3]+1 (2x ISO/ASA) **Development**	X	50 min.	28 min.	17 min.	11 min.	7.5 min.	4.55 min
Push[3]+2 (4x ISO/ASA) **Development**	X	X	37 min.	25 min.	14.75 min.	10 min.	6.13 min.
Push[3]+3 (8x ISO/ASA) **Development**	X	X	X	35 min.	21 min.	14.33 min.	8.75 min.
Pull -1 (½ ISO/ASA) **Development**	X	27 min.	16.25 min.	10 min.	6.5 min.	4.5 min.	2.75 min.
Agitation[4]	Continuous for first minute then 4 inversions every 2 minutes			Continuous first 30 sec. then 4 inversions every minute		Continuous first 10 sec. 4 inversions every 30 sec.	
	22ºC	24ºC	27ºC	29.5ºC	32ºC	35ºC	39ºC*
For remaining steps refer to "Standard Processing Steps" above							

[1] Recommended time and temperature for optimal results

[2] Processing at lower temperatures will result in reduced contrast and color separation

[3] Push processing results in increased contrast and color saturation

[4] Variation in agitation may result in slight color shifts (Insufficient agitation shifts towards red/excessive agitation shifts towards cyan)

Push Processing Notes

All color negative films suitable for the C-41 process can be underexposed and processed for higher than normal film speeds by extending the development time (push processing). As a rule, pushing should be done only when necessary (i.e. when higher film speed is needed) because negative quality does suffer somewhat. When pushing is required, start with the highest speed film available. In other words, pushing an ASA 100 film two stops to ASA 400 offers no benefit since an ASA 400 film is already available.

When Exposure Change Is:	ASA Speed:	Increase Development Time:
1 stop under	2x normal	1.30x (i.e. 3.5 min. x 1.30 = 4.55 min.)
2 stops under	4x normal	1.75x (i.e. 3.5 min. x 1.75 = 6.13 min.)
3 stops under	8x normal	2.50x (i.e. 3.5 min. x 2.50 = 8.75 min.)

Solution Capacities

The solution capacities given in the chart below show how many films we recommend you can reliably process in various quantities of working solutions. If you feel you are interested in extracting more capacity from the solutions, please read the statements under the heading "More Chemistry Capacity."

FILM SIZE	110 (20 exp.)	126	135 (24 exp.)	135 (36 exp.)	120	220	4 x 5 (sheet)	8 x 10 (sheet)
Rolls or sheets/ 960 ml (32 oz.)	36	16	12	8	8	4	32	8
Rolls or sheets/ 480 ml (16 oz.)	18	8	6	4	4	2	16	4
Rolls or sheets/ 240 ml (8 oz.)	9	4	3	2	2	1	8	2

More Chemistry Capacity

One is always concerned about chemistry life and capacity, quality of results and economy when processing multiple rolls in a batch of chemistry. From the user's viewpoint it may seem that chemistry manufacturers are somewhat arbitrary about the number of films which can be processed before the chemistry must be discarded. This stems from the manufacturer not knowing - only guessing - four essential things: how many films will be processed in freshly mixed chemistry; in what manner and how long will the chemistry be stored before processing again; what contaminants have entered the system from either the water supply or from unintentional chemical intermixing; and how far can the results deviate from ideal before the user deems them unacceptable. All developers start on an inexorable downhill exhaustion path the moment they are mixed, and exhaust faster in the presence of air, contaminants and high temperature, and suffer superimposed stepwise exhaustion with each use. We can offer some observations on extended chemical capacity:

- If you accept the role as the final arbiter of acceptable results it is easily possible to process 25%, 50%, or even more rolls of film than those listed in the capacity charts above by following the instructions below for "Chemical Reuse - Processing with Weakened Developer Solution", so long as all processing takes place within a few days after mixing the chemicals. There is only one rule in this exercise: process film until you no longer like the results. The safeguard in this procedure is that results generally will not plummet precipitously from "good" to "bad", but will change gradually.
- If you take full responsibility for quality of results, it is possible to process more film over a much longer time span. This procedure is somewhat risky unless you process some film every day or so to monitor chemistry performance. Otherwise, partially used working solutions left untouched for a week or more might have changed so significantly that you would suffer a dramatic decline in results. If you choose to operate under these conditions, our best advice would be to process a small piece of test film, and on the basis of these results, decide whether or not to commit valuable pictures to the chemistry.

Chemical Reuse - Processing with Weakened Developer Solution

Using a volume of chemicals once will not destroy its ability to develop film. However, extra time must be added to the processing to compensate for the weakened developer. Whenever reusing developer, combine all used developer with unused developer to make 1 quart of Weakened Developer Solution and add 2% to the recommended development time for each 135/120 roll, 8x10 sheet and every four sheets of 4x5 previously processed.

For example, you just developed four rolls of film at 102ºF. You have several more rolls to process. To process the next four rolls at 102ºF, combine used chemicals with unused chemicals to make 1 quart, multiply 3.5 (the development time at 102ºF) by 1.08 (8% increase). 3.5 x 1.08 = 3.78, so you process the next four rolls at 102ºF for 3.75 minutes. The time for the next rolls used in the same 1 quart remixed developer is calculated in a similar manner, except the recommended development time must be increased by 16% (2% for each roll previously processed). 3.5 x 1.16 = 4.06 or 4 minutes.

The same is true when mixing weakened developer solutions in pint and gallon volumes, except development time increase will differ. Weakened Developer Solution instructions for Pint, Quart, and Gallon mixtures are listed below.

PINT: Combine all used developer with unused developer to make 1 pint Weakened Developer Solution. Increase recommended development time by 4% for each roll/8x10 sheet/4x5(4) sheets previously processed.

QUART: Combine all used developer with unused developer to make 1 quart Weakened Developer Solution. Increase recommended development time by 2% for each roll/8x10 sheet/4x5(4) sheets previously processed.

GALLON: Combine all used developer with unused developer to make 1 gallon Weakened Developer Solution. Increase recommended development time by 0.5% for each roll/8x10 sheet/4x5(4) sheets previously processed.

Use the above formula for the Developer ONLY. Optimal results are obtained when chemicals are used only once. See "More Chemistry Capacity" section above for details. Mixing weakened developer solution is not recommend for push processing and is less effective at lower processing temperatures. Reusing the Blix does not affect the processing time.