

USING KODAK CHEMICALS IN MINILABS



This publication is written specifically for minilab operators. It provides the most commonly needed technical information about film and paper processes for minilabs.

Using KODAK FLEXICOLOR Chemicals and KODAK EKTACOLOR Chemicals in your minilab ensures that your film and paper processes will provide optimum results with the least possible environmental impact.

This manual contains information on the film processing cycles recommended for KODAK GOLD, ULTRA MAX, ADVANTiX, and KODAK PROFESSIONAL Films. Also, this manual contains information on paper processing cycles for KODAK EDGE and ROYAL Papers. It is divided into four sections:

- Chemicals and Chemical Handling
- Processing Cycles for KODAK Chemicals
- Process Monitoring
- Troubleshooting Processes C-41 and RA-4

Note: If you are using KODAK SM Chemicals, see KODAK Publication No. Z-101, *Using KODAK SM Chemicals in SM Minilabs*.

If you are using a KODAK Minilab System 88 or 89, a KODAK PROFESSIONAL RP 30 Laser Printer, a KIS DKS minilab system, a Fuji Frontier, or a Noritsu printer/processor designed for Process CP-48 or CP49E, you will find technical information on using KODAK Chemicals in those systems at www.kodak.com/go/photochemicals under the "Technical Publications" tab.

1 CHEMICALS AND CHEMICAL HANDLING

High-quality customer orders begin with proper chemical handling and your choice of chemicals. Chemical handling includes how you store and mix chemicals and your attention to chemical safety.

This section explains the following:

- Chemical terms
- Effects of processing solutions
- Choosing the right chemicals for your processes
- Safe handling of photographic chemicals
- Chemical mixing
- Chemical storage
- Chemical characteristics
- Compensating for evaporation
- Cleaning tanks and racks
- Disposing of processing effluent
- Silver recovery
- Solid-waste disposal

CHEMICALS TERMS

To help you understand the terms we've used to describe the chemicals in this manual, here are some definitions:

Chemical Concentrates or Concentrate—Concentrated chemicals that are diluted to make tank solutions or replenishers.

Fresh Solution—Newly mixed, unused solution.

Replenisher—Solution used to restore the chemical components of the tank solution to maintain photographic performance over time.

Seasoned Solution—A tank solution that has been used and replenished for a period of time. The chemical components and seasoning by-products of a seasoned solution are at an optimum level for processing.

Starter—A concentrate that is added during preparation of a fresh tank solution so that it will yield results similar to those provided by a seasoned tank solution.

Tank Solution—The solution used in the processor tank; often referred to as "working solution."

EFFECTS OF PROCESSING SOLUTIONS

Each solution affects the film or paper differently.

Understanding the function of each solution can help you diagnose processing problems.

Developer

The developer chemically reduces the exposed silver halide in the film or paper to form a metallic silver image. At the same time, the color developing agent in the developer oxidizes and combines with the dye couplers at the site of the silver image in each of the dye-forming emulsion layers to form a color image. Once the dye image has formed, there is no need for the silver image. It is later removed by bleaching and fixing.

The amount of cyan, magenta, and yellow dye formed depends on exposure and developer activity. Temperature, time, concentration, replenishment rate, agitation, and the rate at which solutions diffuse into the emulsion affect developer activity. Time, temperature, and agitation affect the diffusion rate. With *too much* developer activity, too much dye forms; with *too little* activity, not enough dye forms.

Bleach

In the film process, the bleach stops developer activity and converts metallic silver produced in the developer step into silver halide. The silver halide is later dissolved in the fixer.

Bleach concentration and the rate at which the solution diffuses into the emulsion affect bleach activity. Time, agitation, and temperature affect the rate of diffusion. Replenishment rate, mixing procedures, and aeration efficiency affect the chemical concentrations. Bleach aeration adds oxygen needed to convert the reduced bleaching agent into an active form.

If bleaching is inadequate, it can cause retained silver because not all of the metallic silver is converted to silver halide. This can effect the scanning and printing of films, causing an overall increase in the contrast of the print, as well as causing highlight areas to be lacking in detail. Retained silver is caused by a bleach cycle time that is too short, a bleach temperature too low, or a bleach that is too dilute, underreplenished, or not aerated adequately.

Bleach Aeration—In Process C-41, you must aerate the bleach to convert the less active iron II into more active iron III. If aeration is inadequate, it can contribute to retained silver and leuco-cyan dye problems, as well as causing staining by-products that will increase the D-min density of processed films. Too much aeration can cause the bleach to foam and splash, which can contaminate other solutions, and also form developer "tar" particles (oxidized developer) that can adhere to the film.

Fixer

In a film process, the fixer converts silver halide in the film into soluble silver complexes. Most of these silver complexes remain in the fixer solution; you can recover them with electrolytic silver-recovery units, metallic replacement cartridges, and/or chemical precipitation methods.

Fixing efficiency depends on fixer activity and the diffusion rate into and out of the emulsion. Temperature, replenisher concentration, and replenishment rate affect fixer activity. Time and agitation affect the diffusion rate.

Inadequate fixing may not remove all of the silver halide. An increase in the red and green D-min densities of the control plot is one sign of incomplete fixing. Another sign is a milky appearance in the D-min areas of control strips and processed film. If this problem occurs, you can test the fixer by refixing the control strip (or film) in a fixer that you are sure is good. If refixing the strip corrects the D-min densities of the control plot, the original fixer is probably exhausted.

The most probable causes of inadequate fixing are fixer underreplenishment, a fixer that is too dilute due to excessive solution carryover or improper mixing. Also, when fixer becomes exhausted, it can break down and form particles of sulfur and silver sulfide, a condition called "sulfurization."

Bleach-Fix

The paper process uses a bleach-fix instead of a separate bleach and fixer. A bleach-fix has three primary purposes: to stop the action of the developer; to convert metallic silver into silver halide; and to dissolve the silver.

Bleach-fix performance depends on the bleach-fix concentration and the diffusion rate of the solution into the emulsion. Time, agitation, and temperature affect the diffusion rate.

Inadequate bleach-fixing may not remove all of the silver from the paper. A sign of retained silver is an increase in the black-patch (BP) densities and a desaturation of the yellow patch on the control strip (giving it a brown appearance). Retained silver degrades image quality by desaturating the colors—especially yellow—and is most apparent in higher-density areas where there is more retained silver. You can remove retained silver by reprocessing the paper in a good bleach-fix.

Final Rinse

In a film process, the final rinse promotes uniform drying and reduces water spotting. In minilabs that use a washless film process, the final rinse (instead of a wash step) removes residual chemicals from the film.

Stabilizer

In a paper process, the stabilizer permits low wash rates and maintains a clean working solution to avoid dirt and stain formation on the prints.

Wash

Most minilabs operate without a wash step; however, some older minilabs use wash water to remove residual chemicals from film or paper. Good washing requires enough circulation to keep fresh water in contact with the emulsion. The water temperature must be warm enough to swell the gelatin so that the water moves freely into the emulsion to remove the chemicals, but not so warm that it damages the emulsion. A thorough final wash is necessary because chemicals that remain in the film or paper can cause dyes to fade.

CHOOSING THE RIGHT CHEMICALS FOR YOUR PROCESSES

Kodak is committed to providing minilabs with chemicals that are safe, economical, and easy to use. The chemicals designed for minilabs are supplied in liquid concentrates for easy mixing and handling; they are available in convenient and economical sizes. Kodak designs these chemicals to be as safe as possible for our environment.

KODAK FLEXICOLOR Chemicals for Minilab Film Processors

KODAK FLEXICOLOR Chemicals are designed for processing all Kodak color negative films.

FEATURES	BENEFITS
<ul style="list-style-type: none">All-liquid concentrates	<ul style="list-style-type: none">Easy mixing
<ul style="list-style-type: none">Low developer replenisher rates with FLEXICOLOR LU Developer Replenisher LORR	<ul style="list-style-type: none">Less mixingLess effluent discharge—less environmental impactChemical savingsRobust performance when operating in Low Utilization conditions
<ul style="list-style-type: none">Rapid-access cycle time for some minilabs with FLEXICOLOR RA Chemicals	<ul style="list-style-type: none">Faster turnaround time for customer ordersDesigned for use in minilabs using Process C-41RA, or older minilabs using Process C-41B
<ul style="list-style-type: none">Odorless bleach with FLEXICOLOR RA Bleach Replenisher NR	<ul style="list-style-type: none">Better workplace environment
<ul style="list-style-type: none">Availability of washless cycle	<ul style="list-style-type: none">No need for water or sewer hookupSavings in water and energy costs
<ul style="list-style-type: none">Excellent performance when mixed with a variety of water supplies	<ul style="list-style-type: none">Quality of local water supply not critical
<ul style="list-style-type: none">Wide variety of sizes	<ul style="list-style-type: none">Sizes convenient for all users

Kodak packages the following FLEXICOLOR Chemicals in convenient sizes for minilabs. For information on process cycles and production volume, see page 2-1.

KODAK Chemical	Process Cycle	Sizes to Make*	Comments
FLEXICOLOR LU Developer Replenisher LORR	C-41B, C-41RA, C-41	5 L, 10 L	Low replenishment rate helps reduce effluent discharged by as much as 50 percent; less chemical mixing and lower cost per roll of film processed.
FLEXICOLOR Developer Starter LORR	C-41B, C-41RA, C-41	31.5 L (8.3 gal) of tank solution	Use with FLEXICOLOR Developer Replenisher LORR to prepare fresh tank solution.
FLEXICOLOR RA Bleach Replenisher NR	C-41RA, C-41B	5 L	Use with minilabs designed for Processes C-41RA and C-41B. Requires no mixing; packaged ready to use; odorless.
FLEXICOLOR Bleach Starter	C-41RA, C-41	31.5 L (8.3 gal) [†]	Use with FLEXICOLOR RA Bleach Replenisher NR. Odorless, non-corrosive, and non-foaming. One bottle will make 31.5 L (8.3 gal)* of tank solution.
FLEXICOLOR RA Fixer and Replenisher	C-41RA, C-41B	5 L, 10 L	Use with minilabs designed for C-41RA and C-41B. Use as replenisher or tank solution.
FLEXICOLOR Final Rinse and Replenisher	C-41B, C-41RA, C-41	5 L, 10 L	Contains surfactants to reduce drying marks; resists biological growth for cleaner solution, less maintenance.

* Sizes listed are available in the U.S. and Canada. Other regions may supply these chemicals in different sizes; for more information, contact Kodak in your country.

[†] From FLEXICOLOR RA Bleach Replenisher NR.

KODAK EKTACOLOR PRIME and EKTACOLOR RA Chemicals for Minilab Paper Processors

FEATURES	BENEFITS
<ul style="list-style-type: none"> Fast access time 	<ul style="list-style-type: none"> Quicker results from printer test
<ul style="list-style-type: none"> Low replenisher rates 	<ul style="list-style-type: none"> Fewer mixes Less effluent discharge—less environmental impact Chemical and cost savings
<ul style="list-style-type: none"> Lower water usage 	<ul style="list-style-type: none"> Reduced water and energy costs Less effluent discharged
<ul style="list-style-type: none"> Availability of washless cycle 	<ul style="list-style-type: none"> Additional water and energy savings; smaller amounts effluents discharged
<ul style="list-style-type: none"> Greater process stability 	<ul style="list-style-type: none"> Consistent, repeatable print quality over a broad range of processor production volumes Less need to adjust for low production volumes Fewer printer changes due to process shifts
<ul style="list-style-type: none"> Preservatives to protect developing agent from oxidation 	<ul style="list-style-type: none"> Stable developer activity
<ul style="list-style-type: none"> Good mixes with a variety of water supplies 	<ul style="list-style-type: none"> Quality of local water supply not critical
<ul style="list-style-type: none"> Stain-reducing agent 	<ul style="list-style-type: none"> Clean, crisp whites in prints

Kodak packages the following EKTACOLOR Chemicals in convenient sizes for minilabs. For information on process cycles and production volume, see page 2-1.

KODAK Chemical	Process Cycle	Sizes to Make	
EKTACOLOR PRIME SP Developer Replenisher LORR	RA-4	10 L, 20 gal	For minilabs with medium to high production volume. Reduced replenishment rate.
EKTACOLOR RA Developer Replenisher RT	RA-4	10 L	For minilabs with very low production volume. For minilabs with roller-transport design. Formulated to minimize the effects of low production volume.
EKTACOLOR RA Developer Starter	RA-4	Available in 80 oz. (2.366 L) bottle	One bottle makes 59 L (13.9 gal) of tank solution from KODAK EKTACOLOR PRIME SP Developer Replenisher LORR or 95 L (25 gal) of tank solution from EKTACOLOR RA Developer Replenisher RT.
EKTACOLOR PRIME SP Bleach-Fix Replenisher LORR	RA-4	5 L, 10 L, 10 gal	For minilabs with medium to high production volume.
EKTACOLOR PRIME SP Bleach-Fix Starter	RA-4	To make 20L	Use only with PRIME SP Bleach-Fix Replenisher LORR to prepare a tank solution.
EKTACOLOR RA Bleach-Fix and Replenisher	RA-4	10 L	For minilabs with very low production volume.
EKTACOLOR PRIME Stabilizer and Replenisher LORR	RA-4	5 L, 10 L	For use in place of final wash in washless minilabs.

* Sizes listed are available in the U.S. and Canada. Other regions may supply these chemicals in different sizes; for more information, contact Kodak in your country.

SAFE HANDLING OF PHOTOGRAPHIC CHEMICALS

Handle all chemicals carefully. For more information about potential health hazards and safe handling of specific Kodak chemicals, see the package label and the Material Safety Data Sheet (MSDS) for the chemical. MSDSs are available online at www.kodak.com/go/msds.

Follow Instructions Carefully. Kodak chemical packages have precautionary information on the labels. Always follow the label instructions.

Store Chemicals and Processing Solutions Safely. Keep chemicals and processing solutions out of the reach of children and pets. **Do not** store chemicals where you handle or store food. **Do not** eat, drink, or smoke in chemical-handling areas. Always wash your hands thoroughly after handling chemicals, especially before eating or drinking.

Label All Chemicals Properly. In the U.S., the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard requires employers to inform employees about hazardous chemicals in the workplace. This standard requires that all containers of hazardous chemicals, including storage and processor tanks, be labeled. You can obtain downloadable versions of the labels online at www.kodak.com/go/kes. These labels give the chemical hazard and the action to take in case of accidental contact. Use these labels *only* for KODAK Chemicals; use with other manufacturers' chemicals is an incorrect use under the OSHA standard. Other countries may have similar requirements, so check with local authorities or Kodak in your country.

Keep the Mixing Area Clean. Clean up spilled chemicals as soon as possible with mild soap and water; wear nitrile rubber gloves and goggles. Residue from dried chemicals can become airborne and be inhaled or contaminate processing and printing areas.

Wear Protective Equipment and Clothing. Wear goggles or a face shield and an apron (made of PVC) and protective gloves (made of nitrile rubber) when you mix solutions. Clean protective clothing after use to remove any chemical residue that can cause contamination.

Handle Chemicals Carefully. Avoid prolonged contact of any chemicals with your skin; some photographic solutions, particularly developers, can cause skin irritation and an allergic skin reaction. In case of accidental chemical contact, wash your skin with running tap water and a non-alkaline (slightly acid) hand cleaner. If symptoms persist, get medical attention. An eyewash station must be handy to all employees. The station must be capable of providing a 15-minute flush of water or eyewash fluid at a rate of 1.5 litres/minute. All employees must know the

location of the eyewash station. Follow the manufacturers' instructions for eyewash station maintenance, and inspect the unit on a routine basis as required by OSHA.

Ventilate the Area Properly. Some photographic chemicals and solutions give off vapors and gases. For safety and comfort, keep the concentration of these vapors and gases to a minimum. To minimize the concentration of vapors and gases, provide good ventilation and use covers and floating lids on all solution storage tanks (which also helps reduce evaporation and oxidation). Also, keep the processing tanks enclosed and vent the dryer according to the manufacturer's specifications.

Additional Health and Safety Information. If you are interested in obtaining publications from Kodak that address the subject of the Safe Handling of Photographic Chemicals, please visit our website at www.kodak.com/go/kes.

CHEMICAL MIXING

For the most current information, follow the mixing instructions packaged with the chemicals or on the label of the chemical container. Follow all safety precautions and handling recommendations given in the instructions and under "Safe Handling of Photographic Chemicals" on page 1-6.

Contamination Can Ruin a Process. To minimize the possibility of contamination, keep processing and mixing equipment and storage containers clean. Dirt and contamination can affect the life and photographic quality of the processing solutions. Avoid conditions where solutions can come in contact with other chemicals. Small amounts of fixer or bleach-fix solution can contaminate developer solutions and cause adverse photographic effects.

To lessen the possibility of contamination, thoroughly rinse and clean processing and mixing equipment and storage containers before use. Be careful not to drip solution into other tanks when you remove racks for cleaning. Wash and rinse processing and mixing equipment thoroughly before reusing it.

Contamination is most often caused by—

- solution splashed or dripped into another solution
- using mixing equipment that has not been thoroughly cleaned
- dry chemicals that become airborne during mixing
- pipes and tanks made of material that reacts with the photographic chemicals

CHEMICAL CHARACTERISTICS

Fresh FLEXICOLOR and EKTACOLOR Chemical concentrates and solutions have a characteristic appearance and odor. By checking the appearance and odor, you may be able to determine if a concentrate was stored properly. The tables on page 1-8 summarize the characteristics of FLEXICOLOR and EKTACOLOR Chemical concentrates.

Characteristics of KODAK FLEXICOLOR Chemical Concentrates

FLEXICOLOR Chemical	Appearance of Concentrate	Appearance of Mixed Replenisher	Comments
LU Developer Replenisher LORR	Part A—Clear, colorless	Pale yellow to amber	Darkens slightly with age/storage; this will not affect activity. If appearance of Part C concentrate is dark opaque, solution is oxidized, do not use.
	Part B—Clear, colorless		
	Part C—Clear, pale yellow to amber; strong odor of sulfite		If mixed replenisher is dark opaque, it is oxidized, do not use.
Developer Starter LORR	Clear, colorless; odorless	—	—
RA Bleach Replenisher NR	Dark yellowish-green; odorless	Dark yellowish green	Ready-to-use as replenisher. If concentrate is exposed to temperatures below 4°C (40°F), precipitate may form. This precipitate may not dissolve at room temperature.
Bleach Starter	Clear, colorless; odorless	—	—
RA Fixer and Replenisher	Clear, colorless to pale yellow/green; slight ammonia odor	Clear, colorless to pale yellow/green	Age, exposure to high temperature, or oxidation can cause sulfurization. Severely degraded fixers can produce a large amount of white to yellow precipitate (sulfur) and may have a hydrogen sulfide odor (i.e., rotten egg odor).
Final Rinse and Replenisher	Clear, colorless to pale cyan	Clear, colorless	Solution readily foams.

Characteristics of KODAK EKTACOLOR RA Chemicals

EKTACOLOR Chemical	Appearance of Concentrate	Appearance of Mixed Replenisher	Comments
PRIME SP Developer Replenisher LORR	Clear, yellow to orange to brown; fresh odor	Pale amber to amber	Darkens slightly with age/storage; this will not affect activity. If appearance is dark opaque, solution is oxidized, do not use.
Developer Replenisher RT	Part A— Clear, yellow to reddish amber; amine odor	Pale yellow to amber	Darkens slightly with age/storage; this will not affect activity. If appearance of Part B concentrate is dark opaque, solution is oxidized, do not use.
	Part B— Clear, amber to tan; sulfite odor		
	Part C— Clear, colorless; odorless		If mixed replenisher is dark opaque, it is oxidized. Do not use.
Developer Starter	Clear, colorless; odorless	—	—
PRIME SP Bleach-Fix Replenisher LORR	Dark red-brown; slight acetic acid odor	Dark red-brown	Do not allow concentrate to freeze as precipitates may form. Age, exposure to high temperature, or oxidation can cause sulfurization. Severely degraded bleach-fixes can produce a large amount of white to yellow precipitate (sulfur) and may have a hydrogen sulfide odor (i.e., rotten egg odor). If sulphur is seen, do not use.
Bleach-Fix Replenisher	Part A— Clear, colorless, slight ammonia odor	Dark red brown	
	Part B— Dark red-brown		
PRIME SP Bleach-Fix Starter	Dark red-brown	—	—
PRIME Stabilizer and Replenisher LORR	Clear, colorless to pale green	Clear, colorless	—

Chemical Storage

- Store *chemical concentrates* at 7 to 30°C (45 to 86°F) in a dry location. At temperatures lower than 7°C (45°F), components may come out of solution or crystallize. Temperatures higher than 30°C (86°F) will accelerate chemical reactions and cause deterioration.
- Store *mixed replenisher solutions* in polyethylene storage tanks at approximately 21°C (70°F). Too high a temperature accelerates oxidation and evaporation. Too low a temperature can affect the temperature of the tank solution.
- To reduce oxidation and evaporation, use floating lids on all solutions.

For best results, *do not* use mixed KODAK FLEXICOLOR or EKTACOLOR Chemicals that have been stored longer than the times given in the table below.

Mixed Solution	Solution in Processor— No Operation	Replenisher in Covered Tank
FLEXICOLOR Developer LORR	1 week	4 weeks
ETKACOLOR RA Developer RT EKTACOLOR PRIME SP Developer LORR	1 week	6 weeks
All other solutions	2 weeks	8 weeks

COMPENSATING FOR EVAPORATION

When water evaporates from processing solutions, the chemical components remain and the solutions become overconcentrated. Some degree of evaporation occurs naturally, but it is most likely to occur at these times:

- when the processor is on and up to temperature, but no film or paper is being processed
- while the processor is cooling down immediately after shutdown

You can compensate for this evaporation by topping off the solution tanks with water. Use water at a temperature that is close to the temperature of the tank solutions. *Never use cold water to top off tank solutions.* The procedures below provide a helpful guide to compensating for evaporation that occurs over a 24-hour period.

Daily at Startup—With the recirculation system on, check the level of the tank solutions. If the level is not up to the top of the overflow tube, add water, at approximately operating temperature, to raise the level to the top of the overflow tube.

If the solution level is at the top of the overflow tube, squirt the top edges of the tank and the rollers at the top of the rack lightly with warm water to remove any buildup of dried chemicals. To avoid severely diluting the tank solution, be careful not to use too much water.

At Shutdown—Squirt the top edges of the tank, the top of the rack, and the rollers at the top of the rack lightly with warm water to prevent the buildup of dried chemicals. To avoid severely diluting the tank solution, be careful not to use too much water. Clean and rinse crossovers thoroughly to minimize chemical buildup.

CLEANING TANKS AND RACKS

Always wear splash-proof goggles and protective gloves and apron when you clean processor racks and tanks.

Routine Cleaning

Follow the recommendations described below. **Be sure to follow your equipment manufacturer's recommendations for regular maintenance procedures.**

1. Remove crossovers, squeegee rollers, or squeegees at shutdown, and rinse them with hot water.
2. Once a week, remove each rack from the processor, clean it with hot water and a soft, non-abrasive brush, and rinse thoroughly. Inspect the racks for non-moving rollers, deformities in rollers, worn or broken springs and gears, loose screws, deteriorated retaining clips, etc., to ensure smooth transport.
3. On a periodic basis (every 6 to 12 months), clean racks and tanks with a non-abrasive brush, and remove stains from racks and tank walls with a cleaner. Rinse racks and tanks thoroughly before you refill the tanks.

Removing Biological Growth

Biological growth can occur in stabilizer, final rinse, and wash tanks, and is a potential source of dirt. Clean wash tanks weekly, and stabilizer tanks as needed. Wear protective gloves and splash-proof goggles when you follow this procedure. To remove biological growth:

1. Empty the stabilizer or wash tank. Dispose of waste solutions according to local or state disposal regulations.
2. Rinse the tank and racks with hot water; drain the rinse water and repeat.

DANGER! Do not add cleaning agents to processing tanks unless the tanks and racks have been completely drained and thoroughly rinsed with water. Read the Material Safety Data Sheet for more information on the potential hazards when cleaning the working tank.

3. Fill the tank with a dilute sodium hypochlorite (NaOCl) solution, such as 2 mL Clorox (5.25 percent NaOCl) per litre of water.

4. Allow the hypochlorite solution to remain in the tank for up to 30 minutes. Longer soaking times can damage plastic or rubber materials. After treatment, dispose of the hypochlorite solution according to local or state disposal regulations.
5. Brush foreign matter from tanks and racks.
6. Before refilling tanks, flush them thoroughly with water. Small amounts of remaining hypochlorite can have an adverse effect on processing-solution activity. Be sure to recirculate rinse water through the recirculation system to remove traces of hypochlorite.

Note: For information on controlling biological growth, see KODAK Publication No. CIS-3, *Biocides for Photographic Solution Tanks and Wash Water*, available at www.kodak.com/go/photochemicals.

EFFLUENT DISPOSAL

Effluent from processing labs that use KODAK FLEXICOLOR and EKTACOLOR Chemicals consists of developer, bleach, desilvered bleach-fix, fixer, and stabilizer solutions and/or wash water. This effluent is compatible with and can be effectively treated by a municipal secondary waste-water treatment plant.

Photographic effluent is considered an industrial waste discharge. Most municipalities require a permit to discharge industrial waste to a municipal sewer system. After efficient silver recovery, the effluent from a minilab using Processes C-41, C-41B, C-41RA, and RA-4 has such waste characteristics.

Effluent from processes that use FLEXICOLOR and EKTACOLOR Chemicals will also contain concentrations of ammonia, iron, sulfates, developing agents, and chemicals that have an oxygen demand (BOD, COD). The concentrations of these chemicals will depend on factors such as replenishment and wash rates, type of processor, efficiency of squeegees, chemical regeneration, treatment methods, and the co-mingling of effluent with other processing effluents and non-processing waste water. To characterize waste from your processing operation, it is best to have the effluent sampled by an analytical laboratory according to the method required by local discharge codes.

Material Safety Data Sheets

For more information on the chemical components of the processing chemicals that you use, see the Material Safety

Data Sheets. To request MSDSs for Kodak chemicals, you can obtain them online at www.kodak.com/go/msds.

Reducing Processing Effluent

Keep the discharge of photographic chemicals as low as possible by using efficient squeegees and the correct replenishment rates. Avoid making batch discharges, such as tank dumps. If your permit allows, discharge large amounts of working-strength solutions by adjusting the pH and then releasing them slowly into the sewer along with your normal non-processing effluent. To adjust the pH, combine high-pH solution (developer) with low-pH solutions (bleach, desilvered bleach-fix, and desilvered fixer) to neutralize the pH.

Consider silver recovery as part of your normal processing operation. For more information on silver recovery, see KODAK Publication No. J-208, *Introducing the "Silver Management" Series*. For more information on silver recovery from Process RA-4, see "Silver Recovery" on page 1-10.

Other Effluent Disposal Methods

Although most labs discharge their effluent to a municipal waste-water treatment plant, sewer-use discharge restrictions or lack of access to a treatment plant may require some labs to use an off-site disposal (haulaway) service.

Septic tank systems do not have the ability to treat minilab processing effluents properly. Discharging to such a system typically requires permits from state and local authorities. Kodak does not recommend this disposal method.

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SILVER RECOVERY

Silver is a seasoning product of processing photographic films and papers. Sewer codes may limit the concentration of silver in effluent that may be discharged. To reduce the amount of silver in the effluent, you can desilver used fixer, bleach-fix, stabilizer, and rinse solutions with electrolytic silver recovery, metallic replacement silver recovery cartridges, or silver-precipitation methods. The most common type of silver recovery with minilab equipment is the metallic replacement silver recovery cartridges. For further information on using these cartridges, see KODAK Publication J-200, *KODAK Chemical Recovery Cartridges* at www.kodak.com/go/kes.

SOLID WASTE DISPOSAL

In the U.S., Kodak has an established recycling program for KODAK One-Time Use Cameras designed to help labs minimize the amount of solid waste they send to landfills.

For more information about this program, visit www.kodak.com/go/kes

MORE INFORMATION

For general questions regarding health, safety, disposal of chemicals, or other environmental issues, in the U.S. call the Kodak Information Center at 800-242-2424. In Canada, call 800-465-6325. In other regions, contact Kodak in your country.

For emergency health or safety information call (585) 722-5151. For non-emergency information, go to www.kodak.com/go/kes for the MSDS.

For questions concerning the safe transportation of Kodak products, call Kodak Transportation Services at 585-722-2400, between 8 a.m. and 5 p.m. (Eastern time).

The products and services described in this publication may not be available in all countries. In countries outside the U.S., contact your local Kodak representative, or your usual supplier of Kodak products. For more information, visit the Kodak website at www.kodak.com/go/photochemicals.

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