

Specific-Gravity and pH Measurements of KODAK Processing Chemicals

Kodak

TECHNICAL DATA

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You can use specific-gravity and pH measurements to monitor some characteristics of your process and processing chemicals. These are useful measurements, but it is important to keep in mind a few limitations.

pH measurements are very useful for monitoring developers, bleaches, bleach-fixes, and fixers. However, you must make sure your measurements are *accurate* if you want to use them for this purpose. Use a carefully calibrated and maintained pH meter. Follow the manufacturer's instructions on how to use your instrument. To measure the pH of a solution, use the method described in CIS-121, *Measuring the pH of Photographic Processing Solutions*.

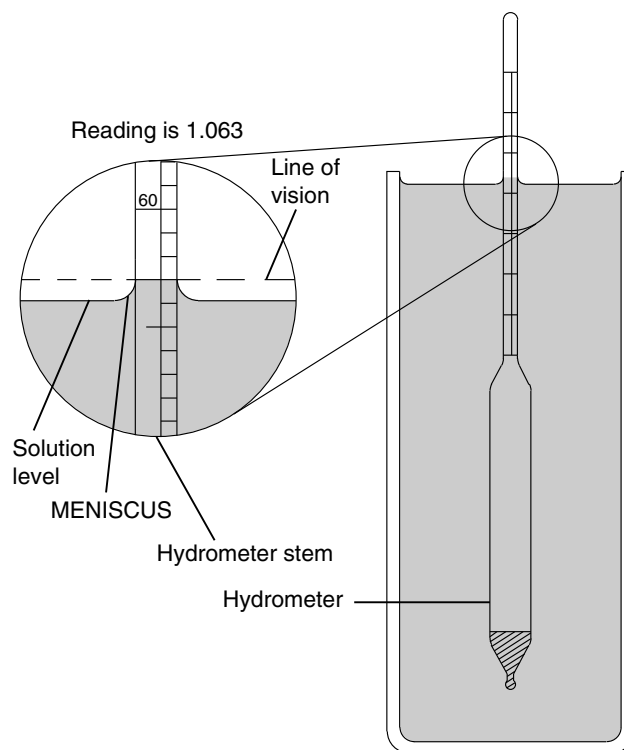
Specific gravity is useful in detecting mixing errors of 5 percent or more, and for checking the concentration of processing solutions such as fresh tank solutions and replenishers. However, it is less useful for monitoring some seasoned tank solutions. The carry-in and carry-out of solutions to and from a seasoned tank solution vary with the type of processor used, the process cycle, the photographic material being processed, and other process conditions.

To make specific-gravity measurements, use a hydrometer that meets the standard ASTM E100-05; make sure that it is marked in increments of 0.001 for an accuracy of ± 0.0005 .

To measure specific gravity:

1. Fill a clean, dry 250 mL graduated cylinder to within 1 inch (2.5 cm) of the top with the solution you are measuring.
2. Adjust the solution to the proper temperature (see the specifications given in the tables on pages 2 through 4). *Proper solution temperature is very important.*
3. Place the cylinder in a sink or tray to catch overflow.
4. Choose the correct hydrometer to match the approximate specific gravity of the solution.

5. Be sure that the hydrometer is clean and dry. Carefully lower the hydrometer into the solution in the cylinder. Let it bob up and down slightly. When it stops, read the number at the **top of the meniscus**.



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6. After making the measurement, discard the sample. To avoid contaminating solutions, do not return the sample to the tank.
7. Rinse the hydrometer and graduated cylinder thoroughly with water.

Note: Never take specific-gravity readings of solutions in the tanks. If you use the wrong hydrometer, it can sink to the bottom of the tank and break. If it bobs on the surface of the tank solution, the stem may hit the edge of the tank and break. Label hydrometer boxes to avoid confusion. Do not use tape labels on the hydrometers.

The tables that follow list pH and specific-gravity measurements for the Kodak chemicals most commonly used in professional and photofinishing laboratories.

Process C-41

KODAK FLEXICOLOR Chemical	Typical pH Values at 25°C (77°F)			Specific Gravity at 25°C (77°F)		
	Fresh Tank	Seasoned Tank	Replenisher	Fresh Tank	Seasoned Tank	Replenisher
Developer Replenisher	10.03 ± 0.05	10.03 ± 0.05	10.12 ± 0.05	1.034 to 1.040	1.036 to 1.044	1.034 to 1.040
Developer Replenisher LORR & SM Tank Developer	10.03 ± 0.05	10.03 ± 0.05	10.17 ± 0.05	1.034 to 1.040	1.036 to 1.044	1.036 to 1.042
LU Developer Replenisher LORR (5 and 10 litres)	10.03 ± 0.05	10.03 ± 0.05	10.17 ± 0.05	1.034 to 1.040	1.038 to 1.046	1.036 to 1.042
Negative Film FC Tank Developer	10.05 to ± 0.05	10.05 ± 0.05	NA	1.038 to 1.044	1.040 to 1.048	NA
Bleach III Replenisher	4.75 ± 0.25	4.75 ± 0.25	4.50 ± 0.25	1.030 to 1.040	1.030 to 1.060*	1.030 to 1.040
RA Bleach Replenisher NR	4.60 ± 0.25	4.60 ± 0.25	4.00 ± 0.25	1.152 to 1.162	1.130 to 1.160	1.170 to 1.180
SM Tank Bleach	4.60 ± 0.25	4.60 ± 0.25	NA	1.169 to 1.179	1.130 to 1.160	NA
Negative Film FC Tank Bleach	4.00 ± 0.25	4.65 ± 0.25	NA	1.118 to 1.138	1.120 to 1.150	NA
Fixer and Replenisher	6.50 ± 0.5	6.50 ± 0.5	6.50 ± 0.25	1.055 to 1.100	1.060 to 1.090	1.080 to 1.090
RA Fixer and Replenisher	7.25 ± 0.5	6.25 ± 0.5	7.50 ± 0.25	1.075 to 1.095	1.075 to 1.125	1.085 to 1.095
SM Tank Fixer	6.50 ± 0.5	6.00 ± 0.5	6.50 ± 0.25	1.093 to 1.103	1.080 to 1.130	NA
Negative Film FC Tank Fixer	6.75 ± 0.5	6.50 ± 0.5	7.00 ± 0.25	1.090 to 1.110	1.105 to 1.135	NA
ELECTROSILVER Fixer and Replenisher LORR	6.50 ± 0.5	—	8.00 ± 0.5	1.075 to 1.115	—	1.130 to 1.140
Tank 1	—	6.50 ± 0.5	—	—	1.085 to 1.125	—
Tank 2	—	7.00 ± 0.5	—	—	1.095 to 1.135	—
Final Rinse and Replenisher	4.0 to 7.0	4.0 to 7.0	4.0 to 7.0	0.990 to 1.010	0.990 to 1.010	0.990 to 1.010
Negative Film FC Tank Rinse	4.0 to 7.0	4.0 to 7.0	4.0 to 7.0	0.990 to 1.010	0.990 to 1.010	0.990 to 1.010

*. The specific gravity of regenerated bleach replenisher should fall within this range.

Process E-6

KODAK PROFESSIONAL Chemical	Typical pH Values at 25°C (77°F)			Specific Gravity at 25°C (77°F)		
	Fresh Tank	Seasoned Tank	Replenisher	Fresh Tank	Seasoned Tank	Replenisher
First Developer Replenisher	9.81 ±0.03	9.83 ±0.03	9.82 ±0.03	1.055 ±0.003	1.060 ±0.003	1.057 ±0.003
Reversal Bath and Replenisher	5.30 ±0.07	5.50 ±0.15	5.30 ±0.07	1.004 ±0.002	1.005 ±0.002	1.006 ±0.002
Color Developer Replenisher	11.89 ±0.05	11.90 ±0.05	12.12 ±0.05	1.034 ±0.003	1.038 ±0.003	1.039 ±0.003
Color Developer Replenisher LORR	11.88 ±0.05	11.85 ±0.05	12.29 ±0.05	1.034 ±0.003	1.038 ±0.003	1.043 ±0.003
Prebleach and Replenisher	6.30 ±0.05	6.90 ±0.50	6.30 ±0.05	1.019 ±0.003	1.021 ±0.003	1.019 ±0.003
Bleach Replenisher	5.85 ±0.20	5.85 ±0.20	5.45 ±0.05	1.130 ±0.010	1.190 ±0.070	1.260 ±0.010
Fixer and Replenisher	6.66 ±0.10	6.56 ±0.20	6.66 ±0.10	1.041 ±0.003	1.065 ±0.025	1.041 ±0.003
Final Rinse and Replenisher	6.50 ±1.00	6.50 ±1.00	6.50 ±1.00	1.000 ±0.003	1.000 ±0.003	1.000 ±0.003

Process RA-4

KODAK EKTACOLOR Chemical	Typical pH Values at 25°C (77°F)			Specific Gravity at 25°C (77°F)		
	Fresh Tank	Seasoned Tank	Replenisher	Fresh Tank	Seasoned Tank	Replenisher
RA Developer Replenisher	10.12 ±0.05	10.12 ±0.05	10.70 ±0.05	1.017 to 1.023	1.027 to 1.035	1.024 to 1.030
RA Developer Replenisher 12	10.10 ±0.05	10.10 ±0.05	10.80 ±0.05	1.019 to 1.025	1.028 to 1.036	1.022 to 1.028
RA Developer Regenerator 12/55	10.10 ±0.05	10.10 ±0.05	10.80 ±0.05	NA	1.032 to 1.040	1.029 to 1.037
RA Developer Replenisher RT	10.12 ±0.05	10.12 ±0.05	10.60 ±0.05	1.017 to 1.023	1.026 to 1.034	1.020 to 1.026
RA Developer Replenisher RT (with Additive)	—	10.12 ±0.05	10.40 ±0.05	NA	NA	1.018 to 1.024
Digital Developer Replenisher RT	10.25 ±0.05	10.25 ±0.05	10.70 ±0.05	1.022 to 1.028	1.027 to 1.035	1.027 to 1.033
PRIME SP Developer Replenisher LORR	10.12 ±0.05	10.12 ±0.05	11.10 ±0.05	1.018 to 1.028	1.027 to 1.035	1.023 to 1.031
RA-2SM Tank Developer	10.30 ±0.05	10.30 ±0.05	NA	1.022 to 1.028	1.031 to 1.039	NA
PC 92/110 Developer	10.46 ±0.05	10.46 ±0.05	12.40 ±0.05	—	1.032 to 1.042	1.034 to 1.042
PC111 Developer	10.50 ±0.05	10.50 ±0.05	12.70 ±0.05	—	1.039 to 1.047	1.041 to 1.049
RA Bleach-Fix and Replenisher NR	5.5 ±0.25	6.25 ±0.7	5.0 ±0.25	1.060 to 1.070	1.080 to 1.110	1.125 to 1.135
RA Bleach-Fix and Replenisher	5.5 ±0.25	6.25 ±0.7	5.4 ±0.25	1.070 to 1.080	1.066 to 1.096	1.070 to 1.080
RA Bleach-Fix Regenerator II (2-tank countercurrent): Tank 1 Tank 2	7.5 ±0.5 7.0 ±0.5	7.5 ±0.5 7.0 ±0.5	7.0 ±0.5	NA	1.130 to 1.160* 1.130 to 1.150*	1.130 to 1.150*
PRIME SP Bleach-Fix Replenisher LORR	5.1 ±0.25	6.2 ±0.7	5.1 ±0.25	1.095 to 1.105	1.065 to 1.095	1.095 TO 1.105
RA-2SM Bleach-Fix Tank	5.4 ±0.25	6.5 ±0.5	NA	1.120 to 1.130	1.125 to 1.155	NA
PC 92/110 Bleach-Fix	—	7.0 ±0.5	5.20 ±0.25	—	1.090 to 1.120	1.113 to 1.123
PC111 Bleach-Fix	6.5 ±0.5	6.9 ±0.5	5.22 ±0.25	—	1.090 to 1.120	—
Stabilizer and Replenisher LORR	4.0 to 7.0	4.0 to 7.0	4.0 to 7.0	0.993 to 1.003	NA	0.993 to 1.003

*.Very limited data, accuracy questionable.

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Black-and-White Processes

KODAK Chemical	Solution Concentration	pH at 25°C (77°F)	Specific Gravity (Fresh Tank) at 25°C (77°F)
Developer D-76	Stock (full strength)	8.5 ±0.05	1.078 ±0.003
	Working strength (1:1)	—	1.039 ±0.003
Replenisher D-76R	Stock (full strength)	—	1.091 ±0.003
DEKTOL Developer	Stock (full strength)	—	1.103 ±0.003
POLYMAX RT Developer and Replenisher	Working strength	10.8 ±0.20	1.045 ±0.003
POLYMAX T Developer	Working strength (1:9)	10.7 ±0.10	1.036 ±0.003
DURAFLO RT Developer Replenisher	Working strength	9.55 ±0.05	1.123 ±0.003
DURAFLO RT Developer	Working strength	9.35 ±0.05	1.115 ±0.003
HC-110 Developer Replenisher	Working strength, Dilution A	9.1 ±0.10	1.023 ±0.003
HC-110 Developer	Working strength, Dilution A (1:15)	8.9 ±0.10	1.015 ±0.003
	Working strength, Dilution B (1:31)	—	1.008 ±0.003
T-MAX Developer	Working strength (1:4)	8.37 ±0.05	1.045 ±0.003
T-MAX RS Developer and Replenisher	Working strength	8.5 ±0.05	1.041 ±0.003
XTOL Developer	Working (full) strength	8.2 ±0.05	1.085 ±0.003
POLYMAX RT Fixer	Working strength	5.25 ±0.25	1.078 ±0.003
POLYMAX T Fixer	Working strength for film (1:3)	4.9 ±0.15	1.069 ±0.003
Rapid Fixer (Parts A + B)	Working strength for film (1:3)	4.4 ±0.05	1.087 ±0.003
	Working strength for paper (1:7)	4.4 ±0.05	1.043 ±0.003
ROYALPRINT Fixer and Replenisher	Working strength and replenisher (1:3)	6.0 ±0.05	1.084 ±0.003

Current Information Summaries provide informal information of limited or specific application. Responsibility for judging the timeliness and applicability of the information to a specific photographic use rests with the user.

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