TI5011 Issued 4-02

KODAK MIN-R S Film / 4906

1) Description

KODAK MIN-R S Film / 4906 is a medium speed, dual coated, ortho-sensitive medical x-ray film for mammographic use with single green-emitting intensifying screens. It is coated on a blue 7-mil ESTAR base support that has a base density of approximately 0.19. MIN-R S Film provides high contrast required to view the breast tissue effectively. MIN-R S Film may also be used to image extremities very well. MIN-R S Film is intended for standard cycle processing. This film provides high contrast with very low sensitivity to varied processing conditions.

2) Safelight

Use a KODAK GBX-2 Safelight Filter with a frosted 7.5-watt bulb located in a ceiling fixture at least 4 feet from the film.

3) Storage and Handling

Handling -
X-ray film is extremely sensitive and prone to handling artifacts. Hands must be clean, dry and free of lotions, etc. Film should be handled carefully by the edges to avoid physical strains such as pressure, creasing, or buckling.

Storage -
Store unexposed film at 50 to 75°F (10 to 24°C), at 30 to 50 percent RH, and properly shielded from x-rays, gamma rays, or other penetrating radiation. Keep exposed film in a cool, dry place that is properly shielded from penetrating radiation. Process as soon as possible after exposure. Processed film should be stored at 60 to 80°F (16 to 27°C), at 30 to 50 percent RH.

4) Relative Film Systems Speed

Screen-Film Characteristics

KODAK Screen	KODAK Film	Relative Processing Cycle	Relative Speed[a]		Contrast[a]		D-Max[a]
			RP	EX II	RP	EX II	
MIN-R 2000	MIN-R S	Standard	150	150	3.40	3.60	>4.0
MIN-R 2190	MIN-R S	Standard	190	190	3.40	3.60	>4.0
MIN-R	MIN-R S	Standard	100	100	3.40	3.60	>4.0

[a] This data is representative of films processed in Kodak processors recommended for mammography film processing. See the Dedicated and Non-Dedicated Processing Environments sections for listings of those processors.

5) Sensitometric Parameters

Relative Speed:	Measured at a density of 1.00 above gross fog.
Contrast:	Measured as slope of the line between densities of 0.25 and 2.00 above gross fog.
Gross Fog:	Density of film base plus processing fog.

6) Process Variations

Changes to speed, contrast, and fog as a result of temperature variation from normal are included in GRAPHS Section.

7) Intermix

This film can be processed with intermixes of common medical x-ray films.

Variations of bromide ions in KODAK RP X-OMAT Developer cause sensitometric speed effects. With KODAK MIN-R S Film, these changes are similar to those for T-MAT Films; included in GRAPH Section.

8) Automated Processing

The following tables are for recommended film processors and replenishment rates for KODAK MIN-R S Film using KODAK RP X-OMAT Chemicals.

> **Note:** For low use rates, if sensitometry does not stay within control limits, flooded replenishment may be needed. Flooded replenishment is intended to maintain the developer solution at a continuously fresh chemical activity. This is accomplished by replenishing not only when film is fed, but also on the basis of processor on time.

For KODAK MIN-R S Film, KODAK RP X-OMAT Developer Starter is added to the replenishment tanks at the rate of 3 fl oz. per gallon, or 89 mL per gallon, or 25 mL per litre. (Use KODAK RP X-OMAT Developer Starter only.) Fill the processor tanks with the solution from the replenishment tank. However, do not add extra starter to the processor developer tank.

For more detailed information on how to set up each processor for Flooded Replenishment, see the Installation or Service manual for each processor and *Conversion Guide for MIN-R S Film*, Publication No. M3-299, Catalog No. 110 0387. The setup should be done by qualified service personnel.

DEDICATED PROCESSING ENVIRONMENTS -
This information is for KODAK MIN-R S Film, and MAY NOT APPLY to other Kodak mammography films.

Also see *Conversion Guide for MIN-R S Film*, Publication No. M3-299, Catalog No. 110 0387.

Processor	**Film Size Processed**	**Average Number of 18x24cm Films per 8 hrs of Processor Operation**	**Replenishment Rates per 35x43cm Dev. Fix**
270 RA, Multiloader 300, Multiloader 700, 460 RA, 480 RA, 3000 RA, 5000 RA, Multiloader 300 Plus	18x24cm and 24x30cm	Any number	105 mL 105 mL
M8	18x24cm and 24x30cm	60 sheets or more less than 60	105 mL 105mL Flooded
			Replenishment Rates per 24cm of film travel
MIN-R, M35A, M35A-M, M7B, M6A-N, M6AW, M6B, M35, M35-M, M7B-E, Miniloader 2000	18x24cm and 24x30cm Single Feed 18x24cm and 24x30cm Double Feed	60 sheets or more, less than 60 60 sheets or more less than 60	30 mL 30mL Flooded 60mL 60mL Flooded

NON-DEDICATED PROCESSING ENVIRONMENTS -
This information is for KODAK MIN-R S Film, and MAY NOT APPLY to other Kodak mammography films.

Also see *Conversion Guide for MIN-R S Film*, Publication No. M3-299, Catalog No. 110 0387.

Processor	Film Size Processed	Use Condition	Average Number of Films per 8 hours of Processor Operation	Replenishment Rates per 35x43cm Dev. Fix
270 RA, Multiloader 300, Multiloader 700, 460 RA, 480RA, 3000 RA, 5000 RA, Multiloader 300 Plus	All	Any	Any number[1]	60mL 85mL
M8	Average size intermix	High Medium Low	75 sheets or more 25-75 sheets less than 25[2]	60mL 85mL 80mL 100mL 100mL 120mL
MIN-R, M35A, M35A-M, M7B, M6A-N, M6AW, M6B, M35, M35-M, M7B-E, Miniloader 2000	Average size intermix	High Medium Low	115 sheets or more 40-115 sheets less than 40[2]	50mL 70mL 65mL 85mL 80mL 100mL

[1] Flooded replenishment should not be required due to the automatic compensation for use feature, but is available if needed to maintain sensitometry for low use conditions.

[2] If sensitometry does not stay within control limits, flooded replenishment may be needed.

Notice: Observe precautionary information on product labels and on the Material Safety Data Sheets.

9) Manual Processing

Solution/Step	Temperature	Time	Agitation
KODAK GBX Developer and Replenisher	68°F (20°C) 72°F (22°C) 76°F (24.5°C) 80° F (26.5 °C)	7 min 5 min 4 min 3 min	Tap sheet film hangers lightly on side of tank immediately after immersion to dislodge air bubbles.
Note: DO NOT agitate films during remainder of development step. Remove film and hanger 5 seconds before end of development. DO NOT allow films to drain excess developer back into the developer tank.			
KODAK Indicator Stop Bath OR Running Water Rinse	60 to 85 ° F (16 to 30 °C)	30 sec	Immerse hanger rapidly; agitate continuously.
KODAK GBX Fixer and Replenisher OR KODAK RP X-OMAT Fixer and Replenisher	60 to 85°F (16 to 30°C)	2 to 4 min	Intermittent, 5 sec every 30 sec.
Running Water Wash[1] (about 8 volume changes/hour)	60 to 85°F (16 to 30°C)	5 min	—
Dry in a dust-free area at room temperature or a suitable drying cabinet. Temperature not to exceed 120°F (49°C).			

[1]KODAK PHOTO-FLO Solution may be used after washing to minimize water spots and drying marks.

Notice: Observe precautionary information on product labels and on the Material Safety Data Sheets.

Fixer Retention -
The ability to maintain a quality image over several years is dependent on the stability of the image you produce. Image stability begins in the processing cycle. High levels of residual fix (hypo) in processed film indicate insufficient washing, and this can significantly impact the stability of the film. Insufficient washing can be caused by improper wash flow rates, loss of fixer temperature control, inactive fixer, or improper film storage conditions. An analysis of fixer retention in film should be performed quarterly or whenever poor washing is suspected.

Drying -
Use the lowest possible dryer temperature that will maintain proper film drying. The dryer temperature will vary depending on the processing cycle, the relative humidity, and the environmental temperature, and should be adjusted to meet individual conditions. Different processing cycles will require different dryer temperatures to compensate for varying times that the film is in the dryer section. Refer to the Operator Manual for dryer temperature adjustment instructions.

For dryer information see KODAK Publication *Dryer Venting Requirements - All KODAK X-OMAT Processors*, Service Bulletin 101 (October, 1992).

10) Image Structure

Diffuse rms Granularity -
GRAPH included; read at net diffuse visual densities from 0.5 to 2.0, 48-micrometre aperture.

11) Graphs[1]

Characteristic:

A) RP X-OMAT Chemicals (4-02)
B) X-OMAT EX II Developer (4-02)

Process Variations from Normal Processing Temperature:

D) Speed (4-02)
E) Contrast (4-02)
C) Fog (4-02)

rms Granularity:

F) (4-02)

Safelight Sensitivity:

G) (4-02)

Spectral Sensitivity:

H) (4-02)

Bromide Effects:

I) (4-02)

Inverse/Squared Sensitometry:

J) RP X-OMAT Chemicals (4-02)
K) X-OMAT EX II Chemicals (4-02)

Note: The Kodak materials described in this publication for use with KODAK MIN-R S Film / 4906 are available from dealers who supply Kodak products. You can use other materials, but you may not obtain similar results.

The contents of this publication are subject to change without notice.

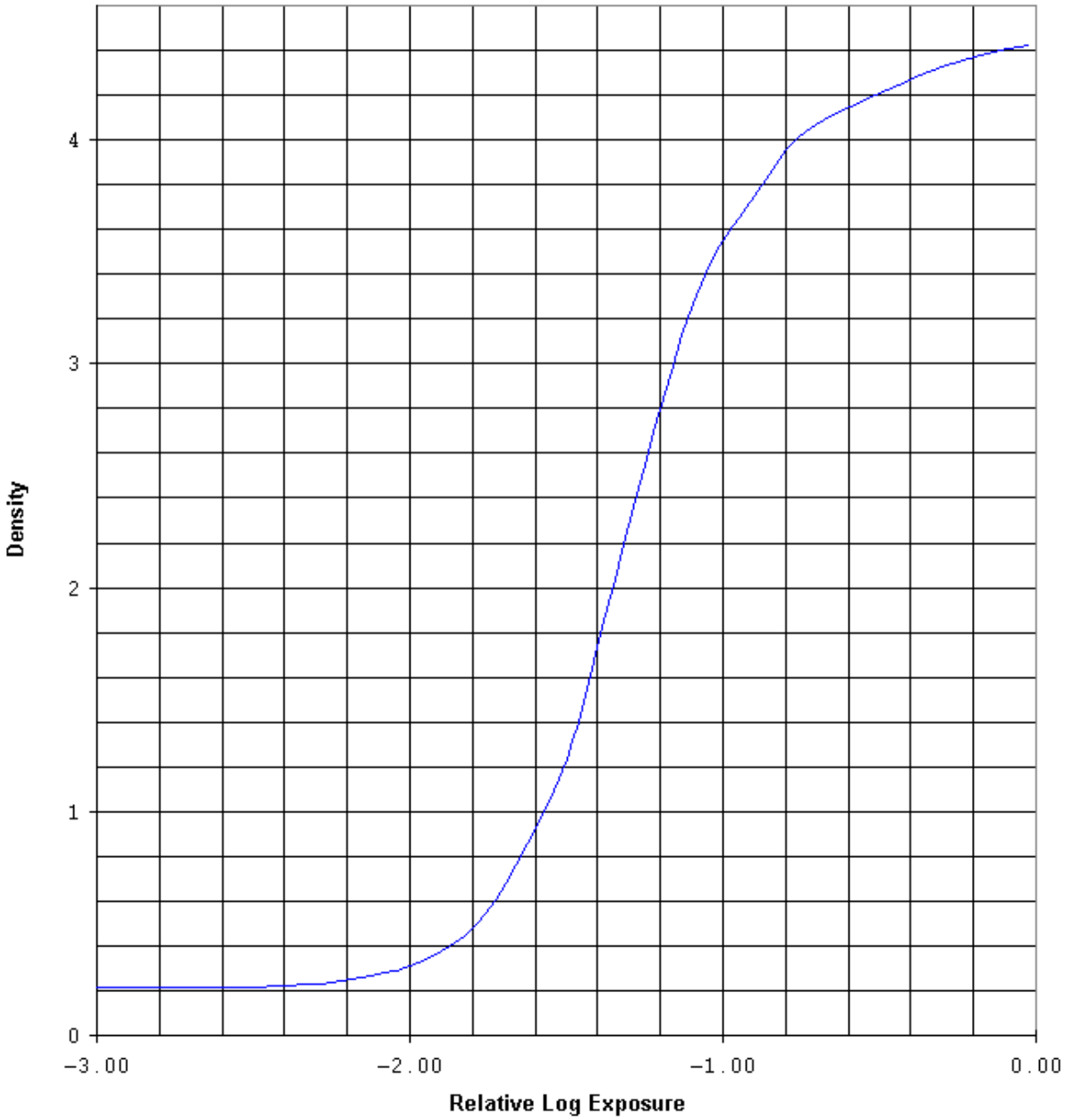
Health Imaging
EASTMAN KODAK COMPANY - Rochester, NY 14650

End of Data Sheet

[1]NOTICE: The data in this publication represent product tested under the conditions of exposure and processing specified. They are representative of production coatings, and therefore do not apply to a particular box or roll of photographic material. They do not represent standards or specifications that must be met by Eastman Kodak Company. The company reserves the right to change and improve product characteristics at any time.

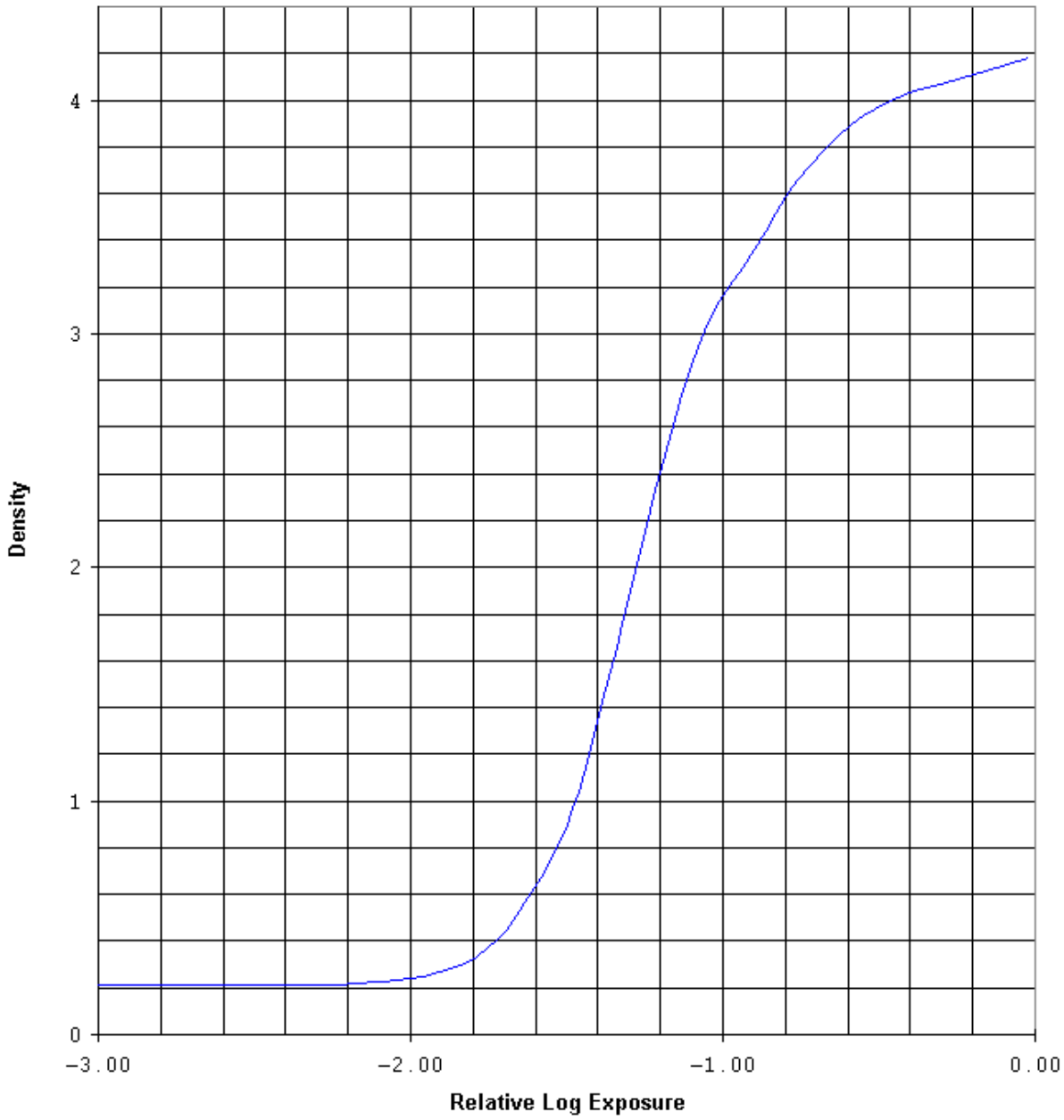
TI5011A 4-02
CHARACTERISTIC, For
Publication

KODAK MIN-R S Film / 4906
1/2 second simulated Green Screen Exposure,
KODAK RP X-OMAT Chemicals, 95 F (35 C), KODAK X-OMAT 460 RA Processor;
Diffuse Visual Densitometry



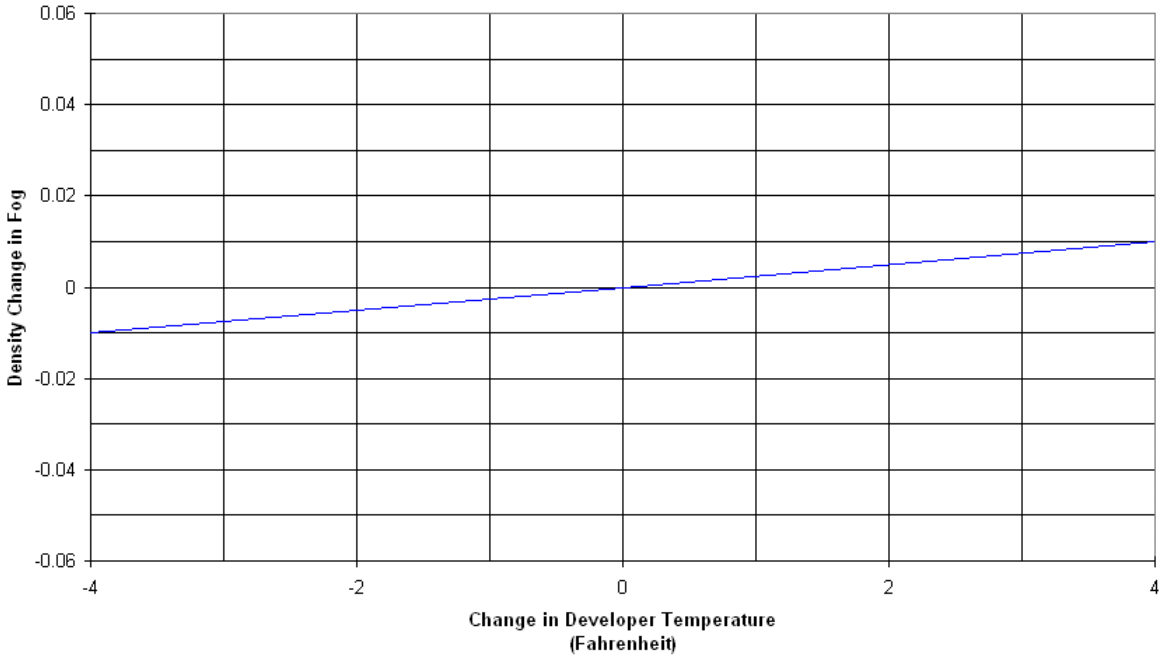
TI5011B 4-02
CHARACTERISTIC, For
Publication

KODAK MIN-R S Film / 4906
1/2 second simulated Green Screen Exposure,
KODAK X-OMAT EX II Developer, 95 F (35 C), KODAK X-OMAT 460 RA Processor;
Diffuse Visual Densitometry



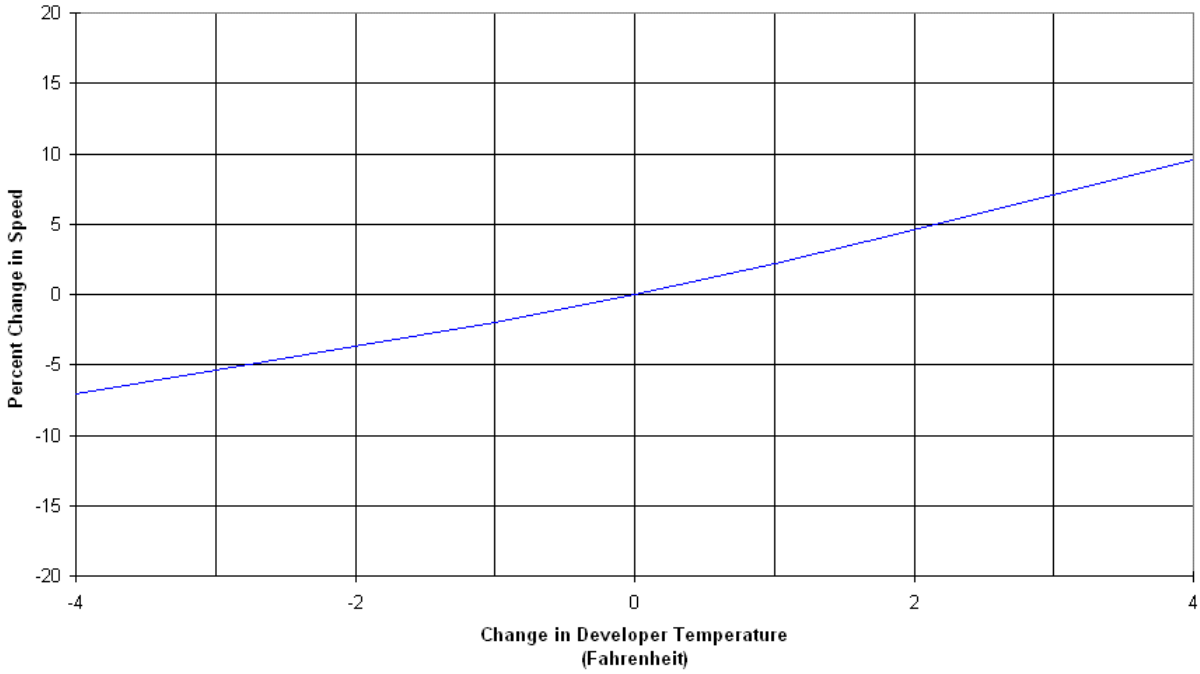
TI5011C 4-02
TEMPERATURE VARIATION, For Publication

KODAK MIN-R S Film / 4906
Density Change in Fog
KODAK RP X-OMAT Chemicals, KODAK X-OMAT 460 RA Processor, 95 F (35 C);
(Reference: Normal Temp. = 0)
(4 F = 2.2 C)



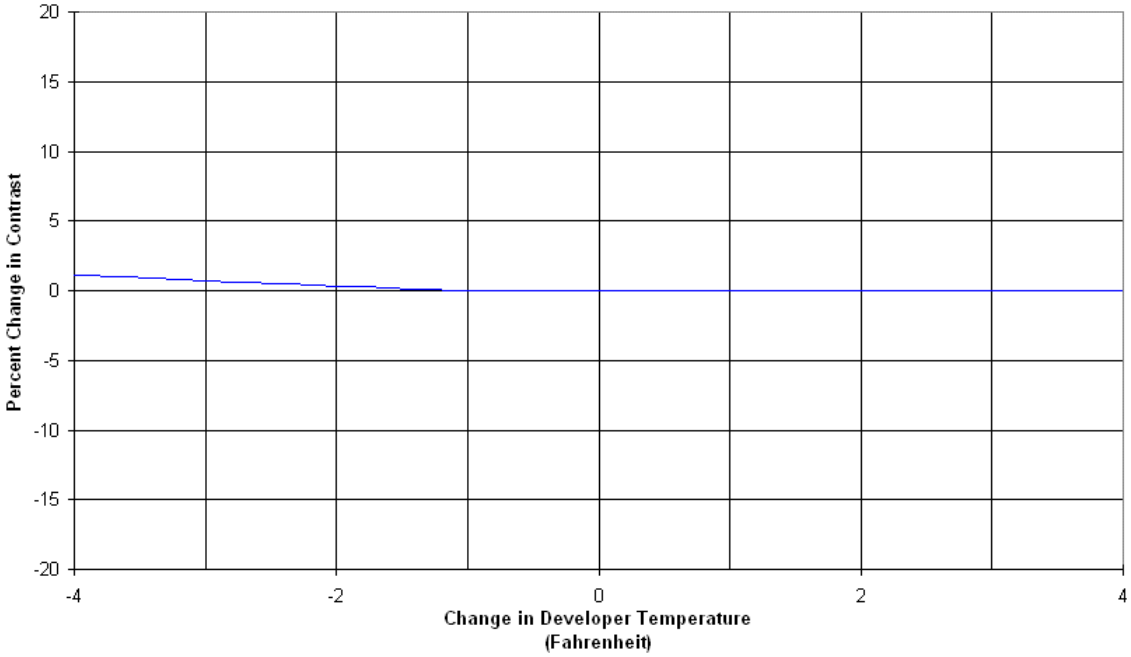
TI5011D 4-02
TEMPERATURE VARIATION, For Publication

KODAK MIN-R S Film / 4906
Percent Change in Relative Speed
KODAK RP X-OMAT Chemicals, KODAK X-OMAT 460 RA Processor, 95 F (35 C);
(Reference: Normal Temp. = 0% Change)
(4 F = 2.2 C)



TI5011E 4-02
TEMPERATURE VARIATION, For Publication

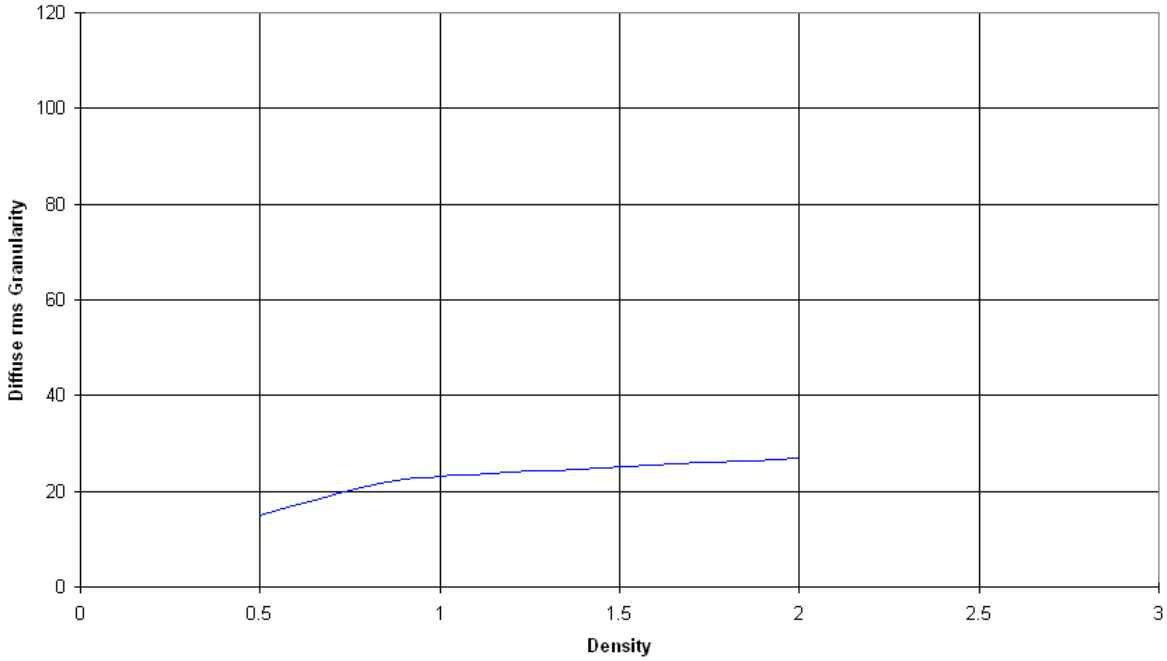
KODAK MIN-R S Film / 4906
Percent Change in Contrast
KODAK RP X-OMAT Chemicals, KODAK X-OMAT 460 RA Processor, 95 F (35 C);
(Reference: Normal Temp. = 0% Change)
(4 F= 2.2C)



Notice: While the data presented are typical of production coatings, they do not represent standards which must be met by Eastman Kodak Company. Varying storage, exposure and processing conditions will affect results. The company reserves the right to change and improve product characteristics at any time.

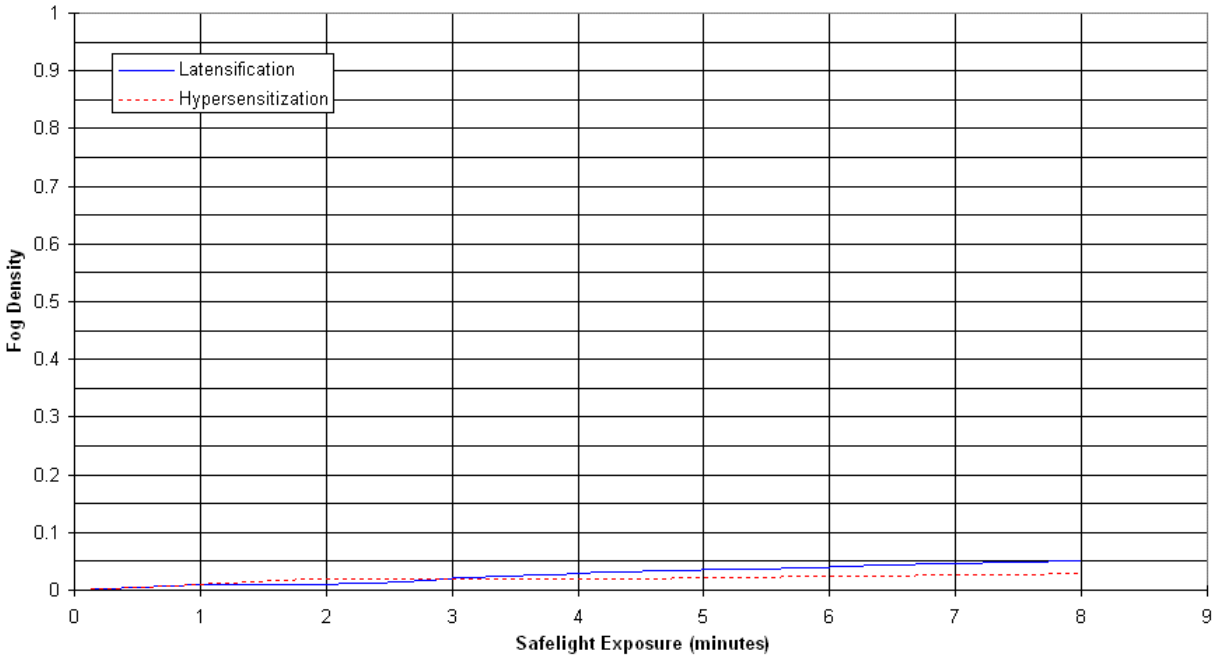
TI5011F 4-02
GRANULARITY, For Publication

KODAK MIN-R S Film / 4906
KODAK RP X-OMAT Chemicals, 96 F (35 C)
KODAK X-OMAT 460 RA Processor



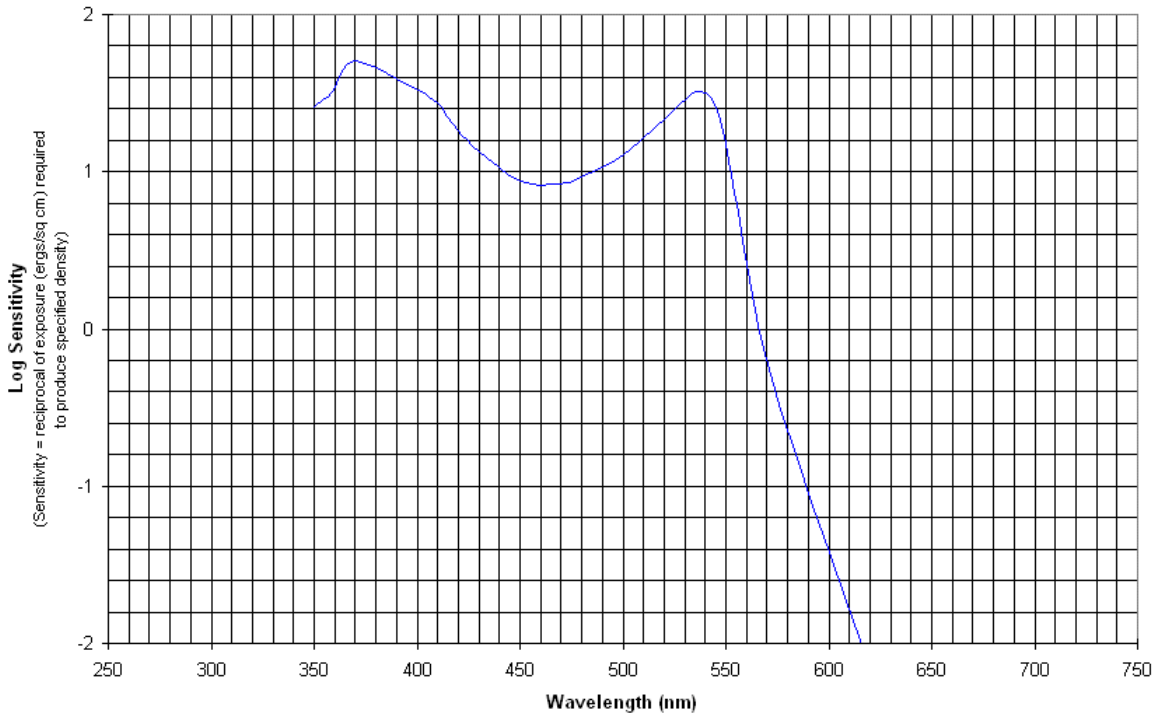
TI5011G 4-02
SAFELIGHT SENSITIVITY, For Publication

KODAK MIN-R S Film / 4906
KODAK GBX-2 Safelight Filter, 7.5 watt lamp, located 4 feet from film;
KODAK X-OMAT 5000 RA Processor; KODAK RP X-OMAT Chemicals,95 F (35.5 C);
(Fog Growth with Increasing Safelight Exposure)



TI5011H 4-02
SPECTRAL SENSITIVITY, For Publication

KODAK MIN-R S Film / 4906
Effective Exposure 1.4 sec;Seasoned KODAK RP X-OMAT Chemicals,
KODAK X-OMAT 460 RA Processor, 96 F (35 C);
Diffuse Visual Densitometry,1.0>Gross Fog



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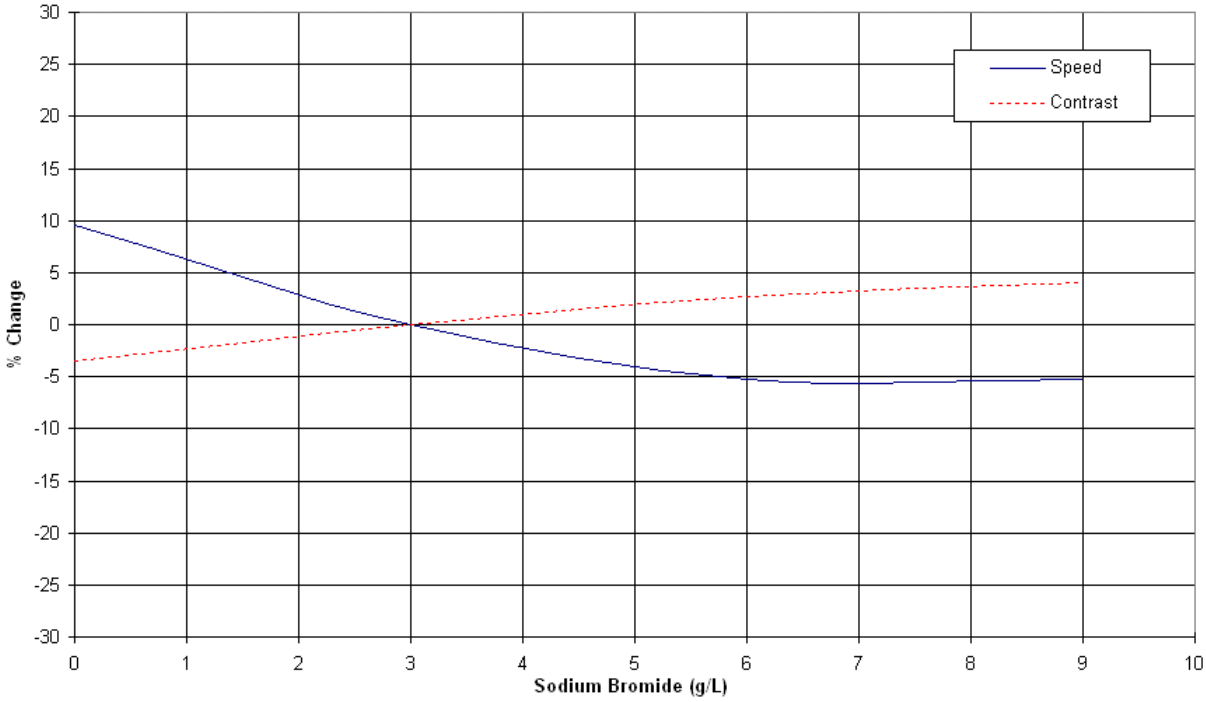
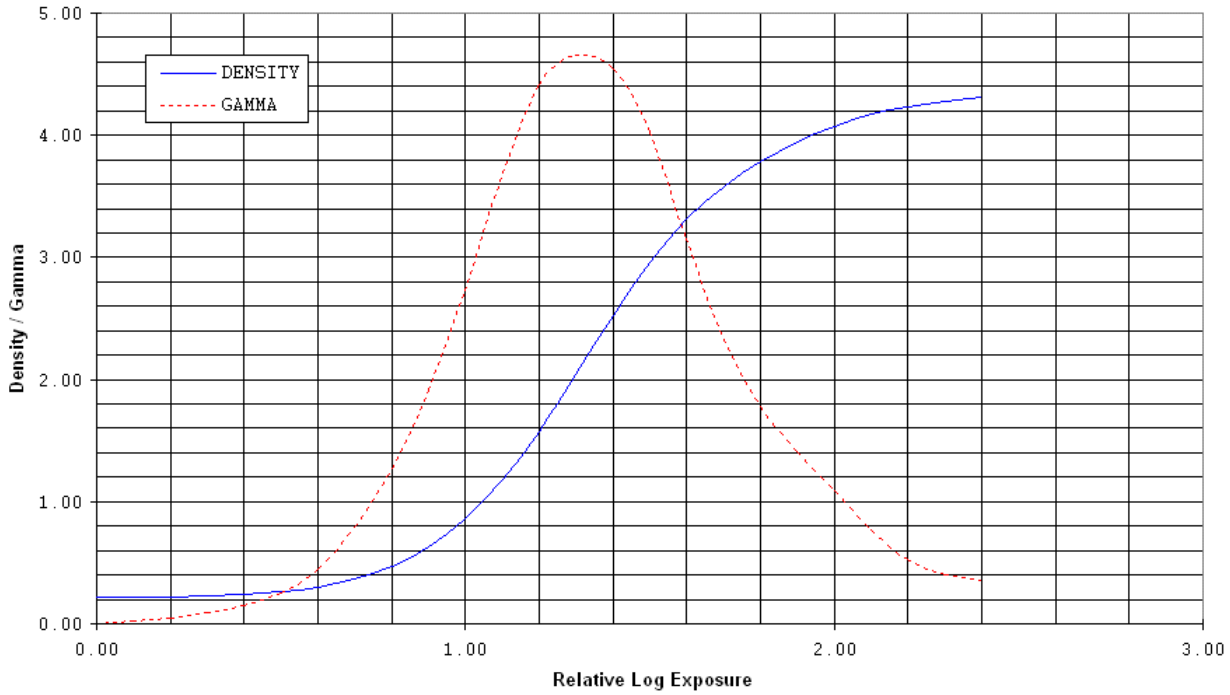
TI5011I 4-02
BROMIDE EFFECTS, For Publication

KODAK MIN-R S Film / 4906
KODAK X-OMAT 480 RA Processor, Seasoned KODAK RP X-OMAT Chemicals, 95 F(35.5 C);
Normal Level is 3.0 g/L



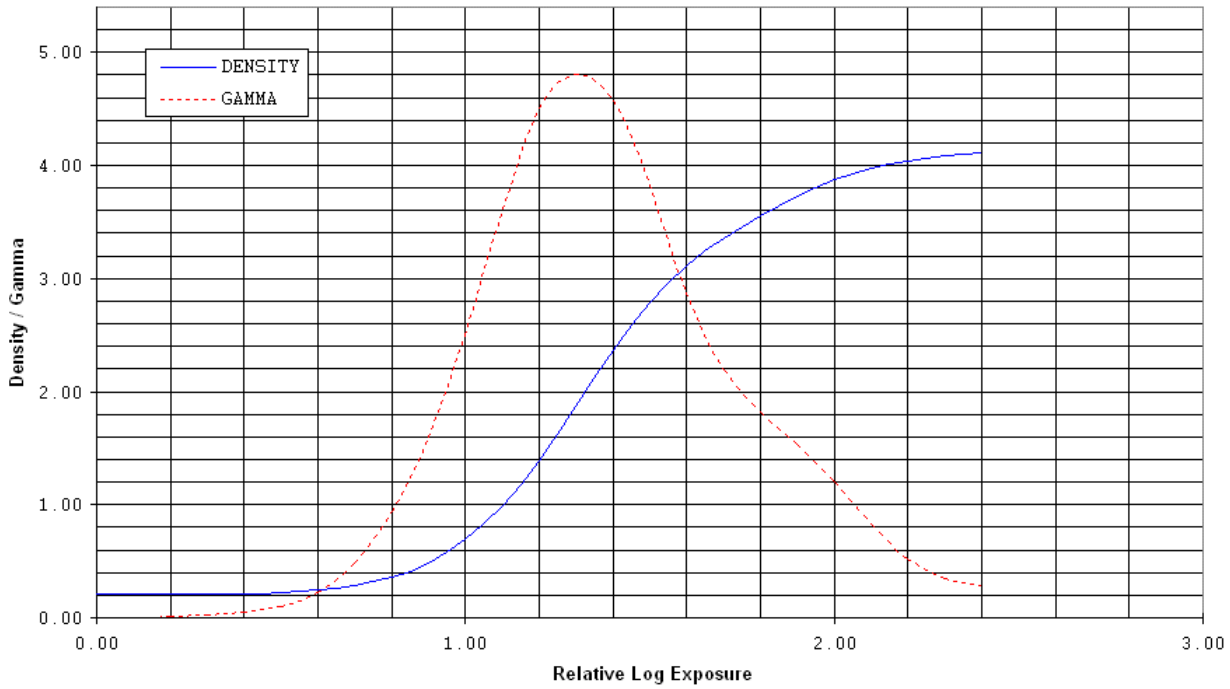
TI5011J 4-02
INVERSE/SQUARED SENSITOMETRY, For Publication

KODAK MIN-R S Film / 4906
Fresh flooded KODAK RP X-OMAT Chemistry, 95F (35C);
KODAK X-OMAT 480 RA Processor



TI5011K 4-02
INVERSE/SQUARED SENSITOMETRY, For Publication

KODAK MIN-R S Film / 4906
Fresh flooded KODAK X-OMAT EX II Chemicals, 95F (35C);
KODAK X-OMAT 480 RA Processor



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