

# PHARMACEUTICAL FORMULAS

PROPOSED FOR A. PH. A. RECIPE BOOK.

A complete list of these Proposed Formulas since February 1912 was published in an Index in the December 1916 number of the JOURNAL. The Committee will continue its work in monthly instalments in this Department of the JOURNAL. Members of the A. Ph. A. are earnestly requested to send suitable formulas and also criticisms of those published to the Chairman,  
Otto Raubenheimer, Brooklyn, N. Y.

## PHOTOGRAPHIC FORMULAS.

It has been decided to have a Chapter on this important subject in the A. Ph. A. Recipe Book. The increasing value of a knowledge of practical photography makes it necessary that pharmacists should become more familiar with the technical details. Very frequently they are called upon to prepare various photographic solutions or to give advice on this subject. Many pharmacists in the city and country are deriving a handsome profit from such knowledge and also from the sale of photographic accessories.

The following introductory chapter is borrowed from *MacEwan's Pharmaceutical Formulas* for the purpose of making the pharmacist acquainted with the history and chemical composition of the newer photographic developers.

### DEVELOPERS.

In compounding developers the main things to keep in mind are to use distilled water and take great care that organic matter does not come in contact with the reducing-agent. If the solution containing the developing-agent must be filtered, asbestos or glass wool should be employed as the filtering-agent.

The following short notes on the various developing-agents in use are arranged in chronological order, and will no doubt be of interest.

**Pyrogallic Acid, or Pyrogallol.**—First employed for developing gelatinobromide plates by Dr. Maddox in 1871, and still the favorite with most workers in photography. The average quantity of "pyro" used to each ounce of water for a developer is  $1\frac{1}{2}$  grains, with ammonia water, sp. gr. 0.88 (rarely now) or sodium carbonate 24 grains, and sodium sulphite 24 grains. Representative formulas are given later.

**Ferrous Oxalate.**—Introduced as a developer by Carey Lea in 1877, but the solution now in use was suggested by Eder in 1879.

**Hydroquinone, or Quinol.**—Discovered to have developing-powers by Sir William Abney in 1880. Is a favorite developing-agent with amateurs. Works best when used with potassium carbonate or hydroxide, but sodium carbonate or tri-sodium phosphate as the alkali gives softer negatives. The average composition of the developer is 3 grains quinol in each ounce, with potassium bromide  $\frac{1}{2}$  grain, sodium sulphite 15 grains, and potassium hydroxide 4 grains.

**Pyrocatechin, or Catechol,** was found by Eder and Toth in 1880 to have developing-power. The solution does not discolor so readily as quinol. With sodium hyposulphite it has been recommended for use in cases where it is desired simultaneously to develop and fix negatives. "Kachin" is the trade-name for a mixture of catechol, potassium hydroxide, and sodium sulphite.

**Eikonogen,** the sodium salt of amido-beta-naphthol sulphonic acid, was discovered by Professor Meldola in 1880, and found by Andresen in 1889 to possess developing-power. The salt is best dissolved in hot water. The proportions for each ounce of developer are eikonogen 9 grains, sodium sulphite 35 grains, potassium carbonate 23 grains.

**Metol.**—Andresen's metol is methyl-para-amido-phenol; Hauff's metol is a homologue, methyl-para-amido-meta-cresol. The average quantity of metol in an ounce of developer is  $2\frac{1}{2}$  grains, with potassium bromide  $\frac{3}{4}$  grain, sodium sulphite 24 grains, and sodium carbonate 18 grains.

**Para-amido-phenol,** patented in 1891, is sent out as the hydrochloride. When exactly sufficient caustic alkali is added to convert the salt into a phenolate, the concentrated liquid is known as "rodinal." Rodinal requires to be diluted with from twenty to thirty times its bulk of water before use.

**Glycin**, or para-oxy-phenyl-glycin, is a slow developer, but most suited for line negatives in process-work, and for "stand" development.

**Amidol**, or diamido-phenol hydrochloride, was first made by Gauche in 1869, but patented as a developer in 1892. The developer should be freshly made by dissolving the amidol in solution of sodium sulphite. The average proportions are amidol 1½ grains, sodium sulphite 48 grains, and potassium bromide ½ to 1½ grains in each ounce.

**Diphenal**, or di-amido-oxy-di-phenol, is made by Cassella & Co., Frankfort, as a liquid, and requires dilution with from fifteen to twenty times its volume of water for use.

**Adurol** is the chloro- or bromo- derivative of hydroquinone. The average composition of an ounce of adurol developer is adurol 4 grains, sodium sulphite 20 grains, potassium carbonate 24 grains, and potassium bromide ¼ grain.

**Imogen Sulphite** is ikonogen modified by the introduction of another amido group and mixed with sodium sulphite.

**Edinol**, the hydrochloride of para-amido-oxy-benzyl-alcohol, does not require the use of caustic alkali. Resembles metol in its action, but is more soluble.

WORKING FORMULAS FOR DEVELOPERS.

No. 426.

ADUROL DEVELOPER.

A.

Adurol.....	170 grains
Sodium Sulphite.....	3½ oz.
Water to.....	20 oz.

Dissolve.

B.

Potassium Carbonate.....	2½ oz.
Water to.....	20 oz.

Dissolve.

For use, mix in equal parts.

No. 426 A.

ADUROL DEVELOPER.

(One-solution.)

Adurol.....	1 oz.
Sodium Sulphite.....	3 oz.
Potassium Carbonate.....	6 oz.
Water to.....	20 oz.

Dissolve.

For use, dilute with 3 to 5 parts of water.

No. 426 B.

AMIDOL DEVELOPER.

Amidol.....	48 grains
Sodium Sulphite.....	½ oz.
Water to.....	20 oz.

Dissolve.

Contributed by Irwin A. Becker, Michael Reese Hospital, Chicago:

DEVELOPERS.

No. 426 C.

All-round M-Q Developer.

Water.....	100 mils
Metol.....	0.2 Gm.
Hydroquinone.....	0.15 Gm.
Sodium Sulphite, dry.....	2.25 Gm.
Sodium Carbonate, dry.....	3 Gm.

Use full strength for single coated plates. Add equal parts water for double coated plates. Good for commercial work, and lantern slides.

No. 427.

EXTREME CONTRAST DEVELOPER.

Where absolute black and white are desired.

Water.....	100 mils
Sodium Sulphite, dry.....	13 Gm.
Sodium Carbonate, dry.....	13 Gm.
Hydroquinone.....	2.25 Gm.
Potassium Bromide.....	0.35 Gm.

For use take equal parts of above and water. Develop 6 to 8 minutes at temperature of 70° F.

No. 428.

CONTRAST DEVELOPER.

For Over-exposed Plates.

Water.....	100 mils
Sodium Sulphite, dry.....	3.35 Gm.
Edinol.....	0.67 Gm.
Potassium Bromide.....	0.135 Gm.
Potassium Carbonate.....	1.67 Gm.

As soon as the plate shows over-exposure in normal developer, rinse and place in contrast developer until it has sufficient intensity.

No. 429.

EXTREME SOFTNESS DEVELOPER.

Where strong contrasts in the subject are to be avoided.

Water.....	100 mils
Metol.....	0.034 Gm.
Sodium Sulphite, dry.....	0.67 Gm.
Hydroquinone.....	0.165 Gm.

Develop for about 30 minutes at temperature of 65° F. to 70° F.

No. 430.  
PYRO-ACETONE.

## A.

Water.....	100	mils
Oxalic Acid.....	0.156	Gm.
Pyrogallic Acid.....	6.25	Gm.

## B.

Water.....	100	mils
Sodium Sulphite, dry.....	10	Gm.
Acetone, pure.....	20	mils

For Tray: A 10 mils; B 10 mils; Water 120 mils. For Double Coated Plates use Water 160 mils.

For Tank: A 10 mils; B 30 mils; Potassium Iodide Sol. (0.2 percent) 20 mils; Water 580 mils.

Temperature 70° F.; Time 30 minutes.

Note: The addition of the Potassium Iodide Solution allows the use of the tank developer from 70° to 75° F. without causing yellow stain or veiling which is liable to occur otherwise.

## No. 431.

## GLYCIN.

## For Tank.

Hot Water.....	100	mils
Sodium Carbonate, dry.....	4	Gm.
Glycin.....	0.8	Gm.
Sodium Sulphite, dry.....	0.8	Gm.

For use: Stock Solution 450 mils; Water 4230 mils.

Temperature 65° F.; Time 30 minutes.

## No. 431A

## BROMIDE DEVELOPERS.

Developers for Bromide and other developing-out papers should be made according to the formulas furnished with each brand or kind of paper, as recommended by the manufacturers.

## X-RAY DEVELOPERS.

The temperature should range from 65 to 72° F. If warmer, the developer may cause chemical fog or unsatisfactory plates, due to fast development.

## No. 432.

## DR. WILLEY'S FORMULA.

## A.

Boiling Distilled Water.....	100	mils
Sodium Sulphite, dry.....	17.72	Gm.
Edinol.....	2	Gm.
Hydroquinone.....	2.95	Gm.
Potassium Bromide.....	2.425	Gm.

## B.

Water.....	100	mils
Potassium Carbonate.....	23.6	Gm.

Use: A 50 mils; B 50 mils; Water 100 mils.

No. 433.  
GLYCIN-HYDROQUINONE.

## A.

Water.....	100	mils
Glycin.....	1.477	Gm.
Hydroquinone.....	4.43	Gm.
Sodium Sulphite, dry.....	8.86	Gm.
Potassium Bromide.....	0.37	Gm.

## B.

Water.....	100	mils
Potassium Carbonate.....	11.8	Gm.

For use take equal volumes of A and B.

## No. 434.

## METOL-HYDROQUINONE.

Water.....	100	mils
Metol.....	0.216	Gm.
Hydroquinone.....	0.864	Gm.
Sodium Sulphite, dry.....	4.725	Gm.
Sodium Carbonate, dry.....	4.725	Gm.
Potassium Bromide.....	0.108	Gm.

Develop 3 to 4 minutes.

## FIXING SOLUTIONS.

## No. 435.

## ACID FIXING AND HARDENING BATH.

## For Plates.

## A.

Water.....	100	mils
Sodium Thiosulphate.....	25	Gm.

## B.

Water.....	100	mils
Sodium Sulphite, dry.....	9	Gm.
Sulphuric Acid.....	1.5	mils
Powdered Chrome Alum.....	6	Gm.

## or B. Alternative.

Water.....	100	mils
Potassium Metabisulphite.....	9	Gm.
Powdered Chrome Alum.....	6	Gm.

Mix solutions exactly and in rotation of ingredients. Always pour A into B while stirring well. If this is not done, precipitation will take place. During cold weather one-half the quantity of B is sufficient for full quantity of A.

## No. 436.

## ACID HYPO FIXING BATH.

## For Developing-out Papers.

Water.....	100	mils
Hypo (Sodium Thiosulphate).....	25	Gm.
Water.....	7.5	mils
Sodium Sulphite, dry.....	1.5	Gm.
Acetic Acid (28 percent).....	4.5	mils
Powdered Alum.....	1.5	Gm.

## No. 437.

## PLAIN HYPO BATH.

Water.....	100	mils
Hypo.....	25	Gm.

No. 438.

IRON CLEARING SOLUTION.

Water.....	100	mils
Iron Sulphate (Clear Crystals)...	14.2	Gm.
Sulphuric Acid.....	5	mils
Powdered Alum.....	4.725	Gm.

To remove yellow stain by Pyro or Hydroquinone Developer, wash well to free from hypo and place in above until stain is gone, then wash well.

No. 439.

CHEMICAL FOG.

For Chemical Fog use Red Prussiate Reducer, using double quantity of water. As soon as fog is gone, wash well.

INTENSIFIERS.

No. 440.

INTENSIFIER.

For Extreme Intensification from Weak Negatives.

A.

Water.....	100	mils
Uranium Nitrate.....	8.84	Gm.
Nitric Acid.....	3.125	mils

B.

Water.....	100	mils
Potassium Ferricyanide (Red Prussiate).....	5.9	Gm.

To use—Take 10 mils of A; 10 mils of B, and water 320 mils.

No. 441.

MERCURY INTENSIFIER.

For Moderate Intensification.

Mercury Bichloride.....	2.15	Gm.
Potassium Bromide.....	2.15	Gm.
Water.....	100	mils

Have negative absolutely free from hypo, and soak in above till milky white, then blacken in a solution of

Sodium Sulphite.....	11.34	Gm.
Water.....	100	mils

Wash thoroughly.

No. 442.

CHROMIUM INTENSIFIER.

C. Welborne Piper.

Potassium Dichromate.....	2.15	Gm.
Hydrochloric Acid.....	1	mil
Water.....	100	mils

Bleach in this solution, wash until free from yellow stain, and re-develop with Amidol, or other non-staining developer. Prolonged washing after fixation is not necessary with this intensifier and the process may be repeated if greater intensification is required.

REDUCERS.

No. 443.

FARMER'S, II.

Attacks thin part of image first and increases contrast.

Hypo solution 1 in 5, add enough Potassium Ferricyanide solution to give a pale yellow color. Negatives must be thoroughly soaked in water before immersion in this solution. As soon as reduction has proceeded far enough plunge into water and wash thoroughly.

No. 444.

PERSULPHATE REDUCER.

For Negatives that are too contrasty, attacks dense portions first.

Ammonium Persulphate.....	3.5	Gm.
Sulphuric Acid.....	2	drops
Water.....	100	mils

As soon as negative is sufficiently reduced, immerse in 5 percent Sodium Sulphite, then wash.

No. 445.

COLOR-SENSITISERS.

For Plates.

Non-color sensitive plates are made sensitive to the entire spectrum by bathing in the following solution:

Pinacyanol (stock solution).....	2	parts
Pinachrome (stock solution).....	3	parts
Distilled Water.....	50	parts

The stock solutions contain 1 part dye in 1000 of Alcohol. They keep well. The dilute solutions do not keep, and should be mixed immediately before use, and not used more than twice.

Bathing is carried out the same way as development, either in dish or tank, in complete darkness, or the light of a panchromatic safe-light. In dish—Immerse plates for 3 minutes, rocking continuously. In tank—Dilute the above 20 times and leave plates in 20 minutes, reversing tank once or twice. Wash plates in running water for 5 minutes and place on rack to dry, preferably in a dark cupboard, through which a current of dry air can be passed and kept about 80° F.

No. 446.

HYPO ELIMINATOR.

Place plates or prints in several changes of water to which sufficient Potassium Permanganate solution has been added to a pale pink color, until the pink color is no longer readily discharged. Then rinse in water. Caution: Too strong a solution acts as a reducer.