

NEW RECOMMENDATIONS FOR THE PROCESSING OF ILFORD PLATES

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JULY 1989

SUMMARY

The new Ilford materials are characterised by very brief induction phenomena during development. This can lead to splash marks from development and a form of patchy scatter after the bleach process is applied. This note suggests new recipes and principles that cure these problems and probably are effective across the board with all forms of halide holography.

1 DEVELOPMENT

Developers should have careful restraint of induction. The following formulation illustrates the chemical routes to this control.

Recommended developer for Ilford Plates and film: (use at $23^{\circ}\text{C} \pm 1^{\circ}\text{C}$).

TRANSMISSION MODE

30 gms Sodium Sulphite (Anhydrous)
 10 gms Sodium Metaborate
 60 gms Sodium Carbonate (Anhydrous)
 Restrainers: 3 gms Potassium Bromide
 0.3 gm Benzotriazole

10 gms Catechol
 5 gms Quinol
 Distilled water to make 1 litre

REFLECTION MODE

Part A 5 gms Pyrogallol
 500 ml Distilled water

Part B
 60 gms Sodium Carbonate
 (Anhydrous)

10 gms Sodium Metaborate
 3 gms Potassium Bromide
 0.3 gm Benzotriazole
 500 ml Distilled Water

Mix equal parts just
 before use

NB The restrainer Benzotriazole is normally used in high energy developers containing Phenidone. Its use as a general restrainer for holography is novel. The addition of this agent gives a notional induction time of about 30 seconds (usual for the Agfa product).

2 REHALOGENATION

Bleaches for rehalogenation are tricky and EDTA systems have now found vogue for reasons of low toxicity and keeping qualities. Nonetheless, in general, the formulations have been built around low haze level in the finished result and observations of diffraction efficiency.

It transpires that bleaches of this type are prone to create spatial non-uniformity of the haze and that this factor creates a poor visual impression of the hologram and, of course, causes variations of efficiency from one position on the hologram to another.

Careful tests have shown that to date, only one method has been capable of elimination of the phenomenon. This is, in fact, the use of water-free brominated methanol as a bleach. Unfortunately, such a bleach system completely eliminates physical transfer of silver ion during bleaching and thus actually eliminates the modulation mechanism of the hologram in the Develop-Rehalogenate mode.

It was seen as crucial that the problem of patchy scatter should be eliminated within the framework of rehalogenating bleaches (where no form of silver solvent process is involved).

The new method which solves this problem is outlined below.

OPTIMISED BLEACH FORMULATION FOR REHALOGENATION WITHOUT PATCHY SCATTER

12 gms Ferric Sulphate

12 gms Di-Sodium EDTA
(Diaminoethane tetra-acetic acid Di-Sodium salt)

30 gms Potassium Bromide

50 gms Sodium Hydrogen Sulphate

Distilled water to 1 litre

Filter before use

The plate or film is placed in the bleach and is left to clear without agitation.

It is not the lack of agitation that effects the cure it is the extended clearance time (in excess of 6 minutes from a density of 3) associated with what is, in effect, a diluted formulation of bleach.

A careful examination of this bleach shows that it is the Di-Sodium EDTA which is responsible for the transfer effect and that the Ferric Sulphate

oxidation of the silver. The concentration of Di-Sodium EDTA is the maximum which dissolves up in the presence of the chosen concentration of Ferric Sulphate (which determines the bleach rate).

The compound Sodium Hydrogen Sulphate is a safe solid acidifying agent which avoids the decanting of strong acids.