

## FILM DEVELOPMENT – Ag halides

So much, has been researched and written about image development, on silver halide photographic process, from its beginnings in the mid-1800s to the end of the 1900s. A history, which dealt with and solved an infinity of problems concerning both the chemistry and the physics of the process, unceasingly running after the evolution of the film. ... to the point of being engaged – from the end of the last century – even with loud *ecological* concerns.

The most recent product for this purpose released by Kodak, before suspending research on b/w material, was X-TOL in 1996, without the ubiquitous *metol* and *hydroquinone* as active agents. X-TOL in fact uses an '*ascorbate*' as a developer salt, that is a derivative of ... vitamin C (1). One last product on the same developing principle, but of free use and no patent was the FX-55 by Geoffery Crowley in 2008 (2)!

In this context, we like to mention - humbly - only some aspects to consider, when choosing a developer for the b/w material, leaving to the curiosity and personal interest the research on more specific and numerous developing agents & their sparkling results, of which there is copious material both in literature and on the web.

In the three basic steps concerning silver photography – shooting, developing and printing – the first two are NOT correctable once they have '*occurred*'; they are, therefore, particularly delicate. Therefore the photographic negative, meaning the transparent film on which the scene is impressed, is unrepeatable and only what it has been gathered by its sensitive layer may be, with skill, found on the print.

But if during the photographic procedure many personal considerations can make the moment of the shot unique (film and set sensitivity, exposure and t/f coupling, light quality, weather conditions, shadows/lights ratio, ...) far less are those where it is possible to settle during the development stage.

Therefore, beyond the paraphernalia adorning your camera, in the first phase some decisions remain a burden of the photographer before the shot, while processing the film everything must take place as a clock work. Photographic syntax does not allow to alter some events too much, in order not to compromise the result.

So the development of the exposed film must be carried out in the most possible fore-seen manner, with regard to the type of developer, its dilution, temperature, shaking and treatment time. Saying fore-seen means – as Ansel Adams teaches – that the shot instant must visualize the final print at the most. On this basis, choices are consciously made in shooting.

Such and many are the chemical and physical variables acting on that thin sensitive surface hidden from the light, that putting them in a row would be of little significance, while instead it will be better to rely on a personal experience (an '*analog*' experience) to oblige the shooting conditions. I would dare say a close-range knowledge rather than a deep understanding about film and developing agent we intend to match, as an indispensable element to obtain expected results.

With the few alternatives offered today (3), a first choice for the development of the latent image will concern the availability and duration of the stock solution or powder; it will in fact be always preferable to use disposable products for a guarantee of freshness in preparation of ready-to-use solutions. In a more refined and conscious way, two aspects will be quoted here that may concern our preferences on the developed film, between *fine grain* (or its '*myth*' as claimed by S. Anchell in '*The film developing cookbook*') and *high sharpness*, or *acutance*, as defined by Kodak technicians in the last '50s: two qualities not entirely compatible, since the former is based on the "*solvent effect*" (4) while the latter is linked to the "*edge effect*", i.e. to a micro increase in density on the edges in highlights-side.

To the first category of developers - *solvent solutions* - belongs the D-76, whose introduction on the market by Kodak dates back to 1927 (the equivalent ID-11 is quoted in an ILFORD 1937 leaflet) and is taken as a reference for this quality in the 1:1 dilution. The Kodak *Microdol* (launched in 1944) fulfills the same function, followed by the *Microdol-X*, defined as super-fine granulant due to its solvent capacity for silver grains (5). This latter dubbed in Europe by ILFORD with the *Perceptol* in 1969 and *Microphen*, of which I find traces in 1967. Modern fine-granulating developers, however, tend to slightly reduce the sensitivity of the film. But the much more recent and above cited fine-grain X-TOL, with modern T-grain films, should be taken into opinion.

Agfa Rodinal (6) belongs to the second category – *non-solvent solutions* – likewise Kodak HC-110 and equivalent Ilford *Ilfotec HC*; so the Paterson *Acu-* series (7). The edge effect is given not only by the specific developing agent ... but also by precise physical conditions of use: in particular the high dilution which forces us to permit a longer film/developer contact, i.e. greater treatment times, multiplied by reduced shaking. In fact, a frequent renewal of fresh developing agent, prevents the edge effect (while promoting, on the other hand, an increase in contrast).

Furthermore, these non-solvent developers provide a '*compensating*' effect, reducing the contrast of the scene lengthening the tonal range slowing down the density increase in highlights, so that they don't remain empty even in overexposure. Thus they provide softer and closer passages of tonal range ... but flatten the half-tones!

It is clear why the choice is therefore crucial, since ... '*virtues*', like defects, are on both sides (8).

In the multitude of possibilities, a special mention deserve the '*two-baths developers*', with their own compensating characteristics up to two stops (3f, according to A. Adams, which in his Zone system proposes developments up to N-3). They provide good sharpness and a moderately fine grain and can be used repeatedly, but they are not suitable for high-sensitivity films and low-contrast scenes. For the best-known *D-23*, the recipes of the various producers (of the past) are almost identical: today all we can do is to prepare it ourself, in a very simple way: bath A contains the developing matter (metol, 0,75%) and bath B the alkali (anhydrous sodium carbonate  $\text{Na}_2\text{CO}_3$ , 10%). Both contain the plain antioxidant  $\text{Na}_2\text{SO}_3$ . Long lasting, versatile, economic and the ability to compensate otherwise insuperable tonal ranges in shooting is – as Adams says – admirable !

a.m.

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(1) *The first research on L-ascorbic acid (vitamin C) identified as a photographic active developer, dates back to 1935! ... after sixty years a circle was closed when research in the field of traditional photography came to a standstill.*

(2) [https://en.wikipedia.org/wiki/FX-55\\_%28film\\_developer%29](https://en.wikipedia.org/wiki/FX-55_%28film_developer%29) for the formulation.

(3) *Although today there are few b/w developers available on the market, as there are just a little film choise, there is on the other hand the availability for buying raw material and pure chemical products on-line in small quantities to prepare oneself photographic baths. Not a difficult task with minimal lab equipment to discover stuff's recipes no longer produced, with specific characteristics. ALWAYS pay great attention to the technical data sheets nowadays accessible on-line too, for raw substances, both for their intrinsic danger and for the necessary manual skill.*

(4) *The micro-grain is realized through a solvent capacity of the solution, that is to say thinning the silver grain by one or more components of the developer. For example,  $\text{Na}_2\text{SO}_3$ , although not a 'developing' agent, is always present as an antioxidant in the composition of the baths; it becomes 'solvent' prolonging contact with the crystal of silver salt. So ... reducing the concentration of developing agent and increasing development time ... .*

(5) *In the ride towards ... perfection, among the super-fine grain developers Microdol caused dichroic veil (iridescence of the film depending on the angle of observation and/or light source) on the films of the '60s, more sensitive and finer grain than the previous ones. From which, in those years, a new formulation came in: the Microdol-X*

(6) *The first formulation of the Rodinal dates back to 1891; the developing agent is p-amimophenol.*  
( <https://www.digitaltruth.com/articles/historic-rodinal.php> )

(7) *For the Acu- series, created starting from 1963 with Acutol, from the aforementioned Geoffrey Crawley with the original initials FX- (from 1 to 55!), see: [https://www.photomemorabilia.co.uk/Paterson/Paterson\\_Acu\\_Range.html](https://www.photomemorabilia.co.uk/Paterson/Paterson_Acu_Range.html)*

(8) *The largest and most complete data collection on film/developer couplings nowadays updated, can be found at: <https://www.digitaltruth.com/devchart.php>*

sources:

- <http://www.photomemorabilia.co.uk/Ilford/Chronology.html#anchorTimeLine>
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- S.Anchell, B.Troop - The film developing cookbook - Focal Press 2nd ed., 1998
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- ILFORD Book of Formulae - 3<sup>rd</sup> ed., 1937