

Periodic Graphics

A collaboration between C&EN and
Andy Brunning, author of the popular
graphics blog *Compound Interest*

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To see more of
Brunning's work, go to
compoundchem.com.
To see all of C&EN's
Periodic Graphics, visit
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The chemistry of Polaroid photography

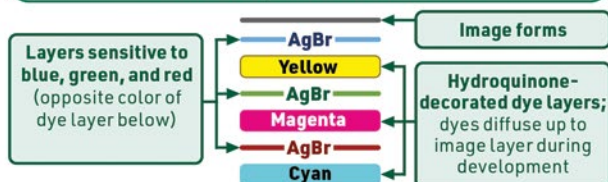
PERIODIC
GRAPHICS

Polaroid photography lets users snap a photo and print it on the spot. Here we focus on the chemistry that makes this instant printing possible.

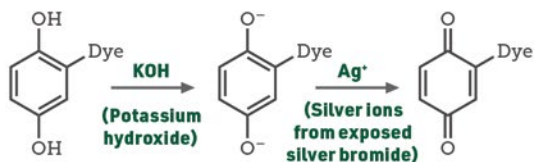
Development and dyes

Polaroid film uses three layers of silver bromide crystals, each sensitive to a different color of light. When the correct color of light hits silver bromide, that compound reacts to produce silver ions.

Selected layers of Polaroid film



After the photo has been taken, a pack of chemicals bursts and spreads over the film. The chemicals include potassium hydroxide, which diffuses downward toward the dye layers. There, it deprotonates the hydroquinone developer molecules attached to the dyes.

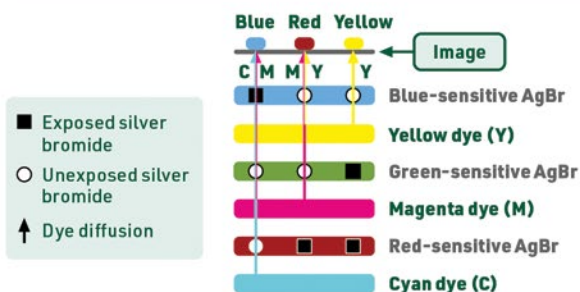


When silver bromide crystals are not exposed to the color of light they are sensitive to, the deprotonated dye right beneath those crystals flows up to the image layer. But in areas where the crystals are exposed to the right color of light, the silver ions oxidize the hydroquinone, preventing the dye layer just beneath from diffusing up to the image layer.



Forming the image and concluding development

The dyes combine to create the different colors that make up the image.



After development, the remaining potassium hydroxide reacts with an acid polymer layer to form water and a potassium salt. Other reagents—potassium thiosulfate and uracil—stabilize the photo by clearing unexposed silver bromide, stopping it from reacting further with light.