

# Why a Color May Not Reproduce Correctly

## Technical Data Sheet

### **The following information is reproduced from Kodak Publication E-73 "Why a Color May not Reproduce Correctly."**

In color film, the three dye layers are capable of producing a pleasing rendition of most subjects. Occasionally, a photographer may have difficulty in reproducing a particular color, even when the film has been manufactured, stored, exposed, and processed correctly.

Because many photographic images include people, good reproduction of skin tones is a primary consideration in designing a color film. The rendering of neutrals (whites, grays, and blacks) and common "memory" colors, such as those of the sky, grass, and sand, is also important. These are the colors that films are designed to reproduce well under a variety of picture-taking and processing conditions. Other colors, for example, chartreuse, teal, lime, pink, and orange may not reproduce well. A film could be designed to reproduce these colors better, but then some of the more important colors might suffer.

Color films do not have the same sensitivity to the full spectrum as the human eye. With most subjects, it is not necessary that the three light-sensitive systems of the film "see" the subject exactly as we do; however, the accumulated effects of red, green, and blue light should be in the same ratio in the film as they are for the eye.

Because color films are sensitive to ultraviolet radiation, a fabric that reflects ultraviolet energy will appear bluer in a photograph than it looks to our eyes. If the fabric is blue to begin with, this is not so important. But with fabrics of other colors, the additional blue may neutralize a portion of the visual color or produce a blue cast. Neutral and near-neutral colors are most likely to be affected by such a shift, because their saturation is low. For example, a black tuxedo made of synthetic material may appear blue in a color photograph. You can reduce this effect by using an ultraviolet filter, such as a KODAK WRATTEN Gelatin Filter No. 2B, over the camera lens or over the light source (if possible). Several lighting manufacturers also produce "amber" tubes that effectively filter out UV radiation.

Closely related is the effect of ultraviolet fluorescence. Some fabrics absorb ultraviolet

radiation and re-emit it in the near-blue (shortest wavelength) portion of the visible spectrum. Because the eye is not very sensitive in this portion of the spectrum, the effect may not be apparent until you see it in a photograph. This is often the case with white fabrics that have brighteners incorporated during manufacture or introduced during laundering to give them a whiter appearance. These brighteners may make wedding gowns and other white clothing appear blue in photographs. Examining a fabric under an ultraviolet source may show whether or not the fabric is likely to fluoresce in a photograph.

For color reproduction with this type of subject, use an ultraviolet absorber over the light source in addition to a UV filter over the camera lens. For example, you can tape a KODAK WRATTEN Filter No. 2B over the flashtube of a small electronic flash unit. For larger light sources, try using a material with a UV inhibitor, such as Rosco Product No. 3114. Call Rosco at 1-800-767-2669 for assistance, or access their website at [www.rosco.com](http://www.rosco.com).

Perhaps most troublesome is the color-reproduction problem sometimes called "anomalous reflectance." It is caused by high reflectance at the far-red and near infrared end of the spectrum, where the eye has little or no sensitivity. Examples of problem subjects from nature are blue morning glories, gentians, and ageratum flowers, which often reproduce poorly because most color films are much more sensitive than the human eye to the far red.

Some organic dyes have high reflectance in the far red. These dyes are often popular with fabric manufacturers because they are relatively inexpensive and work well with synthetic materials. While the high reflectance in the far red and infrared is found in all colors of these dyes, the effect is most prevalent in shades of green and blue. The far-red reflectance neutralizes the green or blue appearance, so the fabrics may reproduce as neutrals or warm colors.

It is possible to check for high reflectance at the far-red end of the spectrum by making tests under actual working conditions. Include a standard color scale or chart, such as the KODAK Color Separation Guide and Gray Scale, KODAK Publication No. Q-13 (small/8 inches long) or Q-14 (large/14 inches long), in the scene. Make test shots with the film you plan to use for the final photographs. Evaluate the results

by comparing the color reproduction in the test photos to the original subjects.

For the most nearly accurate color reproduction in slides or transparencies KODAK EKTACHROME 100 Professional Film is our primary recommendation. It overcomes most of the effects caused by sensitivity in the infrared region. This film was designed specifically to reduce "anomalous reflectance" and generally produces truer color reproduction of problem materials.

For improved color reproduction with color negative films we recommend KODAK PROFESSIONAL PORTRA Films, which give you a choice of speed and contrast levels appropriate for the final output. Although no film reproduces all colors perfectly, the majority of color images are satisfactory. Most

people who take or order color photographs are not aware that color-reproduction problems may occur and chose fabrics for their visual impression. Photographers may also be limited in controlling scene lighting when on location. Individual color corrections can be made through electronic retouching or masking in printing, but these procedures are usually expensive. Understanding the technical explanation for color-reproduction problems will probably not lead to customer satisfaction with the results, but may support the case that a photographer has skillfully produced the best practical results in a given situation.