AATCC NEWS

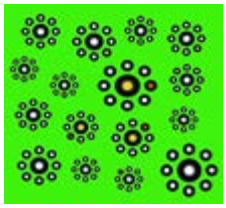
Return to Contents Page

January 8, 2012

The Perils and Pitfalls of Dyeing Neon Colors

By J. Michael Quante

It's the Rage All Over Again



Neon-colored clothing and fashion are back from the 1980s…and in a big way! Just look on Tumblr and Pinterest. 2011 and 2012 have been big years for these colorants, with the trend recently moving into clothing accessories. The vibrancy and brilliance of neon colors makes them stand out, with certain shades providing an extra measure of wearer safety or a bold fashion statement. Why do they scintillate in our eyes? And why is dyeing cotton neon colors particularly challenging?

What Makes Neons POP!

The term "neon colors" comes from a special property of neon gas produced by neon lighting called fluorescence. Fluorescence, of course, is not limited to exotic lighting or neon gas. Certain materials, including so-called "neon dyes," can emit intense visible light upon exposure to ultraviolet light. This is what gives these dyes the ability to appear so vibrantly bright when compared with non-fluorescent dyes. Dyes can be bright, but neon dyes are bright ***and*** fluorescent.

Neon Rainbow?

Fluorescent textile dyes are available in a wide variety of dye classes including acid, basic, vat, direct, disperse, reactive, and pigment dyes (see also the Glossary of Standard AATCC Terminology). Unfortunately, in the reactive dye class, only one fluorescent yellow dye is currently available.

It's the Fiber That Matters

The ease and effectiveness of neon dyeing on fabric depends most on the fiber used. Suitable acid dyes can be used for dyeing nylon, wool, and silk. Basic dyes can be used on acrylic and modacrylic fabrics. Disperse dyes are useful for polyester. For nylon and polyester fabrics, a reasonable selection of "fluorescent" colors is available.

Cotton and other cellulosics, however, have fewer options. The yellow reactive dye can be used, and a fluorescent lime green shade based on yellow can be prepared. Additions of non-neon dyes to the yellow reactive can also be performed, but the fluorescence can be lost. Additionally, basic dyes can be applied on properly pre-mordanted cotton.

A commonly used alternative method for cotton involves the application of neon pigments, which are fixed to the fabric using a binder on a stenter machine. Basic dye pigments are often used for this purpose.

Dye purchasers should make sure that the dye manufacturer's products are REACH compliant and allowable under proposed US EPA rules to minimize potential environmental and health risks.

Tim Williams, marketing manager at Color Solutions International, has said that because of the difficulties and expense of applying neon colors to cotton "the use of neon colors on cotton has largely been restricted to fashion boutique apparel."

Seeing Red Over Neons

When it comes to dyeing fabrics neon colors, many challenges arise. The major issues involving the finished product are fastness, the range of colors available, and the pH during processing. Generally, good fastness properties are observed and color varieties available for fibers like polyester, but issues commonly arise with cotton fabrics.

The few reactive dye combinations available for cotton yield fabrics with relatively poor lightfastness. Neon nylon suffers from lightfastness issues as well. Use of neon-pigments on cotton suffers from poor crockfastness (fastness to rubbing) and the presence of binders can adversely affect the hand.

Manufacturing of pigment dyed fabrics is challenging enough that some traditional dye houses won't perform it. Use of pigments is hard on dyeing equipment, with expensive cleaning often required. Neon-pigment colors can be contaminated by dark shades from previous conventional dyeing operations.

Is "*Almost Neon*" Good Enough?

Non-fluorescent dyes are available with colors close to those of fluorescent dyes and may be good enough for many fiber applications (better performance and fewer manufacturing headaches). In addition, for acid dye mixtures, small amounts of bright dyes can be added to fluorescents to give color with reduced neon effect. If comparable mixtures of bright and neon reactive dyes are used on cotton, the intensity that gives the color its "pop" will not be there. This cannot be simulated by adding optical brighteners to the dyeing process.

The choice of dyeing options is, as always, a matter of compromise—what gives an acceptable amount of performance subject to market limitations and cost. "'Pop' yes, but [the consumer] pays for it in [poor] performance (lightfastness, and some wetfastness [issues] for fluorescent shades)," says Bryan Dill, director, Archroma at Clariant Textile Chemicals. "There [can be] trouble with reproducibility in manufacturing, and, from a retail perspective, color management control [issues]."

According to Williams, smart design can help overcome some of the limitations of dyeing cotton neon shades. "[You can] put [brightly dyed] cotton next to a gray so it looks brighter. For polyester-cotton blends, dye the polyester with a fluorescent disperse dye, then burnout the print to remove the cotton. [This is] a design element usually done with knits. A more tricky method for some shades is to take polyester rich polyester-cotton blends, dye the polyester [with a neon dye], then lightly tint the cotton with a comparable bright dye."

What's Left After the Thrill is Gone

How should textile professionals take stock after the latest neon craze is over? Lessons learned today will help direct decision making the next time neon fashion takes off. Alex Foster, Technical Manager at the Society of Dyers and Colourists put it succinctly. "There should be technical expertise in coloration throughout the supply chain. If designers and buyers could obtain advice within their own organizations from people qualified and experienced in textile coloration, a little advice could save a lot of problems."

Putting Neons to Work

For the hows and whys of fluoresence science, see *Phosphorescence and "Glow-in-the-Dark"* Pigments in the December 4, 2012 *AATCC News*. For a look at testing high visibility safety gear for performance, see *Does Your Lab Pass the Test* in the August 21, 2012 *AATCC News*.