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Printex Monthly News Bulletin

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Tips of the MONTH

Education is an ornament in prosperity and a refuge in adversity.

Aristotel

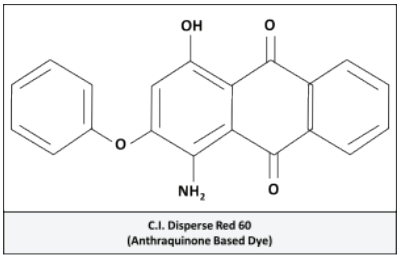
KNOWLEDGE IS LEARNING SOMETHING EVERY DAY. WISDOM IS LETTING GO OF SOMETHING EVERY DAY. ~ Zen Proverb

To solve any problem, here are three questions to ask yourself: First, what could I do? Second, what could I read? And third, who could I ask? ~ Jim Rohn

Banned Amines in Textile and Leather

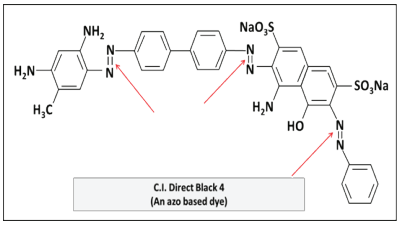
August 11, 2015

Introduction:



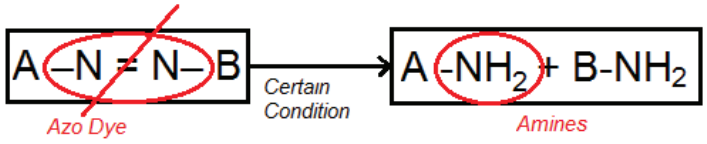
C.I. Disperse Red 60
(Anthraquinone Based Dye)

Customers always love colourful products and hence colour has become an important aesthetic factor in the fashion industry. Different colourants including dyes and pigments are used for the colouration of fashion articles such as apparel, textile, footwear and accessories. These colourants are based on two major chemistries: Azo and Anthraquinone. Colourants based on azo chemistry contain "-N=N-" group or azo group and are known as "Azo Colourants".



C.I. Direct Black 4
(An azo based dye)

Under certain conditions, azo colourants can undergo a cleavage of the "-N=N-" azo bond to form "–NH2" group or an "Amino" group. Such a compound is called an amine.



Some amines are carcinogenic in nature i.e. they can cause cancer and hence there is a ban on usage of dyes and pigments that can release such amines.

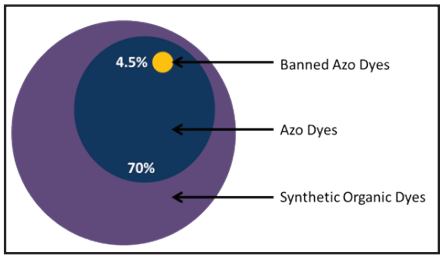

Carcinogenic

Currently, there are 24 carcinogenic amines which are banned (as releasable amines from azo colourants under reductive condition) in textile and leather by global legislations. Some brands and ecolabels have listed a few more in their criteria (25 to 28).

Banned Amines

S. No.	Substance	CAS No.
1.	4-aminodiphenyl	92-67-1
2.	Benzidine	92-87-5
3.	4-chloro-o-toluidine	95-69-2
4.	2-naphthylamine	91-59-8
5.	o-Aminoazotoluene	97-56-3
6.	2-amino-4-nitrotoluene	99-55-8
7.	4-chloroaniline	106-47-8
8.	2,4-diaminoanisole	615-05-4
9.	4,4 -diaminodiphenylmethane	101-77-9
10.	3,3 -dichlorobenzidine	91-94-1
11.	3,3 -dimethoxybenzidine	119-90-4
12.	3,3 -dimethylbenzidine	119-93-7
13.	3,3 -dimethyl-4,4'diaminodiphenylmethane	838-88-0
14.	4-cresidine	120-71-8
15.	4,4 -methylene-bis-(2-chloroaniline)	101-14-4
16.	4,4 -oxydianiline	101-80-4
17.	4,4 -thiodianiline	139-65-1
18.	2-aminotoluene	95-53-4
19.	2,4-diaminotoluene	95-80-7
20.	2,4,5-trimethylaniline	137-17-7
21.	2-methoxyaniline	90-04-0
22.	4-aminoazobenzene	60-09-3
23.	2,4-Xylidine	60-09-3
24.	2,6-Xylidine	87-62-7
25.	5-Chloro-2-methylaniline	95-79-4
26.	p-Phenylenediamine	106-50-3
27.	N,N-Dimethylaniline	121-69-7
28.	Aniline	62-53-3

Do all azo dyes release Banned Amines?



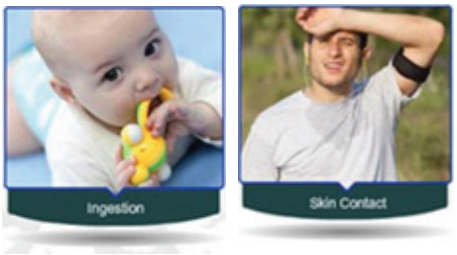
It must be remembered that not all azo dyes release banned amines. Out of the total synthetic dyes manufactured for coloration, almost 70% are based on the 'Azo' group. Out of these, only about 4 to 5% can release banned amines under certain conditions. Thus, only those azo dyes, which on reductive cleavage release a specific amine, are banned for usage, and a proper study of the same needs to be done by the user of the dyes before using in his production process.

Sources of Banned Amines in Textile and Leather:

In general, banned amines can come from different classes of colourants such as Disperse Dyes, Direct Dyes, Acid Dyes and certain Basic Dyes, Reactive dyes and Organic pigments.

In garments, the sources of banned amines are all coloured items such as polyester buttons, beads and sequins, zipper fabric, sewing threads or yarns, base fabrics and leather components.

Human Exposure to Banned Amines:



Humans can be exposed to Banned Amines either through direct and prolonged skin contact with the garment or through ingestion of the dye present on a garment.

In Skin Contact, the dye migrates from a textile or leather article to the skin due to effect of sweat and poor fastness, and then gets absorbed through the pores in the skin.

Ingestion of the dye can happen when a baby or infant sucks on the textile garment or toy allowing traces of the unfixed dye to enter the body along with the saliva.

Once the dye has entered the human body, enzymes in our body cleave the dye to release the amine(s) from the dye molecule.

Banned Amines/ Azo Dyes Regulations:

Azo dyes releasing specific amines (under certain conditions) are restricted in the EU, China, India, Egypt, South Korea, Taiwan and Vietnam. The amount of a banned amine that can be detected in the finished articles is limited to either 30 mg/Kg in the EU and 20 mg/Kg in China. Several brands have a Maximum Allowable Concentration on finished articles as 20 mg/Kg.

Testing of Banned Amines:

Testing is an important step to monitor presence of banned amines in finished products. To ensure accurate results, samples must be tested in an ISO 17025 accredited laboratory covering the analysis of banned amines under its accreditation scope. Here are some guidelines for testing a sample for banned amines:

- All components of an article must be tested.
- All colours present in the article must be tested.
- An undyed fibre or fabric need not be tested, e.g. full white fabric treated with an optical brightening agent need not be submitted for banned amines test.

The test methods to be used for the analysis of Banned Amines in Finished Articles are:

Substrate Type	Test Method
Textile	ISO 24362-1:2014 GB/T 17592 (China) ISO 24362-3:2014
Textile (for 4-aminoazobenzene)	GB/T 23344 (China) ISO 17234-1: 2015
Natural Leather (All amines except 4-aminoazobenzene)	GB/T 19942 (China)
Leather (for 4-aminoazobenzene)	ISO 17234-2: 2011

Azo dyes that can release banned amines:

Acid Dyes

Acid Black 29	Acid Black 94	Acid Black 131
Acid Black 132	Acid Black 209	Acid Brown 405
Acid Orange 24	Acid Orange 45	Acid Red 4
Acid Red 5	Acid Red 24	Acid Red 73
Acid Red 85	Acid Red 114	Acid Red 115
Acid Red 116	Acid Red 128	Acid Red 148
Acid Red 150	Acid Red 158	Acid Red 167
Acid Red 264	Acid Red 265	Acid Red 420
Acid Violet 12	Acid Violet 49	

Basic Dyes

Basic Brown 4	Basic Red 42	Basic Red 111

Disperse Dyes

Disperse Orange 159	Disperse Red 151	Disperse Yellow 7
Disperse Yellow 23	Disperse Yellow 56	

Solvent Dyes

Solvent Orange 7	Solvent Red 19	Solvent Red 23

Pigments

Pigment Red 8	Pigment Red 22	Pigment Red 38

Direct Dyes

Direct Black 4	Direct Black 29	Direct Black 38
Direct Black 91	Direct Black 154	Direct Blue 1
Direct Blue 2	Direct Blue 3	Direct Blue 6
Direct Blue 8	Direct Blue 9	Direct Blue 10
Direct Blue 14	Direct Blue 15	Direct Blue 22
Direct Blue 25	Direct Blue 35	Direct Blue 53
Direct Blue 76	Direct Blue 151	Direct Blue 160
Direct Blue 173	Direct Blue 192	Direct Blue 201
Direct Blue 215	Direct Blue 295	Direct Brown 1
Direct Brown 1:2	Direct Brown 2	Direct Brown 6
Direct Brown 25	Direct Brown 27	Direct Brown 31
Direct Brown 33	Direct Brown 51	Direct Brown 59
Direct Brown 79	Direct Brown 95	Direct Brown 101
Direct Brown 154	Direct Brown 222	Direct Green 1
Direct Green 6	Direct Green 8	Direct Green 8:1
Direct Green 85	Direct Orange 1	Direct Orange 6
Direct Orange 7	Direct Orange 8	Direct Orange 10
Direct Orange 108	Direct Red 1	Direct Red 2
Direct Red 7	Direct Red 10	Direct Red 13
Direct Red 17	Direct Red 21	Direct Red 22
Direct Red 24	Direct Red 26	Direct Red 28
Direct Red 37	Direct Red 39	Direct Red 44
Direct Red 46	Direct Red 62	Direct Red 67
Direct Red 72	Direct Violet 1	Direct Violet 12
Direct Violet 21	Direct Violet 22	Direct Yellow 1
Direct Yellow 24	Direct Yellow 48	

Precautions for Ensuring Banned Amines Compliance of Finished Articles:

For ensuring compliance to Banned Amines in finished articles, you should:

- Get Declarations from all your suppliers to ensure that the dyes and pigments supplied by them do not release banned amines.
- Monitor the presence of banned amines in your finished articles through random testing of your finished articles
- Ensure that trims and accessories used in the garment do not contain colorants that can release banned amines.

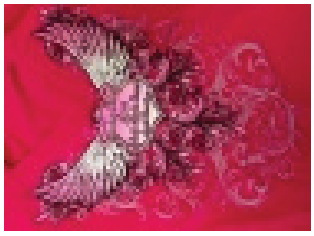
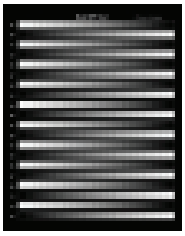
Establishing Rules for Underbase Printing

(July 2015) posted on Tue Jul 21, 2015

A poorly printed underbase will produce washed-out prints or garments too heavy to wear. Find out how to establish procedures that will lead to a quality product, every time.

By Thomas Trimmingham




Deciding whether or not to use an underbase for a color can be complicated, involving a lot of factors that will affect the final print. Many printers throw in the towel and just underbase everything in the design. Of course, this makes the shirt feel as though a big plate of ink is sitting on top of it, and it also tends to make all of the top colors that are not flashed immediately begin to bleed outside of their image area. Then, when customers complain about these "bulletproof" prints, some printers overcompensate and underbase very little in an image, perhaps only specific colors such as bright red, yellow, or blue. This will cause the design to look dull and washed out on a dark shirt and can create unpredictable color shifts if you'll be printing several shirt colors with the same image.

Neither of these quick fixes solves the problem, and both can lead to a lot of spoilage and even orders that your customer refuses to accept. So, what is the right way to produce a good underbase and get consistent results time after time?

The best practice is to develop some simple rules about when colors should or shouldn't be underbased that are specific to your shop. It requires analyzing your process, developing underbase guidelines, and then doing quality checks of prints coming off the press to be sure the standards are working. The first steps are often the hardest because they require that everyone in your company remain objective, something that can push a lot of people out of their comfort zones.

Analyze Your Process

In a lot of screen printing shops, one person always makes the call as to what should and shouldn't be underbased in an image. The judgment is often arbitrary based on the experience and background of the person making the decision. What happens when that person is on vacation or leaves? It's better for everyone to understand the process of making a good underbase and the primary factors that dictate what the best choice will be.

Shirt Color

This is usually the primary reason to use an underbase. Screen printing inks typically are not completely opaque when printed in the thin layers that printers strive for to control the hand and avoid producing garments that will be uncomfortable to wear. Therefore, any shirt color other than white will affect the color of the ink to a certain degree. In some cases, it's okay for the shirt color to penetrate the image, such as in a vintage design with a washed-out appearance (see Figure 1). An underbase wasn't used in parts of this design intentionally to create the vintage look. But for most prints on any garment color except white, the design should include an underbase for any brighter colors in the image.

Shirt Style

Two issues that can potentially influence an underbase are the fabric composition of the shirt and any seams that fall close to the print area. A variety of issues with the fabric type can affect the underbase – the amount of absorption that the fabric has, for example (and whether it will soak up or repel the ink) or how fuzzy the surface of the material is. An ironic thing about ultra-soft, treated shirts is that they tend to have finer fibers that stick up and feel softer, but also cause an underbase print to not release well or peel back up into the screen (commonly called "orange peel").

If you have any concerns about the printability of the fabric, always test it with a sample print prior to the production run. If you have to modify the inks, you'll have time to do so before you're on press and things get down to a rush.

Having samples of the garments ahead of time will also help you avoid any problems with the seams. Get the smallest and largest sizes of the garment that will likely be ordered. This will allow you to adapt the artwork to fit within the printable area for each size, or know you have an issue that might cause a reject with that specific style or size of shirt. For example, when you print different types of baseball jersey T-shirts, the sleeves can run at an angle that may hit a wide or vertical design near the shoulder seam. This can cause serious issues with an underbase print, problems that would also show through in the top colors and cause the shirts to be scrapped.

Design Complexity

The more complex a design, the smaller the individual elements become, which can make creating a successful underbase more difficult. Designs with many different elements (shapes, spaces, lines, etc.) and/or a lot of color transitions usually require careful consideration. Although a simpler underbase can occasionally work with a complex design, usually it's a sign of a poor-quality separation, where the underbase is too solid to properly support the detail in the top colors. It doesn't have to be a nightmare, but it will be usually take considerably longer to prepare than the other colors in the design.

Screen tension is of particular concern when a design has very small image elements that the under- base needs to support. Thicker, tackier inks might pull the mesh slightly during the print if the screen isn't tight enough. This can cause the white underbase to show up in unwelcome places and the top colors not to register properly. Even a small amount of distortion from screen stretch can be visible due to the lower margin for error with small, tightly registered image elements.

Design Location

The placement of the design on the garment can become a concern when seams or the edge of the garment cause the squeegee or screen to become unlevel during the print stroke. This is a common problem when printing across the zipper of a hoodie or over the seam of a garment's shoulder sleeve. These "bumps" push the screen away from the surface of the garment, causing distortion in the underbase that you'll typically see as bleeding, puckering, or image drop-offs in the final print.

You may be able to solve problems like this through equipment modifications. Platens with soft, spongy surfaces can help by pushing these areas of the garment down and leveling out the printing surface. Some squeegees are designed with a gap or slightly lifted area in the middle to compensate for center seams. At one of my old companies, we would cut a notch in the squeegee blade on higher-volume jobs to get around vertical seams, a job-to-job solution that costs a squeegee blade but prevents you from tearing the screen. Other common adaptations include using different types of ink that absorb into the garment and don't pool or pucker as easily, such as water-based inks or reduced-opacity plastisols.

In the art department, you can compensate for these issues by making the design less hard-edged and more forgiving to slight printing distortions. One way to do this is to distress the artwork, adding an overlay layer in the design software that intentionally makes it appear to be worn out or damaged, allowing any printing errors to blend in easily (see Figure 3). Another solution is to break up the design into smaller pieces and use separate screens over each side of the bump in the garment, though this is obviously a less friendly option on volume and cost.

Screen and Press Variables

Sometimes, your underbase decisions will be limited by the number of colors you can print on the machine, depending on the design and the method you'll be using to separate it. You might prefer to add a gray screen or another off-white color to extend the subtlety of the printed image and help the brighter colors to pop, but you won't always have an open station to allow for that. If you are short on available stations for a job, you can try to create a gray value on a darker shirt using the underbase, a technique that may also save costs by allowing you to use fewer screens (see Figure 4). An experienced separator will account for the screen and press limitations in choosing the best approach to get the right amount of detail into the design that production can duplicate.

Of course, the subtle work that a separator does to vary the coverage of the underbase to get the best possible results without putting down too much ink and compromising the hand of the garment will be lost if your printing process isn't under control. This means choosing the right mesh count, tensioning screens properly, having consistent stencil-making procedures, choosing the right squeegees, setting up the press properly, and so on.

With an underbase, the most important variable is the stencil thickness and the EOM (emulsion over mesh ratio) – the thickness of the emulsion that rises above the surface of the mesh, which will form the "well" that holds the ink after the flood stroke. The open area and thickness of the mesh are obviously important as well, but even a high mesh count can produce a thick print if the EOM is high enough. This is why thick capillary films are used in high-density printing, because the emulsion rising above the surface of the mesh will hold and print the thickest possible deposit.

Pay attention to your coating process and the resulting EOM that you achieve, because they will have a big effect on the quality of your underbase printing. At my former company, I once tested more than 25 white inks trying to find the brightest possible one for underbase printing. I printed them all under the exact same conditions and saw only small variations in brightness from one ink to the next. During the test, I accidentally double coated a previously coated screen. (Yes, I was really tired when I did that.) But the resulting print was more than twice as bright as any of the other prints from the test. This helped me realize the importance of controlling the EOM to get the brightest underbase.

When I work with clients, some of the ways I help them increase the EOM include putting the emulsion in the refrigerator, switching to an emulsion with a higher solids content, and adding extra coats using a more rounded scoop coater with less pressure. A coating machine will allow you to get consistent results from job to job. EOM gauges are also available that allow you to measure the exact stencil thickness as a quality-control measure.

The downside of using a screen with a high EOM for an underbase is that the thicker ink deposit can make the final print feel heavier and uncomfortable to wear. This is why the positive for the underbase screen shouldn't just be complete coverage for every color in the design.

All of these variables – the number of screens available for a job, type of film positive, ink opacity, ink viscosity, press setup, press registration capabilities, skill of the press operator, and more – can be mapped out using some simple tests that will help you see where your production team is able to hold and replicate details in an underbase print (see Figure 5). Several styles of test prints are available that will help you document the detail and quality capabilities that your shop currently possesses. Use the tests to find the ideal settings at each step of the process and make sure you record each variable when you achieve the best print you can with your current processes and equipment.

News from Printex

Mr. Gomez Ignasi from Print Corex – Cresa visited the valuable customers in Pakistan and beside the Technical Discussion conduct some trials of their new range of CYMK Ready to use Series.

Printex Lahore office will be shifting to a new venue this month.

In-sha-allah

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