



About Color Remover, deColourant, and Bleach

By Michael Katz

We are getting a lot of questions about Color Remover, deColourant and Bleach. I will attempt to describe the chemicals and actions of each, and to contrast their action. If I veer off on a on a tangent, it will be intentional. It is often important for people to see where else in our lives we encounter these products and why.

Bleach is the most ubiquitous of these products. Bleach is used to whiten textiles (and other substances like paper, hair, waxes) and to remove other impurities in the fabric. The key to the whole process, a science that has evolved over 200 years, is to remove as much color and impurities without damaging the fiber. This is a very important process to dyers. Unprocessed cotton coming off the loom, or yarn, contains a host of impurities that can't be dyed like starch, waxes, pectin, ash and so on. These are removed in the bleaching and whitening process, which allows the dyer to get better results.

The active ingredient in bleach is chlorine. Chlorine is usually delivered as sodium hypochlorite. This breaks down in the water bath to release chlorine. Chlorine is highly reactive by oxidizing everything in its path. That is why it is used as a disinfectant in drinking water and swimming pools. Another whitening agent for textiles, also very effective and widely used, and much more environmentally friendly, is Hydrogen Peroxide (H₂O₂). Liquid detergents now advertise an "oxygenated" whitener in their formulas. This is Hydrogen peroxide because it is rich in oxygen. We often advise dyers interested in bright colors on straw or potpourri to treat it first in a H₂O₂ bath (hot with stabilizers like sodium silicate and soda ash). Not only to whiten the material so that it dyes brighter but also to remove pectins on the sheath of wheat straw or other plant material which prevents the dyes from penetrating.

All fabrics can be bleached, but hypochlorite turns wool yellow and most synthetic fibers are white enough when they are made. Commercially, bleaching with Hypochlorite is done hot and fast with caustics then it is washed extensively and neutralized. Bleach from grocery stores is dilute if used as directed in the washing machine. If bleach is thickened, and then applied to fabric, or brushed on in "out of the container" concentrations, then it needs to be removed from the fabric by washing and the remaining hypochlorite removed with an "antichlor" to neutralize and remove all residual hypochlorite, which would degrade the fiber if left in. Sodium bisulfite usually is used as the antichlor.

Color Remover and deColourant: To avoid damage to the fiber of a fabric another method to remove color is to employ a reducing agent. The reducing agent works by adding electrons to the double bonds of the chromophore. The chromophore of a pigment or dye is a complex molecule shaped in a ring with double bonds. Light excites the molecule eliciting their vibration which ultimately gives us color. Some light is reflected, some absorbed. White is perceived when all light is reflected. When the chromophore does not resonate after treatment with a reducing agent then it loses its color. Then you see the color of the ground material the dye was on. The color is affected but the fabric is not affected. This is a useful tool when the utilization of bleach may damage the fabric. There are many techniques where a bleach cannot be used such as in a printing application, shibori, over printing, or even when you want to whiten an antique fabric without the risk of weakening the fibers with bleach.

Two common discharge agents are sodium hydrosulfite and zinc formaldehyde sulfoxylate, both of which we offer.

Our color remover contains Thiourea dioxide and soda ash. It is activated in a water bath at high temperature. The hotter the water bath the more effective color removal. Sometimes you get the smell of rotten eggs from the formation of sulfides in the process.

All colors in a particular dye range react differently to a discharge and pigments will not lose color at all. Dischargeability is rated from 1 to 5 and based on the activity of zinc formaldehyde sulfoxylate. It is the standard but also not particularly environmentally friendly. A dye color rated at five will discharge to white. Often times a color will lose a certain portion of its color, and the shift to another, usually lighter, color. Some will not discharge at all such as turquoise in reactive dyes. When you know this type of information you can use it very cleverly to get certain effects. Add the discharge to a turquoise dye solution, apply it to purple, which is dischargeable, steam set or heat press, and you leave behind the turquoise in a field of purple.

In order to print, stamp or draw with a discharge it needs to be made into a paste before it is applied. One can make up a standard printing paste, then add the reducing agent, print, then heat or steam. The problem is that reducing agents are not stable in the presence of water and might last only several hours. Our deColourant is stabilized in water with all the additives necessary to increase activity, so that it can be stored.

Question: How do you know when the fabric you are working on has been dyed with a vat dye, like indigo on blue jeans?

Answer: Vat dyes are unique. You use a reducing agent to get it to go into solution so that you can dip dye or print with it. It is colorless in its reduced form. Then turns color when it is lifted out of the dye bath into the air. Magic. We have had calls asking why does the color on the fabric goes away when I use a discharge, then reappears later? The answer is that vat dyes needs to be reduced to go into solution. It also loses it's color in this reduced form. The air (oxygen) reoxidizes the vat dye bringing back the color.