Optical Brightener Additives (commonly referred to as OBA's) are widely used in paper coatings, textiles, and laundry detergents to increase the perceived "whiteness" of the treated products. OBA's work by absorbing light from the (invisible) ultra-violet end of the spectrum and emitting light in the (visible) blue/white range of the spectrum. This shift in the frequency of light energy, results in a whiter and brighter appearance of the treated product.

Many digital inkjet printmakers, who print using Epson 9800, Epson 7800, Epson 4800, and/or Canon imagePROGRAF iPF9000 prefer a bright white surface to print on, to the true surface colour of their naturally-yellow substrate. As a result, paper manufacturers are adding OBAs to the digital inkjet receptive coating (IRC) used on their fine art papers and inkjet canvas'. The reflection of white light emanating from the OBAs will completely overwhelm the paper's natural colour, creating a higher perceived whiteness, which artificially enhances the maximum colour gamut and black density of the printed image. Popular rag papers that contain OBAs are the Hahnemuhle Photo Rag, Somerset Velvet, and Breathing Colour Elegance. These papers are known for their bright white surface and excellent colour gamut and black density.

While OBA's appear to be an effective solution for enhancing the whiteness and overall image quality of inkjet paper, this conclusion is slightly premature. The fact is, that OBA's can pose a serious threat to the integrity and longevity of a fine art print by accelerating metamerism and causing colour shifts, and yellowing over time. Let us explore each of these issues in further detail.

What is metamerism? Harald Johnson defines metamerism as a normal phenomenon relating to how the human eye perceives colour. It occurs when "two different colour objects have the same colour appearance to a normal human viewer under one light source (metameric match) but look different under another light source (metameric mismatch)." (*1) To a printmaker, this means that the painstakingly precise colour information applied to each print will be compromised whenever that print is viewed under a different light source. Thus, one primary goal of any printmaker should be to avoid metamerism in order to validate the time spent on colour management and to uphold the integrity of the reproduction. After all, what good is a reproduction if it does not closely match the original?

Now that we understand metamerism and why it should be avoided, how do OBAs fit into the picture? When OBAs are exposed to UV light, the treated paper appears brighter and whiter. When OBAs are not exposed to UV light (in the evening), the OBA's "lose activity", causing your eye to actually see the paper colour without OBAs - which will look creamy or somewhat yellowed. This amount of "OBA activity loss" will vary constantly depending upon how much exposure the paper has to UV light. Picture the lighting conditions inside of an art gallery and how they will change depending upon the time of day. This will have a subsequent effect on the art itself, as it is exposed to various levels of UV light throughout the day. For example, your print could be displayed in a gallery near a window where direct or indirect daylight may be illuminating the print. In a case like this, where there is a high UV component, inkjet papers that contain OBA's will strongly fluoresce and will appear bright white. However, in the evening when the same print is displayed with low or non-existent UV component (or incandescent tungsten illumination), the OBAs will not fluoresce, making the paper appear yellow, therefore causing your eyes to see the image colour differently.

How does this happen? Think about it. Your "bright white" paper is profiled to your printer so that the computer can translate colour information accurately to the substrate. Anyone with experience creating colour profiles will tell you that the "white point" of your substrate is an integral component of a profile's

accuracy. If the whiteness of your paper changes, so must your profile. This is precisely how OBAs are constantly working against your colour management. As the perception of whiteness of the paper is constantly changing, so do the perception of colours. Here's a good test. If you can find a paper offered in both bright-white and natural-white, try using the natural-white paper printing profile on the bright-white paper. You will be surprised by how different your results will be.

Next, take both papers and observe the whiteness in broad daylight. The paper with optical brighteners should look extremely bright white, while the paper without optical brighteners will look creamy. Then, take the two papers indoors where they are exposed to no sunlight and observe the whiteness. You probably will not be able to tell a difference between the two. At the very least, you will notice that the paper with OBAs no longer looks so white and bright. Many times, the OBA-Free paper will appear whiter. Nevertheless, the important point is that your OBA-Free paper has remained consistent under both lighting conditions, while the paper with OBAs has been inconsistent. This inconsistency directly correlates to the inconsistency that your image colour will have under different lighting conditions. Still, overall white point is only one of the risks associated with using substrates that contain OBAs.

Another problem with OBAs is that they have been known to decompose over time and can cause yellow stains to appear on your prints. It is possible to avoid this issue with UV inhibiting products and overcoats that are designed to reduce the UV activation of OBAs, but their effectiveness in this regard has yet to be proven. Therefore, regardless of the post-print protective coating that can be applied, the fact remains that any fine art print made on a paper manufactured with OBAs is a print at risk. To quote Henry Wilhelm from the Wilhelm Research Institute, "When long-term image permanence is an important consideration - or may eventually become an important consideration - fluorescent brighteners should be avoided".

This associated risk is precisely why OBA-Free papers have rapidly gained popularity in recent years despite their "Natural White" colour, which could be considered creamy or even yellow. Of course some printmakers have chosen to use OBA-Free papers because they specifically like the warm tone of the paper, but the majority of the market is avoiding papers manufactured with OBAs because they (1) enhance metamerism and (2) they are a potential risk to the longevity and integrity of a substrate. A few examples of popular OBA-free papers are Epson's Ultrasmooth Fine Art Paper, and Breathing Colour's Sterling Rag 210.

Printmakers who use OBA-Free papers simply eliminate the entire element of what can be called "OBA-associated Risk" from their business. These printmakers know that metamerism is a problem that should be minimized whenever possible - certainly never enhanced. Furthermore, OBA's have degradation potential and up to this point there is no guarantee that anything will last. Nevertheless, if an artist or photographer specifically requests that their artwork be printed on a paper manufactured with OBA's, a disclaimer should be issued, clearly explaining the facts and associated risks. Ultimately the customer should be left with the decision of how they want their art to look.

In an industry so obsessively tied to colour accuracy and long-term print stability, it is a wonder why OBA-Free papers are not more commonly used than papers manufactured with OBA's. Art sells because of how it looks and in this business there is no room for error. Therefore, anyone who is involved in this relatively infant industry of selling printed art has genuine incentive to make colour integrity a top priority. As further research is performed on the subject of OBA's, this industry will become more educated which will most likely cause a shift towards the widespread use of OBA-Free papers.

It is for this reason that Breathing Colour has been conducting a great deal of research and development in quality paper manufacturing, which has resulted in the latest technological breakthrough "Chromata White". The Chromata White technology allows Breathing Colour to create a highly stable white base paper/canvas without the use of harmful OBA's or any other fluorescent brightening additives. Colour shifting is reduced by stabilizing the whiteness of the base substrate with a special anti-oxidation technology that even further protects printed images. Furthermore, metamerism is minimized by quenching the ultraviolet excitation wavelengths resulting in a more stable illumination of an image under different spectral power distributions.

By using Chromata White inkjet papers and canvas', printmakers now have the opportunity to get the best of both worlds. They eliminate all OBA-associated risk, and they have bright white surfaces to make beautiful prints that uphold the highest standards of colour integrity that are possible today.