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Metamerism

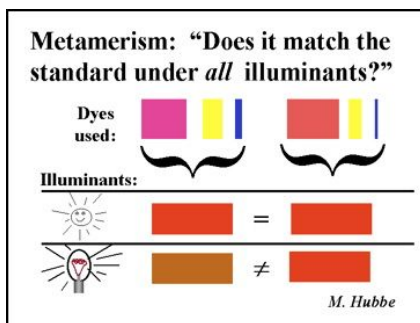
Have you ever looked down at some point in the day and realized you were wearing one black sock and one blue sock? Dumbfounded at best because you were absolutely positive the pair was a match when you left home? If this has happened to you, please read on...

In colorimetry, the science used to quantify and describe human color perception, **metamerism** is defined as the apparent matching of colors which have different spectral reflectance values. Colors that match in this manner are referred to as metamers and the multiple light sources used to illuminate the surfaces are where the problem is revealed.



Much to the dismay of industries where color matching is imperative to the quality of their product, metameric matches can be quite common. Many products, for a variety of reasons, are manufactured at different locations, in a variety of materials, and with multiple processes. For example, the automotive industry must bring together dyed leathers and fabrics, plastic components, and multiple painted surfaces, all in the same color, under very tight matching tolerances, in order to manufacture the interior of a vehicle. Consumers expect the components to match under multiple, okay, ALL lighting conditions. If the spectral reflectance values of the components vary too dramatically, matches in daylight may be unacceptable under fluorescent illumination.

Since many pigments have characteristics that limit their use across a broad spectrum of the resins and solvents used to disperse, carry and subsequently deliver them to a surface, metamerism can be an unfortunate common occurrence. Proper research must be done to identify pigments that are common to the materials that will be used to formulate and produce the required color palette.



Illuminant metamerism described above, is just one of several forms of metamerism. **Geometric metamerism** can occur when samples match at one angle of observation, but fail to match when viewed from another angle. Material considerations such as translucency and surface texture should also be considered in color matching to avoid this particular concern. **Observer metamerism**

failure can occur due to differences in color vision between observers. Normal variations in the amount of yellowing in the lens and macular pigment of the eye vary from person to person. These differences alter the perception of a color match resulting in an acceptable match for one observer and unacceptable to another.

Most people are likely unaware of the many forms of metamerism; some may notice a color or appearance difference but the degree is minimal and inconsequential to their particular situation. However, color professionals working in industries where color is a critical component of quality depend on their suppliers to minimize and eliminate metameric failures.