The market for non-dairy milk made from almonds, cashews, and other nuts is growing rapidly; non-dairy milk sales have increased by 61 percent since 2012, and sales are expected to continue to grow over the next few years.[1] To cater to this popular market, non-dairy milk manufacturers must ensure that their products are high in quality and consistent in color. However, according to a 2015 Global Health and Wellness survey, most consumers reported that they are more likely to buy products that contain no artificial colors, preferring all-natural ingredients instead.[2] This poses a challenge for nut-based milk manufacturers. How do you produce consistent-colored products without the use of artificial colors?

To offer all-natural products to consumers, many manufacturers are turning to spectrometry to test their products for color consistency and refine their manufacturing process. By measuring the color of your almond milk or other nut-based milk products using a spectrophotometer, you can create more consistent batches of milk without relying on artificial coloring agents to create visual appeal.

Creating Consistent-Colored Almond Milk

When you manufacture almond milk and other nut-based beverages, achieving precise color consistency across multiple batches can be challenging.[3] Each step of the manufacturing process can cause color variations in your product, including:

- **Sorting: Although peeled almonds are naturally more consistent in color than raw almonds that still have the skin on, you should still analyze your raw, skinned almonds and remove any that fall outside of your color standards in order to achieve color consistency in your milk products.**
- **Soaking**: During the soaking stage, color consistency can vary significantly between one batch of raw almonds and another. Additionally, if you leave the skin on the almonds, your milk product will be darker in color and it may be more difficult to achieve color consistency.
- **Blending**: When you blend your almonds and add flavors to the mix, the color of the almond beverage may change again, as added flavors like vanilla extract can impart a brown color to the product. You may choose to measure the color of your product once again at this stage in order to maintain color standards.
- **Filtering**: Inadequate filtering may leave solid particles in the milk, impacting appearance and consistency.
- **Pasteurization and other treatments**: Pasteurization or ultra-high pressure homogenized (UHPH) treatment processes eliminate bacteria and extend the shelf life of the product.[4] During this stage, you should look for signs of discoloration in your product. That's because the treatment techniques used to extend the shelf life of almond milk can impact the color of the product; for example, UHPH treatment typically produces milks that are lighter and more stable in color than pasteurization.

By testing the color of almond milk and other nut-based milks spectrophotometrically throughout the manufacturing process, you can tailor your processes to create the color you want and retain color consistency from batch to batch. A spectrophotometer can help you detect slight variations in color at every step, allowing you to address the color issues immediately through UHPH, additional filtering, or stricter nut sorting protocols.

How to Test Your Nut-Based Milk Products for Color Consistency

In order to test the color of your nut-based milk products during the optical sorting stage, the blending stage and the pasteurization, or UHPH stage, you need to use the appropriate spectrophotometer for each task.

Testing the Color of Solid Ingredients

To test the color of your raw nut ingredients in solid form, you need to use a non-contact spectrophotometer that is capable of measuring the color of irregularly-shaped samples. The Aeros spectrophotometer may be the best option for your lab because it is specifically designed for non-contact measurement of textured

products like raw almonds and other nuts. Notably, this instrument provides the largest sample area measurement the in the world, allowing you to analyze much larger sample sizes than any other spectrophotometer. This is important when you manufacture nut-based milk beverages, as a large sample of nuts will be a more accurate representation of the entire batch that you plan on using in your final product. Alternatively, if you want to integrate color measurement within the processing line itself, the SpectraTrend HT may be the perfect choice for your facility. The SpectraTrend HT is an on-line spectrophotometer that continuously monitors color in real-time, eliminating the need for time-consuming sample preparation and streamlining the quality control process.

Testing the Color of Liquid Samples

Some manufacturers receive consistent-colored raw nut ingredients in bulk from manufacturers that perform their own color quality control on their products. As a result, you won't have to test your raw ingredients for consistency in advance. However, all almond milk manufacturers need to use an instrument that can measure the color of samples in a liquid state, such as the UltraScan VIS. The instrument measures both reflected and transmitted color, allowing it to handle samples that range from completely opaque to transparent.

The UltraScan VIS spectrophotometer is engineered for extraordinary accuracy and precision. When the instrument is operated in reflectance mode, it can provide unprecedented insight into the color of opaque milks and confirm that your products fall within a specific color tolerance. The UltraScan VIS is also a great choice for measuring the color of translucent milks, as it is a CIE-conforming sphere instrument that eliminates the effects of light scattering in a semi-transparent liquid. Using this instrument, you can get accurate results regardless of the opacity or transparency of your products.

Full article with photos available here:

https://www.hunterlab.com/blog/color-food-industry/spectrophotometric-color-measurement-helps-eliminate-artificial-colorants-in-almond-milk-and-other-nut-based-beverages/