



As the ice cream market becomes more competitive and specialized than ever before, spectrophotometric color measurement is becoming increasingly critical to monitor appearance and quality. Image Source: Pexels user [Pixabay](#)

Summer is a time for lazy days at the beach, backyard barbecue parties, and chasing fireflies into the evening. It's also the time for ice cream. Whether lured by the familiar sound of the neighborhood ice cream truck or drawn in by a new wave of socially conscious ice cream shops, we flock toward these frozen treats in massive numbers¹. According to Fortune, Americans spent over \$13 billion on ice cream in 2013, "not including restaurant sales," and the average consumer will eat ice cream almost 22 pounds of ice cream each year². Despite the explosion of the frozen yogurt market, ice cream sales still outnumber frozen yogurt sales by a factor of 24 to 1. What's more, ice cream sales have shot up in recent years in countries like Turkey, Brazil, and China, adding to what is currently a \$78 billion global business.

However, the ice cream market is changing. As the public has become both more health conscious and more interested in food sourcing and quality, ice cream manufacturers have had to re-evaluate their production and marketing strategies. For some, this has meant [moving toward more natural ingredients](#), devoid of the [artificial colors and flavors](#) many major ice cream producers have relied on for years. For others, it has opened the door to ice cream manufacturing for the first time, giving creameries the opportunity to enter the burgeoning premium ice cream market. In cities like Los Angeles and New York, people are lining up around the block to sample novel flavors like sticky rice and mango or labneh with pistachio and candied orange offered by artisanal shops³.

But despite the introduction of virtually limitless new and novel flavors, the most popular ice cream variety remains vanilla. According to the International Ice Cream Association, vanilla ice cream is preferred by 29% of consumers, with chocolate coming in second place at a mere 8.9%⁴. With the transformations occurring within the world of ice cream, however, vanilla can no longer simply be, well, vanilla. [Rising consumer demand for high quality products](#) is forcing both long-time players and newcomers to raise the bar and perfect their vanilla ice creams. With the stakes higher than ever, spectrophotometric color measurement is now becoming an increasingly critical part of the manufacturing process.



The color of vanilla ice cream is affected by a range of process variables, including whether real vanilla or synthetic vanillin is used in the manufacturing process. Image Source: Flickr user [Joy](#)

Why the Color of Vanilla Ice Cream Matters

Color is a vital aspect of any food; research has confirmed again and again that [what we see deeply affects how we experience foods](#) and can make or break a particular food product. This may be particularly true of food “basics”, like vanilla ice cream. Consumers have specific expectations of what vanilla ice cream looks like and while there may be a range of acceptable colors, a product that falls outside of that range can turn off customers simply due to appearance.

Part of this is logical; the color of vanilla ice cream reflects its ingredients and we may reasonably expect a yellowish creamy variety to taste different than a pale white vanilla ice cream. The color of ice cream flavored using natural vanilla is typically different than that flavored using vanillin, for example. The other part, however, is sentimental. “Ice cream is about sense memory,” says Michael Palmer, owner of McConnell’s Fine Ice Creams, a Santa Monica-based creamery with a number of popular Los Angeles-area outposts⁵. “Everybody has a story, a memory about ice cream.” Part of that sense memory is aesthetic; you want vanilla ice cream to look a certain way because you remember it looking that way in the past, regardless of whether appearance is directly correlated to the flavor. Because, ultimately, it is not just the taste, but the *experience* of ice cream consumers are seeking. And that experience begins with sight.



Spectrophotometers are ideally suited to measure the color of vanilla ice cream to ensure the highest level of quality in every batch. Image Source: Pexels user [Madeline Tallmann](#)

Measuring the Color of Ice Cream

The ideal color of vanilla ice cream is subjective and will vary according to each manufacturer's process and preferences. Creating and reproducing that color, however, requires [objective analytical tools](#). This is particularly true when working with pale shades that can be particularly susceptible to the impact of ambient light and other environmental interferences. Additionally, the nature of ice cream itself presents unique challenges for accurately assessing color. As Rachael Stothard writes:

The physical characteristics of ice cream do make it hard to measure consistently; it would be detrimental to alter the production process to attempt to attain a sample of the frozen finished product and most measurements would be taken in a warm laboratory meaning the sample would be changing consistency as it melts. Therefore, when talking of measuring the color of ice cream, it is not the frozen matter being measured but rather the liquid substance that gives ice cream its desired color.⁶

Spectrophotometers are [ideally suited to measure the color of ice cream](#) via sophisticated optical geometries that allow you to accurately capture reflectance values over the visible spectrum.

Ice cream samples should preferably be poured or pipetted in circular, glass cups that fit flush against the sample area and allows the liquid "to be distributed evenly for measurements. Plastic cups may be used in environments with a high risk of breakage, although plastic's susceptibility to scratching could compromise measurement accuracy. To enhance the reliability of results, each sample should either be covered by an opaque cover or backed by a white backing tile depending on your preference. One sample from a batch, however, is not enough. Rather, multiple measurements should be taken of each sample and multiple samples should be analyzed from each batch. Sample averaging will allow you to achieve the greatest insight into the color behavior of each batch, optimizing accuracy.

The Benefits of Color Measurement

Measuring the color of vanilla ice cream has multiple benefits that enhance overall quality and ensure that your product is the best it can be. First, it gives you the data you need to determine the exact shade of white needed for your ice cream. During the product development process, spectrophotometric analysis allows you to determine the impact of each variable on color and gives you the opportunity to tailor your manufacturing process to create your standard and tolerance range. Once in production, spectrophotometers allow you to monitor your ice creams by automatically alerting you when a batch falls outside of your desired tolerance. When this happens,

you have the opportunity to halt production to determine the cause of the variation, minimizing product waste and making it possible to quarantine faulty product.

In today's competitive environment, the ability to tailor the appearance of your vanilla ice cream to your exact specifications and consistently reproduce that color in each batch can be imperative to attracting discerning consumers. At the same time, the ability to prevent the release of a faulty product while minimizing material and labor waste has real economic benefits. As such, investment in a spectrophotometric instrument can pay for itself many times over during the course of its life.

HunterLab Quality

HunterLab has been on the cutting edge of color measurement technology for over 60 years. Today, we offer [the most advanced spectrophotometers and accessories](#) available to suit the needs of both large and small ice cream producers. With versatile, user-friendly designs, our instruments are easily integrated into any manufacturing environment to give you the highest level of quality control at any stage of your process. [Contact us](#) to learn more about our renowned range of products and let us help you select the right instrument for your needs.

1. "Ice Cream With A Side of Social Justice Has Arrived in Times Square", May 24, 2017, http://gothamist.com/2017/05/24/ice_and_vice_times_square.php#photo-1
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3. "You Scream, I Scream ... At the Price of Ice Cream", August 3, 2010, <http://www.nytimes.com/2010/08/04/dining/04icecream.html>
4. "The Top 15 Most Popular Ice Cream Flavors", July 30, 2008, <http://www.foodchannel.com/articles/article/the-top-15-most-popular-ice-cream-flavors/>
5. "Artisanal Ice Cream Is Taking Over L.A.", <http://www.foodandwine.com/blogs/new-ice-cream-shops-create-freezing-frenzy-in-la>
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