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[BSHB] The Color of Beer

1 meddelelse

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Til: CooperSdk <CooperSdk@gmail.com>

BeerSmith Home Brewing

Dear CooperSdk,

Beer spans an endless array of colors. The deep black color and white foam of an Irish Stout, deep copper of a Pale Ale and cloudy light color of a Bavarian Wheat are all within the rainbow we call beer. Today we'll look at beer color, how its measured, color limitations, and how to estimate the color of a beer recipe.

The History of Beer Color

The system used to characterize beer color has its origins in the late 1800′s. The original lovibond system was created by J.W. Lovibond in 1883, and used colored slides that were compared to the beer color to determine approximate value. For decades, beer was compared to colored glass standards to determine the Lovibond color, and we still use the term "Degrees Lovibond" extensively today to describe the color of grains.

Over time, limitations of the Lovibond were recognized, not the least of which was that it depended upon a person's vision – which naturally has variations in color perception from person to person. By the mid-20′th century, light spectrophotometer technology was developed. In 1950 the ASBC adopted the Standard Reference Method (SRM) color system. Separately the Europeans developed another visual system called the European Brewing Convention (EBC). It originally used visual comparison, but some 25 years later changed to use a spectrophotometer in a slightly different way than SRM.

For multiple grain additions, you can simply calculate the MCU for each addition and add them together. MCU provides a good estimate of SRM color for light beers, but starts to diverge as beer color exceeds 6-8 SRM, because light absorbance is logarithmic and not linear. For a more accurate estimate that holds for darker beers up to about 50 SRM, we turn to the Morey equation:

- SRM color = 1.4922 * (MCU ** 0.6859)

The Morey equation provides an excellent estimate of beer color throughout the range from 1-50 SRM, and is the one used by most brewers today.

Limitations of Beer Color and Color Estimates

No matter how accurately your color estimate or measurement is, you need to recognize that all existing beer color systems have very real limitations. The SRM color system, for instance, is measured from the absorbance of a single wavelength of light. It can't tell the difference between similarly colored red beers and amber beer, for example. The

Measuring Beer Color

The SRM color of beer is measured using a ½" glass cuvette measured by a spectrophotometer at a light wavelength of 430nm. The SRM color is approximately 10 times the amount of absorbance, which is measured on a logarithmic scale. The SRM color is approximately equal to the old lovibond scale in most cases. The other common method, called the European Brewing Convention (EBC) is measured at the same wavelength but in a smaller 1 cm cuvette. In practice the EBC color is approximately 1.97 times the SRM color. (EBC = 1.97 * SRM) [Ref: Daniels]

If you don't have a spectrophotometer handy in your personal laboratory, a number of tools are available to help you measure the color of your beer. The most popular and easy to use is a beer reference color card, such as the Davidson guide, to do a visual comparison of your beer against standard reference colors. I recommend purchasing such a guide from your local store. I don't recommend printing an online color card, as the variations in printer color will spoil your measurements.

Another method involves diluting your beer with distilled water and comparing it to known color standards such as mass produced commercial beer. Ray Daniels describes this method in detail in his chapter on beer color from his book Designing Great Beers, if you are a truly dedicated brewer. For my money, a nice beer color card is easier to use.

Estimating Beer Color for a Recipe

As a home brewer, I'm very interested in how to estimate the color of my beer for a given recipe in advance of brewing. In practice, good home brewing software like BeerSmith will automatically estimate the color of your recipe as you build it, but I think it is still useful to know what is going on under the hood.

A first iteration at estimating beer color involved simply calculating the Malt Color Units (MCUs) of a recipe.

- MCU = (Weight of grain in lbs) * (Color

subtle hues of red and brown may look identical at the 430nm wavelength.

In fact, it is not possible to specify the precise color of a beer with a single "beer darkness number" such as SRM. The subtle variations in red, brown, gold, copper and straw can't be captured in a single dimension beer color system. Irish Red is a good example – if you do an estimate of the color for an Irish Red you will likely get something that does not look very red at all on the color card. Yet the addition of a tiny amount of roasted barley gives it the distinctive red hue that the SRM system simply can't capture.

Extract brewers need to be aware that liquid extracts in particular tend to get darker as they age, and also that extracts will darken in a process called carmelization as they boil. I wrote an article on how to use late extract additions to reduce this effect. The net result of the aging and boiling effect is that many extract beers come out substantially darker than an estimate would indicate.

In practice, these issues are not a problem for the average home brewer, but commercial breweries often use coloring agents, mixing of batches and other techniques to achieve very precise color matching from batch to batch. For a home brewer, it is enough to know that a color estimate has limitations.

BeerSmith Does the Color Work For You

BeerSmith has the Morey equation built into it so as you add grains, it automatically updates the color estimate and displays it on screen.

BeerSmith also has tools to adjust the color of a recipe quickly and easily.

- Download BeerSmith
- Get BeerSmith Support

of grain in degrees lovibond) / (volume in gallons)

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