

# Technical Tips

## Caramel in Brewing

A valuable brewing ingredient for more than a century, caramel contributes to the character of beer on every continent. Caramel provides colour, flavour, and consistency in beer. It also has applications in a variety of related products including cider, shandy, and non-alcoholic malted beverages. Caramel, by weight, is the world's most widely-consumed colouring ingredient in foods and beverages.

### What is Caramel?

Caramel is produced from the controlled heat treatment of carbohydrates, typically glucose syrup. The glucose can be combined with food grade catalysts to facilitate the browning process and provide caramel colour stability. A standard beer caramel is a long polymer chain that is a positive-charged colloidal solution, which lends to its beer stability due to the positive charge of the beer (malt protein charge). Caramel, an inert, physically stable product when stored properly, will not promote bacterial growth.

Beer caramels are available in a range of colour intensities as well as a variety of different hues (from pale yellow, to red, to brown).

### Brewery Applications

Each brewery may have its own particular caramel application method; in general, brewers add caramel either at the wort boiling stage (if large volumes are required) or at the end to standardise colour lost in batch processing. Brewers can make adjustments to final beer colour by adding caramel to the beer during the filtration process. The caramel can be added to ensure finished product colour consistency or to target a darker colour without significantly adding to the beer's calories or gravity.

The dosage of beer caramel varies by type. Traditional ales contain 0.02% or more to add colour and some flavour character. Certain dark beers, including some stouts and bocks, may rely on higher caramel dosage. Lagers require more minimal caramel amounts for colour consistency (typically 0.01%) than other types. Adjusting a lager type beer to a Bock beer colour would require an addition of 0.05-0.075%.

### Brewing Advantages

Advantages of using caramel – apart from its stability as a beer colour – include its ease of addition in metered volumes, its cost effectiveness compared to other colouring choices, and its unique flavour. Caramel can be utilized to adjust the final beer colour (or adding to the visual appeal) without changing the character of the beer.



### International Standards

The World Health Organization (WHO) and United Nations (UN) Joint Evaluation Committee for Food Additives (JECFA)<sup>1</sup>, the European Union and United States recognize four classes of caramel colour. Furthermore; the U.S. Food and Drug Administration (FDA) identifies caramel colour as GRAS (Generally Recognized as Safe)<sup>2</sup>. These authorities specify caramel's purity standards<sup>3</sup>, and D.D. Williamson's caramels meet these standards.

All beer caramels are in Class III; however, not all Class III caramels are stable in beer. Hence, D.D. Williamson performs a test on each batch of its beer caramels (300-series) to ensure its stability in beer. Class III caramels that are not beer-stable result in beverage turbidity.

<sup>1</sup> JECFA Compendium of Foods Additive Specifications, 2006.

<sup>2</sup> United States Code of Federal Regulations (CFR), Title 21, Section 172.1235.

<sup>3</sup> Food Chemicals Codex, Sixth Edition.

## Beer Caramel Specifications

The table below outlines D.D. Williamson's best-selling beer caramels. The company also manufactures ten speciality beer caramels not included in this product list.

| DDW Product | Colour Intensity <sup>1</sup> (Typical) | Colour I.O.B. <sup>2</sup> (Typical) | Colour EBC's <sup>3</sup> (Typical) | Hue Index <sup>4</sup> (Typical) | Percent Solids | Global DDW Facility       | Feature                                |
|-------------|---|--------------------------------------|-------------------------------------|----------------------------------|----------------|---------------------------|--|
| #300        | .185                                    | 24,500                               | 22,000                              | 5.6                              | 74%            | USA, Swaziland            | popular in North America               |
| #301        | .108                                    | 31,500                               | 29,800                              | 5.5                              | 66%            | USA, UK                   | most widely-used beer caramel globally |
| #303        | .130                                    | 35,000                               | 34,000                              | 5.5                              | 65%            | USA, UK, Swaziland, China | available globally                     |
| #304        | .075                                    | 20,500                               | 19,000                              | 5.6                              | 74%            | USA                       | for malta or pilsner                   |
| #306        | .075                                    | 20,500                               | 19,000                              | 5.6                              | 74%            | USA                       | provides a sweet porterine flavour     |
| #310        | .060                                    | 17,000                               | 16,000                              | 5.7                              | 74%            | USA                       | Emkamalt; yellow tone                  |
| #373        | .150                                    | 45,000                               | 42,000                              | 5.4                              | 64%            | UK                        | general purpose dark                   |
| #377        | .055                                    | 15,000                               | 12,000                              | 5.7                              | 35%            | UK                        | low solids for direct addition         |
| #385        | .175                                    | 48,000                               | 45,000                              | 5.3                              | 69%            | UK                        | darkest beer-stable liquid             |
| #641        | .190                                    | 52,000                               | 49,000                              | 5.4                              | 97%            | Swaziland                 | beer-stable powder                     |

## Specialty Brewing Syrup Specifications

Brewing syrups are carbohydrate blends, usually glucose and sucrose, lightly boiled to contribute flavour and condition to finished beer. These "burnt sugars" range in fermentability from 60% to 92%. The syrups demonstrate an increase in sweetness with increasing fermentability.

They can be used as kettle adjuncts for added fermentability, mouthfeel, flavour, and cost effectiveness. Alternatively, the brewing syrups can be added to unfiltered beer as a priming sugar for conditioning and carbonation, as well as to add some sweetness and mouthfeel to the finished product. In addition, the syrup can also be utilized for mouthfeel, palette fullness, and some sweetness in a traditional pasteurized beer.

| DDW Product | Colour Intensity <sup>1</sup> (Typical) | Colour I.O.B. <sup>2</sup> (Typical) | Colour EBC's <sup>3</sup> (Typical) | Fermentability <sup>5</sup> | Percent Solids | Global DDW Facility |
|-------------|---|--------------------------------------|-------------------------------------|-----------------------------|----------------|---------------------|
| #731        | .020                                    | 40                                   | 40                                  | 80%                         | 80%            | UK                  |
| #732        | .030                                    | 120                                  | 105                                 | 80%                         | 79%            | UK                  |
| #733        | .020                                    | 100                                  | 100                                 | 92%                         | 78%            | UK                  |

## Test Methodology

<sup>1</sup> Colour Intensity = Darkness = Absorbance of a 0.1% (w/v) solution of caramel in deionized water measured in a 1-cm cell at 610 nm wavelength

<sup>2</sup> Colour I.O.B. = Institute of Brewing = Absorbance of 0.1% (w/v) solution at 530 nm x 100,000

<sup>3</sup> Colour EBC's = European Brewing Convention units = Absorbance at 430 nm x dilution x 25

<sup>4</sup> Hue Index = Redness =  $\text{Log}((\text{ABS @ 510 nm})/(\text{ABS @ 610 nm})) \times 10$

<sup>5</sup> Fermentability % = DP1% + DP2% + DP3%



For samples or technical questions,  
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