

Malt , Malt and Malt

Barley is the major grain used in beer making. Malting is the process of preparing the barley for brewing. Barley that has been malted is referred to as “malt” (clever, huh?)

So, what does barley provide to the brewing process and the final product?

Carbohydrates

Sugars for the yeast to convert to alcohol

Dextrins for residual sweetness and body

(Sugars are small, simple carbohydrates, while dextrins are larger, unfermentable carbs)

Proteins

Amino acids for yeast vitality

Medium sized proteins for head retention and body/mouthfeel.

Amino acids are very small proteins.

Flavor Compounds (flavonoids?)

Produced by heating (kilning or roasting) the starches and sugars in the malt

Raw barley contains carbs and proteins, but not in usable form. They are much too big and complex for beer making. **Malting** begins the process of reducing the size and complexity of these molecules. **Mashing** finishes the process.

Malting

“Controlled germination”

Enzymes in the grain begin to break down the protein matrix and the starch granules.

(“Break down” means to reduce the size of the molecules themselves)

“Modification” is the enzymatic breakdown of proteins and starches.

As modification proceeds,

More enzymes are formed

Proteins become smaller and less hard (Proteolytic enzymes do this)

Starches become smaller and softer (Amylase enzymes do this)

Kilning

When modified to the appropriate degree, the malt is dried with warm air in a kiln, stopping the modification process

Some grains are modified more than others, but almost all **modern malts** are “**fully**” modified.

Two types of malts – base malts and specialty malts

Base malts are used to produce fermentable sugars for the yeast to ferment. These malts must be mashed to continue the enzymatic breakdown of the starches into simple sugars.

Pale Malts

Pilsner Malt

American 2-row malt
American 6-row malt
English Pale Ale Malt

Due to longer kilning to ensure complete modification, English Pale Malts tend to be darker than Pilsner malts and the American malts. This longer kilning also denatures (kills) some enzymes.

As a result of the shorter kilning, the Pilsner and American malts are very light in color so they would be more suited to the production of straw-colored beers. They also have more enzymes so that a brewer can use more adjuncts such as corn, rice, and non-malted wheat and barley. German Pilsner malts will also tend to have an additional sulfur-y bite that other malts do not have. This is partly a function of the barley strain, but it is also accentuated by the lower kilning. Those sulfur compounds are very volatile and would be driven off by higher temperatures.

Kilned malts malts that are kilned longer to give more color and flavor. **Strecker** reactions proceed to produce maltier flavors.

Vienna Malt
Munich Malt
Aromatic Malt

These malts provide a rich sweet flavor and aroma. They are most commonly found in the dark German lagers, such as Vienna/Maerzen/Oktoberfests, Munich Dunkels and Bocks.

Guidelines for use:

In a typical 5 gallon batch, you'll need 8-9 pounds of Pils, American 2 row or English Pale ale malt to achieve a starting specific gravity (SG) of 1.050. You would need a slightly higher amount (perhaps 10%) of the kilned malts since they lose some of their "sugar potential" during the kilning process.

Specialty Malts are used mainly for flavor and color. Since specialty malts need no further enzymatic activity in the brewing process, they malts do not have to be mashed by the brewer. Simply steeping them in hot water will extract their color and flavor into the beer. This makes them very easy to use in conjunction with malt extracts, providing the extract brewer with the ability to create a wide range of beer styles.

Generally, these are malts that are roasted to achieve different flavors and colors. Maillard reactions caused by the heating of sugars produce furans, pyroles and pyrazines.

Furans -	toffee, caramel
Pyroles and pyrazines	- nutty, coffee, popcorn dry, acrid, bitter

Higher temps lead to less furans and more pyroles and pyrazines.

Crystal malts - Roasted while wet. That is, the malt is steeped and germinated, but not kilned (dried) before roasting. The enzymatic reduction of starches continues, essentially creating sugars (some fermentable, some not) in the husk. The roasting provides flavors and colors mainly through the production of furans via the Maillard reactions. Most malters produce

several versions of crystal, differentiated by the time and temperature of the roasting process. Some crystals are lightly roasted, while others undergo much more roasting. When choosing crystal malt, the level of roasting is represented by the malts color rating, expressed in degrees Lovibond. A 10 L crystal is very light and will impart minimal color and a slight caramel hint, a 30L crystal will impart more color and a richer caramel/toffee flavor, while an 80L crystal imparts more color and the flavor profile begins to exhibit hints of the pyroles and pyrazines that are generally typical of the roasted grains (next).

Crystal malt is used in many different beer styles. In fact, most styles have at least **some** crystal malt included in the grain bill.

Chocolate, Black Patent - malted as above (steep, germinate and kiln), then roasted to very high temps (200 C - 400F) to essentially burn the sugars and starches. Of these two, Chocolate is roasted less and therefore is usually a deep brown color. The flavor produced has some similarities to dark, unsweetened chocolate. The Black Patent is, well, usually black with a very bitter, almost burnt character. Most recipes that use this malt use it sparingly.

Chocolate malt is often used in brown ales and porters and is a major ingredient in sweet stouts. Black patent is often used in small amounts in some stouts and is the characteristic malt of many robust porters.

Roasted barley - not malted. This specialty grain is produced by roasting raw barley. The flavor is typically smoother and less acrid than Black Patent, giving more of a charcoal effect. This is the signature grain of dry stouts.

Grain Bill Speculations

Munich Helles – predominantly German Pilsner malt. Sweet, grainy, sometimes slightly sulfury. (Excessive sulfur is often from either skunking via light or heating during transport and storage).

Oktoberfest and Bock – usually a blend of pilsner malt and one or more of the kilned malts (Vienna, Munich) Bocks will have a higher proportion of the kilned malts, especially Munich.

American Amber – American 2-row? And crystal malt.

Scottish Ale – predominantly U.K. Pale Ale malt and crystal malt Perhaps some peated malt.

Scotch Ale – Lots of Pale ale malt and crystal

Sweet Stout – Crystal and chocolate

Dry Stout – Roasted Barley