



Fermentation

Fermentation is the most important phase of the home brewing process. It is all about providing the yeast that converts sugars in the Wort by numerous steps into alcohol, with the conditions they require for best beer production. Two of the most important parameters for us as home brewers, are the dissolved oxygen content and temperature of the ferment.

Firstly, sufficient oxygen must be supplied early in the ferment to allow for growth of yeast (aerobic phase). Once this is done, it is vital that no more oxygen is allowed to contact the Wort (air is 26% oxygen) so don't be tempted to open the lid, even to have a look, or worse yet stir or test by dropping the hydrometer into the fermenter.

This is a source of oxygen and airborne contaminants. Yeast don't make alcohol when oxygen is available, just more yeast and plenty of CO₂. Additionally, the oxygen produces undesirable oxidation reactions which spoil beer and the extra growth results in excessive production of esters.

Yeast must be encouraged to produce the maximum amount of alcohol and minimum growth by restricting oxygen and temperature to 9-20°C (dependant on yeast variety) for best beer flavour, to that preferred by the yeast of 25-32°C.

Yeast cell death occurs above 38°C. Why then don't we ferment our beers then at 32°C, decreasing the time that it takes to make beer? Why do we make yeast work slower? Because what is best for yeast, is not best for beer. As they grow and multiply, yeast produces many compounds, the most noticeable of which are esters.

As the temperature of fermentation rises, more yeast growth occurs and consequently more esters are produced. At 32°C yeast produce so much acetaldehyde (which tastes like apples) that the beer becomes undrinkable.

The optimum ale fermentation temperature has been found to be 20°C (18-22). This temperature strikes the best balance between yeast growth and ester levels for most ale strains. Most ale strains are unable to ferment or grow at 12°C, which is the most common lager fermentation temperature.

This fermentation temperature greatly reduces the ester-forming ability of most lager strains, creating the clean flavour associated with lager beers.

Ester levels are kept low, placing the emphasis on malt and hop flavours.