Acetaldehyde

An organic compound. An aldehyde. Many fragrances are aldehydes and acetaldehyde is manufactured for the production of perfumes as well as being a precursor to acetic acid (vinegar). It is found widely in nature in breads, fruits, coffee and a part of normal plant metabolism.

Fermentation by brewer's yeast is the conversion of sugar to ethanol and carbon dioxide with the accompaniment of the production of many other compounds in much smaller quantities (e.g. esters, fusel alcohols) and intermediary compounds such as aldehydes. When yeast converts sugar to alcohol, the sugar undergoes intermediary changes including conversion to acetaldehyde before becoming alcohol. For this reason, the quantity of acetaldehyde first increases and then declines with the beers maturity, making acetaldehyde a common green beer flavor and a good indicator of beer maturity. Acetaldehyde is responsible for grassy, rough, cider (green apple) flavors and aromas found in beer prior to maturation.

Since the creation of acetaldehyde is an intermediate step in the ethanol production, successful control includes proper secondary/maturation practices that allow the yeast to reduce acetaldehyde to alcohol. Essential to this reduction is the carryover of enough living and healthy yeast cells through primary fermentation and maturation. Elevated levels may result from diminished yeast activity brought upon by early cooling, non-vital cells, or removing yeast from green beer by filtration or racking prior to complete maturation. Ensuring that yeast remain healthy and in sufficient quantities to complete fermentation starts with the rapid onset of active fermentation provided by a sufficiently large and vigorous yeast population supported by adequate pitching rates and strong wort aeration. Because aldehydes are easily volatized, even at low temperatures, they are readily carried off by evolving C02. Pressurized fermentation that traps CO2 retains higher levels of acetaldehyde which then must be reduced by the conditioning process.

The introduction of oxygen into packaged beer can cause alcohol to convert back to aldehydes, which is a contributor to stale beer flavors. Other catalysts like light can create oxidative pathways that result in the creation of aldehydes and stale flavors.

Methods for influencing increased Acetaldehyde during Primary fermentation

- Intense fermentation
- Increased temperature
- Increased pitching rates
- Increased pressure
- Minimal aeration
- Stirred fermentation

Methods for reducing acetaldehyde after primary fermentation

- Intense secondary and conditioning
- Warm conditioning
- Increased yeast concentration during conditioning
- Minimized aeration