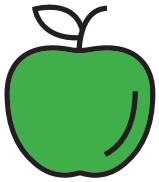

BEER OFF FLAVOR:

ACETALDEHYDE

Acetaldehyde (CH_3CHO) is a naturally occurring compound in beer fermentation. It is found in various fruits, vegetables, and is produced in humans through the metabolism of ethanol.

HOW DOES ACETALDEHYDE SMELL OR TASTE?

Typical sensory descriptors associated with acetaldehyde include green (Granny Smith) apples, pumpkin flesh/seed, unripe avocado, and latex paint. Acetaldehyde is somewhat unique in this regard; that the "character" of its aroma can change as its concentration changes. The sensory threshold in pale lager beer is typically 1-5 mg/L but this can vary with beer style, in some cases ranging from 5 – 15 mg/L.

HOW IS ACETALDEHYDE MEASURED?

Acetaldehyde may be detected by a trained sensory panel or through gas chromatography utilizing the ASBC Beer-48 method.

HOW IS ACETALDEHYDE PRODUCED IN BEER FERMENTATION?

Acetaldehyde is an intermediate in alcoholic fermentation. Acetaldehyde is reduced by yeast during fermentation as the last step in the production of ethanol from wort sugars.

Wort Sugar → Acetaldehyde ↔ Ethanol

*Simplified rendering of acetaldehyde formation during the fermentation process

WHEN DOES ACETALDEHYDE BECOME AN OFF FLAVOR?

Acetaldehyde is present in all beers and, in lower concentrations, can contribute positively to a beer's sensory character. When the concentration of acetaldehyde remains above or well above its sensory threshold, it becomes an off flavor. The concentration of acetaldehyde is tied to yeast health and is formed during the beginning and middle of beer fermentation. Its concentration will normally decrease towards the end of a healthy fermentation and maturation process. Acetaldehyde can rise during prolonged warm maturation when yeast lose viability.

HOW IS ACETALDEHYDE CONTROLLED IN THE BREWERY?

The best way to keep acetaldehyde in check is to ensure normal, healthy fermentation and maturation conditions. Below are some general recommendations.

Do:

- ❑ Provide adequate wort FAN (100 – 140 mg/L in normal gravity wort)
- ❑ Provide adequate wort zinc (0.48 – 1.07 mg/L)
- ❑ Aerate wort with clean air or pure oxygen (8-10 mg/L)
- ❑ Pitch the correct concentration of healthy yeast (work with your supplier)

Avoid:

- ❑ Removing yeast or dropping temperature too early
- ❑ Extended warm temperature maturation
- ❑ Leaving non-viable yeast in maturation for extended periods of time

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