



VERMONT BREWERS
ASSOCIATION

Off-Flavor Sensory Panel: Recognition & Troubleshooting



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How We Perceive Flavor

- All of our senses influence what we perceive in food/beverage
- Flavor = aroma, taste, and mouthfeel
- **Aroma**
 - Olfactory nerves in our nasal passages detect thousands of aromas
 - We subconsciously breathe through our nose when eating/drinking - aroma is carried from our mouth to our nose, our brain interprets this as tastes coming from the food/drink when really it's aromas
 - Very wide variety of possible aromas in beer!
- **Taste**
 - Sweet, sour, salty, bitter, umami, and fat
 - All tastes are possible in beer, but most will be a balance of bitter, sweet and sour.
- **Mouthfeel**
 - Trigeminal reception system - perceives actual temp as well as flavor-based sensations like cooling (mint/anise), burning (chiles, alcohol), numbing (menthol), drying/astringency, mouthwatering, and more
 - In beer, think carbonation, body, and aftertaste/finish
- What about sight and hearing?

Off-Flavors in Beer

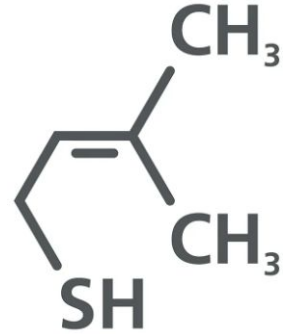
- Increased concentration of unexpected or undesirable flavor compound(s)
- Dependent upon several factors:
 - Type or style of beer
 - Sensitivity of taster
 - Consumer expectation
- Possible causes:
 - Raw materials
 - Process controls
 - Micro spoilage
 - Contamination
 - Packaging
 - Improper storage
- Individual flavor compounds have different detection thresholds, and may be more or less apparent depending on intensity of other flavors present
- Examples: **lightstruck**, **oxidation**, **diacetyl**, DMS, acetic acid, acetaldehyde





Lightstruck

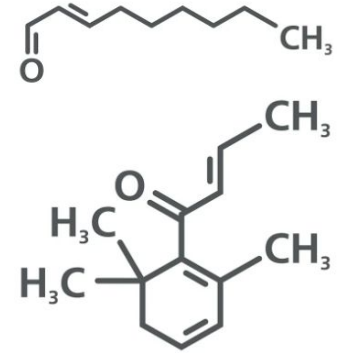
- 3-methyl-2-butene-1-thiol (MBT for short)
- Skunky aroma
- Threshold - 0.001-0.03 ppb in beer *very low!*
- Photo-oxidation reaction of hops that come into contact with light
 - Strong sunlight can result in a reaction in a matter of seconds
 - Fluorescent lights in cooler - reaction occurs over time
- Primarily a packaging & storage related issue
 - Brown vs. green vs. clear glass
 - Cans / kegs / cardboard box offers best protection
- Prevention
 - Protect from light sources
 - Selection of packaging materials
 - Modified hop products that are “light stable”
- Acceptable styles?





Oxidation

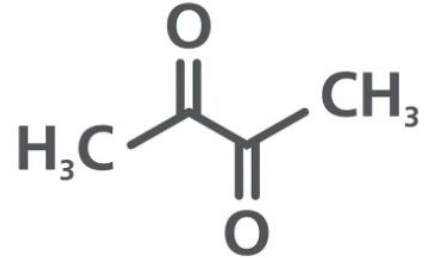
- [Trans-2-nonenal](#), [beta-damascenone](#), etc.
- Papery, wet cardboard; black tea, leathery, blackcurrant
- Threshold - 0.12 ppb; 150 ppb
- Various compounds from different ingredients/components of beer react with oxygen in solution to create different off-flavors
 - Most notable is unsaturated fatty acids (lipids) from malt → cardboard
 - Melanoidins (malt) → sherry
 - Hops → cheesy/sweaty; blackcurrant, also diminished flavor/bitterness
 - Alcohol → almond, toffee, or sherry-like flavors
- Temperature vs. O₂ solubility vs. rate of oxidation reaction
 - As temp increases, O₂ solubility decreased
 - As temp increased, rate of oxidation reaction increases
- Acceptable styles?





Diacetyl

- 2,3-butanedione
- Butter, butterscotch, buttermilk
- Threshold - 30 ppb
- Produced in early fermentation (amino acid production)
 - Yeast produces α -acetolactate, eventually becomes valine
 - Some leaks out of yeast cell and chemically converts to diacetyl
 - Yeast reabsorbs the diacetyl and converts to 2,3-butanediol (no significant flavor)
 - Yeast health/nutrients can impact how much diacetyl is produced (\downarrow FAN, \uparrow Diacetyl)
- Can also be produced from certain lactic acid bacteria
 - Unsanitary beer lines
- Prevention
 - diacetyl rest (lagers)
 - VDK test
 - ALDC enzyme
 - regular cleaning of draught lines
- Acceptable styles?





Questions?
THANK YOU!

Sources

- [Cicerone Certification Program](#)
- [Pints and Panels](#)
- *Tasting Beer*, 2nd Edition, Randy Mosher
- [American Society of Brewing Chemists](#)
- *The Oxford Companion to Beer*, Garrett Oliver