

Acetaldehyde

Minnesota Home Brewers Association: Sean P. Hewitt 1/26/06

Alcoholic

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Troubleshooting Off-flavors- Acetaldehyde

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Green apples - Grassy - can taste and smell acetic (vinegar) / cidery 	Yes, at low levels	L/S/P American Lagers (from yeast character is optional)	<ul style="list-style-type: none"> - Premature removal from yeast - Premature flocculation -Oxygen depletion - Bacterial spoilage - Oxidation 	<ul style="list-style-type: none"> - Allow ferment to complete - Good yeast strain - Aerate wort prepitching - Practice good sanitation - Beer handling to avoid O2 contact - long lagering will reduce

Troubleshooting Off-flavors- Alcoholic

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Hot, Spicy - Vinous aroma - A warming, prickling sensation in the mouth and throat 	Yes	Stronger ales and lagers	<ul style="list-style-type: none"> - High amount of fermentable sugars - High fermentation temperature - Low mash temperature - Underpitching - Low O2 or FAN - Yeast strain 	<ul style="list-style-type: none"> - avoid large amounts of sugars - Lower fermentation temperature - Increase mash temperature - Pitch sufficient yeast quantity - Aerate wort prior to piching - Healthy Yeast - Age

Astringent

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Bitterness

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Troubleshooting Off-flavors- Astringent

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Dry, Mouth puckering, unpleasant - in mouthfeel and aftertaste - tannic, tart sensation reminiscent of grape skins 	No	N/A	<ul style="list-style-type: none"> - Extraction of tannins (overcrushing, oversparging) - Alkaline mash or runoff water - excessive hopping - Polyphenols from acetobacter - Spices 	<ul style="list-style-type: none"> - Don't overcrush - Keep sparge temp low - Watch mash/runoff pH - Reduce hop immersion times - Practice good sanitation - Reduce spice additions

Troubleshooting Off-flavors- Bitterness

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - will be tasted on the back of the tongue and the roof of the mouth 	Yes	<ul style="list-style-type: none"> IPA's Pales ales English Bitters 	<ul style="list-style-type: none"> - High AAU hops - Lengthy hops times - fermentation temperature 	<ul style="list-style-type: none"> - Use hops with lower alpha acids - Reduce hop boil times - Higher temperature and quick fermentation decrease bitterness - filtration reduces bitterness

Buttery

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Cardboard

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Troubleshooting Off-flavors- Buttery

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<p>- in Aroma, Flavor and Mouthfeel</p> <p>- Diacetyl</p> <p>- Low: Nutty, caramel</p> <p>- High: Butter, Butterscotch</p> <p>- Mouthfeel, a slickness on the palate</p>	Yes	<p>Scotch Ales</p> <p>Bitters</p> <p>Dry Stouts</p> <p>Czech Pils</p> <p>Oktoberfest</p>	<p>Diacetyl:</p> <ul style="list-style-type: none"> - Premature racking/ fining/ lagering - Low fermentation temperature - Mutant yeast - Lactic acid bacteria (Pediococcus) - Long periods of wort cooling - Underpitching of yeast - Too long an acid rest in mash 	<ul style="list-style-type: none"> - Allow ferment to complete - Higher temperature primary fermentation - Good pure yeast strain - Practice good sanitation - Quick wort chilling - Adequate yeast starter amount - Shorter acid rest in mash

Troubleshooting Off-flavors- Cardboard

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<p>Oxidation</p> <p>- in Aroma and Flavor</p> <p>Initial: Cardboard, paper, wet paper, stale bread crumbs, pineapple</p> <p>Later: sherry-like, leathery, woody</p>	No	N/A	<ul style="list-style-type: none"> - Aeration of hot wort - Aeration of beer during bottling - excessive age - High storage temperatures - Adding tap water to finished without boiling -excessive head space in bottle 	<ul style="list-style-type: none"> - Quiet transfer of beer when siphoning or transferring - Serve beer in appropriate amount of time -Cool (<55F) storage temps -Add only boiled/ chilled water to beer after primary fermentation -Proper head space in bottle

Cloudiness

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Cooked Corn

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Troubleshooting Off-flavors- Cloudiness

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - in Appearance - Cloudy, hazy 	Yes	Wheat Beers, Lambics, American Wheat	<p>Chill haze:</p> <ul style="list-style-type: none"> - Insufficient conversion time <p>Permanent Haze:</p> <ul style="list-style-type: none"> - excessive or high temperature sparge <ul style="list-style-type: none"> - Bacterial/ wild yeast contamination - Poor, wrong, weak or mutated yeast strains - wheat malt 	<ul style="list-style-type: none"> - Longer mash - Use protein rest - Use clearing agents - Use filtration - Reduce sparge temps - Practice good sanitation - Use well-flocculating yeast strain

Troubleshooting Off-flavors- Cooked Corn

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - DMS (dimethyl sulfide) - in Aroma and Flavor - Vegetal (Sweet cooked corn, celery, cabbage, parsnips) - Shellfish or oyster-like in higher amount - Precursor S-methyl-methionine (SMM) occurs naturally in Pale malt, turns in DMS with heat, evaporates 	Yes	American Lagers Cream Ales	<ul style="list-style-type: none"> - Poor sanitation - Covered boil - not boiling wort for at least an hour - contaminated yeast - Over-sparging with water below 160 degrees - Overnight cooling - Underpitching 	<ul style="list-style-type: none"> - Practice good sanitation - Open, rolling boil for an hour or more - Fresh yeast culture - Proper sparging - Quick wort cooling - high pitching rates

Fruitiness

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Light Body

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Troubleshooting Off-flavors- Fruitiness

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Esters - in Aroma and Flavor - Banana, apple, citrus, strawberry, black currant, grapefruit, raspberry and pear, etc 	Yes	<ul style="list-style-type: none"> Ales American Dark Lagers (very light) Dopplebock (in dark versions) Eisbock 	<ul style="list-style-type: none"> - Alcohols combining with acids at higher temperature. (Ethyl acetate, Isoamyl acetate, Ethyl Hexanoate) - Yeast strain used - Higher fermentation temperatures - High-gravity wort 	<ul style="list-style-type: none"> - Choose a different yeast - Lower fermentation temperature (Ales around 60 F, Lagers around 50 F) - Lower gravity wort

Troubleshooting Off-flavors- Light Body

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Watery - Weak - in Flavor and Mouthfeel 	Yes	<ul style="list-style-type: none"> American Light lagers Lambics 	<ul style="list-style-type: none"> - Lack of dextrins - Poor quality malt - Large percentage of sugar - Low-temperature saccharification rest 	<ul style="list-style-type: none"> - Use quality malt - Keep percentage of sugars small - High-temperature saccharification rest - Use dextrin, crystal or wheat malt.

Grassy

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Husky-Grainy

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Troubleshooting Off-flavors- Grassy

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/controlled?
<ul style="list-style-type: none"> - in Aroma and Flavor - Fresh-cut grass - New-mown hay 	Yes, as a hop character	American Pale Ale English IPA America IPA Imperial IPA	<ul style="list-style-type: none"> - Poor quality malt - Poor storage of malt - Cracking grains well in advance of brewing - Some English and American hop varieties - Dry Hopping - Oxidation of alcohols creating hexanal and heptanal 	<ul style="list-style-type: none"> - Good, fresh malt stored under airtight conditions - Cracking grains shortly before brewing - Choose a different hop

Troubleshooting Off-flavors- Husky-Grainy

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/controlled?
<ul style="list-style-type: none"> - in Aroma and Flavor - Cereal - Grainy - Huskiness - Spent grains <p>Husky</p> <ul style="list-style-type: none"> - Tannins from grain husks <p>Grainy</p> <ul style="list-style-type: none"> - starches in barley malt 	<p>No-Husky</p> <p>Yes-Grainy</p>	<p>None</p> <p>Light Lagers Pilsners N. German Alt Brown Porter Robust Porter Dry Stout Wheat beers</p>	<ul style="list-style-type: none"> - Excessive grain crushing - High Sparge temperature - Excessive sparging - High pH during sparging (above 6.0) - High mineral content in water - Boiling grains - Improper decoction mashing 	<ul style="list-style-type: none"> - Proper crush - Lautering temperatures between 164-170° - Proper sparge amounts - Monitoring pH of runoff (keep pH below 6) - Water appropriate to style - Steeping adjunct grains below 170 degrees - Temp. controlled or infusion mash

Low Head Retention

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Phenolic

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Troubleshooting Off-flavors- Low Head Retention

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Flat - in Appearance and Mouthfeel 	Yes	<ul style="list-style-type: none"> Lambics High Alcohol Beers 	<ul style="list-style-type: none"> - inadequate protein rest - insufficient or deteriorated hops - Dirty/oily/soapy glasses - low-temperature saccharification rest -not using a one-hour boil 	<ul style="list-style-type: none"> - Adequate protein rest - Use hops with high alpha acids - Use clean well-rinsed glasses - High-temperature saccharification rest - good one hour (open) rolling boil (to extract the isohumulones) - Use cara-pils, crystal malt, malto-dextrin, wheat malts - Lower alcohol by lowering the grist bill

Troubleshooting Off-flavors- Phenolic

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - in Aroma and Flavor - Band-aid - Clove-like - Smoky Chlorophenolics - Plastic - Medicinal 	Yes	<ul style="list-style-type: none"> Some Belgians beers Smoke beers Some Wheat beer 	<ul style="list-style-type: none"> - Wild yeast - Improper sanitation - Some malt types - Some yeast strains - Chlorophenols in water - Improper rinse of chlorine sanitizers - Oversparging; sparging above pH 6.0; sparging above 170 degrees 	<ul style="list-style-type: none"> - Use pure yeast strains - Practice good sanitation - Use "clean" malt - Use yeast less prone to phenolic production - filter tap water - Use non- chlorine sanitizers - Proper sparging while monitoring temperature and pH

Lightstruck

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Musty

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Troubleshooting Off-flavors- Lightstruck

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<p>- in Aroma and Flavor</p> <p>- Skunky</p> <p>- Mercaptan</p> <p>- Sulfidic (H₂S)</p> <p>- Ultraviolet light reacting with isomerized alpha acids</p>	No	None	<p>- Beer stored in clear or green glass bottles</p> <p>- Beer exposed to direct sunlight or ultraviolet light</p>	<p>- Store beer in Brown bottles</p> <p>- Keep beer</p>

Troubleshooting Off-flavors- Musty

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<p>Oxidation of malt compounds</p> <p>- in Aroma and Flavor</p> <p>- Musty</p> <p>- Cellar-like</p> <p>- Earthy</p>	Yes	Bière de Garde	<p>- Aeration of hot wort</p> <p>- Aeration of beer during bottling</p>	<p>- Quietly transfer of wort/beer when siphoning or transferring</p>

Sherry-like

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Sourness

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Troubleshooting Off-flavors- Sherry-like

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
Oxidation - Sherry - Vinous - Leather - Woodsy - Wine-like - Paper-like - Old - Accompanied by hazelnut or almond notes	Yes	Barleywines English Old Ales	- Oxidative yeasts acting on higher alcohol beers creates aldehydes (ie. trans-2-nonenal)	- Use different yeast strain - Create less alcohol by lowering grist bill - Serve beer younger - Ferment cooler

Troubleshooting Off-flavors- Sourness

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
basic taste sensation - in Aroma and Flavor -perceived on sides on the tongue - Tart - Sour - vinegar-like aroma -	Yes	Witbier Lambics Flanders Ale Berliner Weisse (optional sourness) American Wheat or Rye, Dry Stout, Witbier and Saison	Poor sanitation Acid-creating Bacteria's (Lactobacillus, Pediococcus, Acetobacter) - Some yeast strains - Excessive acid rest - Mashing too long - Scratched plastic fermenter - Storage at warm temperatures	- Practice good sanitation - Choose a different yeast - Shorter acid rest - Mashing for less than two hours - Use glass carboy or stainless steel fermenters - Cool (<55 degree) storage

Solvent-like

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Sulfury/ Yeasty

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Troubleshooting Off-flavors- Solvent-like

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - in Aroma and Flavor - Pungent, acrid aroma - Harsh, burning sensation on the tongue, back of the throat - Acetone-like - Lacquer-thinner like - Turpentine - Ethyl acetate 	No	None	<ul style="list-style-type: none"> - Wild yeast contamination - High fermentation temperatures - Lack of oxygen - Underpitching - Non-food grade plastic equipment 	<ul style="list-style-type: none"> - Good sanitation of equipment - Cooler fermentation temperatures - Proper wort oxygenation - Pitch sufficient yeast quantity - only food-grade plastic used

Troubleshooting Off-flavors- Sulfury/Yeasty

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - in Aroma and Flavor - Rotten eggs - Yeasty - Meaty <p><u>Sulfitic- SO₂</u> Struck match</p> <p><u>Sulfidic</u> Hydrogen sulfide (H₂S)</p> <p>Low level: Garlic, onion</p> <p>High level: burnt rubber, shrimp-like</p>	No	None	<ul style="list-style-type: none"> - Bacterial contamination - Wild yeasts - Yeast strain -- old beer (yeast autolysis) - Rapid temperature changes to fermenting wort 	<ul style="list-style-type: none"> - Practice good sanitation - Good yeast strain - Racking off sediment - Cooling lagers no more than 5 degrees per day

Sweet

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XXX

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Troubleshooting Off-flavors- Sweet

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
<ul style="list-style-type: none"> - Basic taste sensation - taste perceived primarily at the tip of the tongue - Due to the presence of reducing sugars - Sugary - Syrupy 	Yes	<ul style="list-style-type: none"> - High levels desirable in most strong ales and lagers - Low levels in American light lagers and lambics 	<ul style="list-style-type: none"> - Quick flocculating or Low attenuating yeast strain - High-temperature mash - Addition of dextrin malt, malto-dextrin, crystal malt - Addition of lactose or licorice - Poor yeast health - Premature lagering 	<ul style="list-style-type: none"> - Yeast strain with good attenuation - Low-temperature mash - Reduce the grain - Reduce the amount - Add yeast nutrients, Proper wort oxygenation - Lagering, after primary fermentation

Troubleshooting Off-flavors- x

Describe/Discuss	Ever Appropriate?	If so, what styles?	How is it caused?	How can it avoided/ controlled?
-			-	-