

ASBC Beer Flavor Wheel, Second Edition: Expanded List of Terms (5-1-23)

RING 1	RING 2	RING 3	ASSOCIATED TERMS (MAY VARY BASED ON PHYSIOLOGY AND EXPERIENCE)	RELEVANT CHEMISTRY	POTENTIAL SOURCES	
Basic Taste	Sour	Acetic	Vinegar, solvent	Acetic acid	Produced by yeast during fermentation; acetic acid bacteria	
		Acidic				
		Citric	Lemon juice, acidic	Citric acid	Produced by yeast during fermentation; acidification in brewhouse; bacterial contamination	
		Lactic		Lactic acid	Produced by bacteria in mashing; bacterial contamination	
	Sweet	Sweet	A taste derived from sugar	Sucrose	Derived from malt, yeast, adjuncts	
	Salty	Salty		Sodium chloride	Brewing salts; malt	
	Bitter	Bitter	A sensation experienced on back of the throat	Iso-alpha-acids	Hops during the kettle boil	
	Umami	Umami	Soy sauce, autolyzed yeast, meaty, marmite			
Mouthfeel	Astringent	Astringent	Dry/drying, puckering		High polyphenol levels (especially glycosidically bound flavon-3-ol)	
	Chalky	Chalky	A dry, powdery sensation and an aroma associated with mineral salts such as chalk		Generally high levels of insoluble calcium (carbonates and phosphates) which may also promote astringency and excessive bitterness	
	Mouthcoating	Mouthcoating	The impression of a coating film in the mouth which diminishes over time		Beta-glucans from malt and microbes, phytosterols (esters, glycosidically-bound, native) from hops and malt, some flavon-3-ol polyphenols, lipids from adjuncts	
	Body	Full	Not to be confused with viscous, the feeling of force against the mouth and tongue; high in body; Body: mouthfeel associated with thinness, fullness, and thickness		Beta-glucans, fermentation resistant polysaccharides/dextrins, polyphenols	
		Thin	Low in body			
	Carbonation	Effervescent			Carbon dioxide	Produced by yeast during fermentation
		Flat				
	Irritating	Hop burn/Scratchy	An abrasive, lingering bitterness commonly experienced on the back of the tongue/throat		Multiple potential - proline binding polyphenols & polyamines, excessive hop oil in solution	
	Alcoholic	Warming	General effect of ethanol, warming	Ethanol		
	Aroma	Dried fruit	Date		Isoamyl phenyl acetate	Aged beer; higher inclusion rates of dark malt
Fig					Aged beer; higher inclusion rates of dark malt	
Prune					Aged beer; higher inclusion rates of dark malt	
Raisin					Aged beer; higher inclusion rates of dark malt	
Jam		Jam				
		Compote				
		Marmalade				
Berry		Black currant/Catty	Fruity, cat urine		P-menthane-8-thiol-3-one; 4-mercapto-4-methyl-2-pentanone	Raw materials impart catty (hops, yeast); ageing/oxidation
					Alpha-ionone	Hops
		Blackberry				
		Blueberry				
		Concord grape			Methyl anthranilate	
		Cranberry				
		Green grape				
		Grape	Wine		2-Aminoacetophenone	The origins of 2AAP is typically from corn syrup adjunct, particularly dextrose. Other causes of 2AAP are stressed yeast during fermentation, pseudomonas aeruginosa found in cellars that produce precursors to 2-aminoacetophenone and enzymatic hydrolysis of glycoside precursors.
Muscat grape						
Raspberry			Damascenone	Aged beer; higher inclusion rates of highly hopped beers		
Strawberry			Damascenone	Aged beer; higher inclusion rates of highly hopped beers		
White grape						

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Aroma	Tropical	Banana/Isoamyl acetate	Banana, solvent, fruity	Isoamyl acetate	Produced by yeast (strain, grain, and fermentation affect)		
		Coconut	Fatty, waxy, floral, apricot	Gamma decalactone, coconut lactone			
		Guava	Earthy, musty, overripe, tropical	3-mercaptohexyl acetate	Produced by yeast; hops		
		<i>Kiwi</i>			Produced by yeast; hops		
		<i>Lychee</i>	Rose, citronella, lime	3-mercaptohexyl acetate, L-Rose oxide; Citronellol	Produced by yeast; hops		
		Mango	Harsh floral smell, green and metallic, reminiscent of mango skin	3-mercapto-1-hexanol,	Produced by yeast; hops		
		Passion fruit		3-mercaptohexyl acetate	Produced by yeast; hops		
		<i>Papaya</i>		3-mercaptohexyl acetate	Produced by yeast; hops		
		Pineapple	Sweet aromatic, bubblegum, fruity, artificial fruit	Ethyl butyrate	Produced by yeast (strain, grain, and fermentation affect)		
		Stone fruit	Apricot/Peach		C8-12 lactones; Delta damascone; Damascenone		
			Cherry	Marzipan, sweet aromatic, almond	Geranyl/terpinyl butyrate; Terpinyl acetate; Benzaldehyde		
			<i>Nectarine</i>				
			<i>Plum</i>				
		Apple	<i>Cider</i>		Acetaldehyde	Produced by yeast; high oxygen levels in packaging	
			Green apple/Acetaldehyde	Vegetal, paint, green leaves, grassy, solvent, fruity	Acetaldehyde	Produced by yeast; high oxygen levels in packaging	
			Red apple/Ethyl hexanoate	Waxy, fat, licorice, anise, spicy, green apple, solvent, fruity	Ethyl hexanoate	Produced by yeast	
			<i>Pear</i>	<i>Pear</i>			
		Melon	Cantaloupe				
			Cucumber	Vegetal, paper, banana, vegetal	Trans-2-nonenal; Cis-3-hexanol		
			Honeydew				
			Watermelon	Green leaves, fresh-cut grass	Cis-3-hexanal		
	Aroma	Citrus	<i>Blood orange</i>				
			Grapefruit				
			Lemon	citronella		Linalool, Geraniol	
			Lime			Citronellol, Geraniol	
			Orange			Limonene	Hop compounds added at the end of copper boil or start of fermentation will add late hop character to beer. The flavour will be a light citrus, fruity or floral fragrant character. Hop varieties typically used include Saaz, Super Styrian and Hersbrucker. Late hop character is associated with lagers, ales and top fermented speciality beers.
			<i>Tangerine</i>			E-4-decenal	
			Floral	Geraniol	Rose, lime, geranium, lemon, floral, fruity, hyacinth		Hop oil
			<i>Hibiscus</i>				
			<i>Honeysuckle</i>				
			Jasmine				
			Lavender	Woody, spicy, coriander, floral, rosewood, fruity	Linalool		
			<i>Lilac</i>				
			<i>Perfume</i>	A floral character as found in perfumes			
			<i>Soapy</i>	Aldehydic, citronella, oily			
			Rose	Lychee, citronella, lime, geranium, lemon, floral, fruity, hyacinth	Citronellol, Geraniol		

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Aroma	Grassy	Fresh-cut grass	Green leaves, watermelon, banana, cucumber, vegetal, green leaves	Cis-3-hexanal, Cis-3-hexanol	Hops or immature malt
		Green grass	Green leaves, watermelon, fresh-cut grass, banana, cucumber, vegetal, green leaves	Cis-3-hexanal, Cis-3-hexanol	Hops or immature malt
		Hay			Malt
		Straw			Malt
	Herbal	Basil			Hops
		Black tea			Hops
		Cannabis			Hops
		Cilantro			Hops
		Citronella			Hops
		Dill			Hops
		Green tea			Hops
		Lemongrass			Hops
		Mint			Hops
		Rosemary			Hops
		Sage			Hops
	Tea			Hops	
	Thyme			Hops	
	White tea			Hops	
Aroma	Spicy	Allspice			Ageing
		Anise		Anethol; Anisole (Methoxybenzene)	Ageing
		Black pepper	Medicinal, resinous, woody, pine, grassy, balsamic	Myrcene, Piperine	Ageing
		Cinnamon		Ethyl cinnamate	Ageing
		Clove	sweet aromatic, burnt, smoke, vanilla, medicinal, burnt rubber	4-Vinyl guaiacol; 4-Ethyl guaiacol	Ageing
		Ginger			Ageing
		Nutmeg			Ageing
	Woody	Cedar		Humuene epoxide II, III	
		Cherry wood			
		Eucalyptus			
		Oak			
		Pine	Medicinal, resinous, spicy, black pepper	Myrcene	
		Resinous	Medicinal, spicy, balsamic	Myrcene	This attribute comes from the complex volatile oil fraction of hop. Most of the component substances do not survive the brewing process intact and are chemically transformed into as yet poorly defined compounds. Certainly, there does not appear to be one compound solely responsible for hop aroma in beer, although several groups (e.g. sesquiterpene epoxides, cyclic ethers, furanones) have been strongly implicated.
		Sawdust			
		Tea tree			
		Tobacco	Dried fruit, woody, sweet aromatic, herbaceous, earthy, dry leaves, solvent, menthol, honey	Ethyl syringate; Damascenone	
	Earthy	Beet		Geosmin	
		Bell pepper	Chiles	2-isomutyl-3-methoxypyrazine	2-isobutyl-3-methoxypyrazine is imparted to beer through use of contaminated brewing liquor, rinse liquor or dilution liquor. The source of the taint is growth of microorganisms in the water supply.
		Compost		2-methylisoborneol	Mouldy flavours from 2-methylisoborneol are imparted to beer through use of contaminated brewing liquor, rinse liquor or dilution liquor. The source of such taints is growth of microorganisms in the water supply.
		Geosmin	Soil, earthy, sugar beets		Geosmin is imparted through use of contaminated brewing liquor, rinse liquor or dilution liquor. The source of the taint is usually growth of microorganisms in the water supply.
	Leather		6-isobutylquinoline	Ageing	
	Mineral				
	Mushroom	Mouldy, canned mushrooms	1-octene-3-ol		
	Musty	Earthy, musty, mold	Trichloroanisol	Raw materials or packaging contamination	
	Petrichor	"A pleasant smell that frequently accompanies the first rain after a long period of warm, dry weather"			

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		Soil	Freshly-dug soil	Ethyl fenchol	Water supply contamination	
	Cereal	Cereal	Biscuit, popcorn	Acetylpyridine	Malt or yeast derived	
		<i>Cheerios</i>		THP	Malt or yeast derived	
		<i>Corn flakes</i>			Malt or yeast derived	
		<i>Grape nuts</i>			Malt or yeast derived	
	Bready	Biscuit	Cereal, popcorn	Acetylpyridine	Malt or yeast derived	
		<i>Bread crust</i>			Malt or yeast derived	
		<i>Bread dough</i>			Malt or yeast derived	
		<i>Corn tortilla</i>			Malt or yeast derived	
		Dough			Malt or yeast derived	
		<i>Pie crust</i>			Malt or yeast derived	
		<i>Play-Doh</i>			Malt or yeast derived	
		Toasted bread			Malt or yeast derived	
		Yeasty	Fermented, sulfury, bread-like, fresh yeast, flavor of heather thiamine		Malt or yeast derived	
	Malty	Malty	Cereal, biscuit, popcorn	Acetylpyridine	Developed in malt kilning	
	Grainy	Corn grits	Green, harsh, green malt character	Iso-butylaldehyde	Pale malt usage, brewhouse procedures, yeast strain	
		Husky				
	Worty	Worty				
	Nutty	<i>Almond</i>	Marzipan, cherry	Benzaldehyde	Oxidation or ageing	
		<i>Hazelnut</i>				
		Peanut butter				
		<i>Pumpkin seed</i>				
		<i>Sesame seed</i>				
		<i>Sunflower seed</i>				
		<i>Walnut</i>				
	Roasted	Burnt toast	Roasted, or scorched malt		Roasted or specialty malts; Maillard reactions	
		Chocolate			Roasted or specialty malts; Maillard reactions	
		Coffee			Roasted or specialty malts; Maillard reactions	
		<i>Roasted barley</i>			Roasted or specialty malts; Maillard reactions	
Aroma	Sweet aromatic	Brown sugar	Maderia wine or curry leaves	Sotolon	Infection with <i>Botrytis cinerea</i> , so-called noble rot. It can also be derived in ways that are not yet fully understood in	
		Bubblegum	Pineapple, banana, fruity, artificial fruit	Ethyl butyrate	Produced by yeast (strain, grain, and fermentation affect)	
		Caramel		Fureneol		
		<i>Cotton candy</i>		Ethyl maltol		
		<i>Ethyl butyrate</i>	Pineapple, bubblegum, fruity, artificial fruit		Produced by yeast (strain, grain, and fermentation affect)	
		Honey		Damascenone		
		<i>Maple syrup</i>				
		<i>Marshmallow</i>				
		Molasses				
		Toffee				
		Vanilla		Vanillin	Malt derived; ageing characteristic, especially if in barrel	
		Diacetyl	Butter	Dairy, buttermilk, cheese	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination
			<i>Buttermilk</i>	Dairy, butter, cheese	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination
			<i>Butterscotch</i>	Dairy, butter, caramel, sweet aromatic	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination
			<i>Dairy</i>	Butter, buttermilk, cheese	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination
			<i>Earthy</i>	Mold, sewage	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination
			<i>Mold</i>	Earthy, sewage	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination
			<i>Yogurt</i>	Dairy, butter, buttermilk, sour, cheese, fruity	Ethyl lactate; Diacetyl; Butyric acid	Diacetyl: produced from a yeast precursor in fermentation; lactic acid bacteria contamination

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Aroma	Spirits	<i>Amaretto</i>			Excessive alcohol; yeast-derived	
		Brandy			Malt derived; ageing characteristic, especially if in barrel	
		<i>Red wine</i>	Vinous			
		Rum	Caramel		Malt derived; ageing characteristic, especially if in barrel	
		Sherry			Malt derived; ageing characteristic, especially if in barrel	
		Tequila		Propanol	Malt derived; ageing characteristic, especially if in barrel	
		Whisky			Malt derived; ageing characteristic, especially if in barrel	
		<i>White wine</i>				
		Phenolic	Adhesive bandage	Medicinal, earthy, barnyard, plastic	4-Ethyl phenol	Wort production; some yeast strains or wild yeast contamination
			<i>Burnt rubber</i>	Medicinal, spicy, clove, burnt, smoke	4-Ethyl guaiacol	
			<i>Cough syrup</i>			
			<i>Garden hose</i>			
			Medicinal	Antiseptic	4-Vinyl guaiacol; Chlorophenol; 2,6-dimethoxyphenol; 6-chloro-o-cresol	POF+, PAD+ yeasts, other micro contamination
			<i>Plastic</i>	Medicinal	Styrene	
			Smoky	Phenolic, medicinal, bacon, balsamic, burnt, woody	Guaiacol; 2,6-dimethoxyphenol	Raw material exposure to smoke; micro contamination
			<i>Vinyl</i>			
		Brettanomyces	Barnyard	Medicinal, adhesive bandage, earthy	4-Ethyl phenol; cresol; indole; skatole	Brettanomyces used in fermentation or as infection
			Corn chip			Brettanomyces used in fermentation or as infection
			Horse blanket			Brettanomyces used in fermentation or as infection
			<i>Manure</i>	Fecal	Indole	Brettanomyces used in fermentation or as infection
			<i>Musty</i>	Damp basement or cork taint in wine	2,4,6-trichloro-E268moanisole; 2,4,6-tribromoanisole	Brettanomyces used in fermentation or as infection; 2,4,6-trichloroanisole and 2,4,6-tribromoanisole are not caused by Brett
			Sweaty			Brettanomyces used in fermentation or as infection
		Sulfur	<i>Boiled eggs</i>	Sulfidic	Hydrogen sulfide (H ₂ S); Mercaptan	Produced by yeast during fermentation and maturation; bacterial contaminant
			Burnt rubber		2-thiophenethiol; 1-propanethiol	Formed by yeast through the metabolism of sulfur-containing amino acids, particularly SO ₂ . A small amount may also come from hop oils, particularly in hops that have been treated with sulfur during farming. Using unapproved gasket materials on heat exchangers (EPDM - teflon and buna-N)
			Garlic		Dimethyl trisulfide	Old hops/hop oil
			Hydrogen sulfide (H ₂ S)	Boiled eggs, hair perm, wet dog		Produced by yeast during fermentation
			Lightstruck	Skunky, fresh brewed coffee, cannabis-like	3-methyl-2-butene-1-thiol (MBT)	Formed when certain hop acids in beer are exposed to light. It is formed when photosensitized isohumulones react with sulphur-containing amino-acids and proteins in the presence of riboflavin.
			Mercaptan	Drains, boiled eggs, vegetal, rotting compost	Methanethiol	Yeast autolysis; bacterial growth
			Onion	Cooked onion	Dimethyl sulfide	Produced in wort boiling, purged by yeast-produced CO ₂ ; old hops/hop oil. Although produced from amino acids during wort boiling most dimethyl trisulphide is formed during storage of packaged beer. Some hops impart this character when used post-fermentation.
		<i>Struck match</i>	Sulfitic, burnt		Produced by lager yeasts; added as preservative	
		Sulfur dioxide (SO ₂)	Struck match, young white wine, choking, multi-vitamin pill bottle		Sulfur can come from two sources, inorganic and organic. Inorganic sulfur can come from the water supply (Hard water) or sulphites can be added to beer as a preservative or an antioxidant. Organic sulfur, notable amino acids that contain sulfur, cysteine and methionine. Lager yeasts naturally produce sulphite during fermentation.	
	Vegetal	<i>Canned corn</i>		Dimethyl sulfide	DMS: formed from precursor in malt S-methylmethionine; bacterial contamination	
		Cooked cabbage		Dimethyl sulfide; Methyl thioacetate	DMS: formed from precursor in malt S-methylmethionine; bacterial contamination. Methyl thioacetate is produced by lager yeast (but not by ale yeast) during fermentation	

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Aroma		Cooked onion		Dimethyl sulfide; Dimethyl trisulphide	DMS: formed from precursor in malt S-methylmethionine; bacterial contamination
		<i>Cooked potato</i>		Methional	Ageing attribute
		<i>Celery</i>		Myrcene	
		<i>Cucumber</i>		(E,Z)-2,6-nonadienal	Beer staling
		Dimethyl Sulfide (DMS)	Canned corn, cooked cabbage, baked beans, black olives, onion, tomato paste, tomato sauce, squash		Formed from precursor in malt S-methylmethionine; bacterial contamination
		<i>Green beans</i>			
		<i>Bell pepper</i>			
		<i>Tomato paste</i>		Dimethyl sulfide	DMS: formed from precursor in malt S-methylmethionine; bacterial contamination
		<i>Tomato plant</i>			
	Oxidized	Cardboard	Stale, paper	Trans-2-nonenal	Formed in wort production, released during storage of packaged beer; ageing
		<i>Dusty</i>			
		<i>Leather</i>	Dry hay	Isobutylquinoline	Ageing attribute
		<i>Lipstick</i>	Stale, waxy	Trans-2-nonenal	Formed in wort production, released during storage of packaged beer; ageing
		<i>Meaty</i>			
		<i>Mousy</i>		2-acetyltetrahydro-pyridine	
		Papery	Stale, cardboard	Trans-2-nonenal	Formed in wort production, released during storage of packaged beer; ageing
		<i>Stale</i>			Ageing attribute
		<i>Waxy</i>	Fat, vegetable oil	Caprylic acid; Octanoic acid	Octanoic acid is produced by yeast during maturation of beer. It is released into beer from autolysing yeast cells.
		<i>Wet dog</i>			
	Butyric	Baby vomit		Butyric acid	Produced by bacteria during mashing or storage, spoilage in package
	Caprylic	Goaty	Waxy, fat, vegetable oil;	Caprylic acid; Octanoic acid	Produced by yeast during conditioning. Octanoic acid is produced by yeast during maturation of beer. It is released into beer from autolysing yeast cells.
	Isovaleric	Cheesy	Sweaty socks, dairy, stale	Isovaleric acid	Breakdown of alpha-acids in hops; wild yeast
	Chemical	<i>Acetic acid</i>	Sour, vinegar, sharp, solvent		
		Acetone	Nail polish remover		
		Alkaline	Caustic, chemical cleaner	Sodium bicarbonate	Caustic contamination
		<i>Ethyl acetate</i>	Solvent, fruity		Produced by yeast during fermentation
		<i>Permanent marker</i>			
		Metallic	Iron, rust, blood-like	Ferrous sulphate	Contact of beer with metal materials
		<i>Paint thinner</i>			
		<i>Petroleum/diesel</i>	Kerosine		
		Plastic			
		Solvent	Ethyl acetate	Ethyl acetate	
		<i>Vinegar</i>		Acetic acid	