Flavor Bites: δ-Octalactone

Use in fruit, dairy, savory and alcohol flavors

John Wright; johnwrightflavorist@gmail.com

δ-Octalactone (FEMA# 3214; CAS# 698-76-0) is, puzzlingly, one of the least widely used of the entire family of lactones. It has an attractive, predominantly coconut character with significant creamy and hay notes. However, most creative interest amongst δ-lactones is typically directed toward δ-decalactone (FEMA# 2361, CAS# 705-86-2) and δ-dodecalactone (FEMA# 2401, CAS# 713-95-1), both of which are predominantly creamy in character. Among other lactones with a dominant coconut character, γ-nonalactone (FEMA# 2781, CAS# 104-61-0) is overwhelmingly used in formulations. γ-Nonalactone also has a long history of use, and for many years was the only practical choice for coconut flavors.

Coconut flavors derived from γ-nonalactone are quite powerful, but also relatively harsh and unrealistic. This is not at all surprising, because this chemical actually has no role in the character of coconuts in nature. δ-Octalactone is not normally the lactone present naturally in the highest quantities in coconuts, but organoleptically it is always the dominant note, usually with significant modification from the creamy notes of δ-decalactone and δ-dodecalactone.

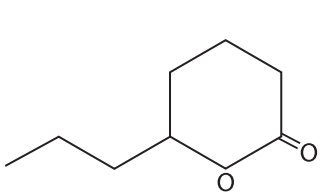
Other lactones possessing notable coconut characters are δ-hexalactone (FEMA# 3167, CAS# 823-22-3), which has a dominant hay note; δ-heptalactone (CAS# 3301-90-4), which combines hay and coconut notes; δ-nonalactone (FEMA# 3356, CAS# 3301-94-8), which combines creamy and coconut notes; and γ-octalactone (FEMA# 2796, CAS# 104-50-7), which combines coconut and hay notes. All are interesting but none has the soft, realistic character and wide range of uses possessed by δ-octalactone.

Coconut Flavors

Coconut flesh: δ-Octalactone may not always be the dominant lactone, but it has by far the most important character recognition role. It imparts a soft, highly natural character when used at around 10,000 ppm in a flavor intended for use at 0.05% in ready-to-drink beverages, soups or sauces.

Coconut water: The role of this chemical is even more dominant in coconut water because of the reduced importance of δ-decalactone and δ-dodecalactone. Coconut water has a much more subtle flavor than the flesh, so levels of use in flavors are lower, typically around 1,000 ppm.

Structure of δ-octalactone F-1



Berry Flavors

Raspberry: In my opinion, δ-octalactone is easily the most effective lactone for the difficult task of adding depth and fleshy character to berry flavors. One thousand ppm makes a very good starting level in flavors but radically different levels can be as effective.

Blackcurrant: This ingredient is similarly useful in blackcurrant flavors and can be used to add depth at varying levels around 500 ppm.

Strawberry: Lower levels are helpful to round out strawberry flavors, typically at around 200 ppm.

Cranberry: Relatively low levels can be effective in cranberry flavors, about 100 ppm.

Blackberry: Five hundred ppm is effective in blackberry flavors, although higher levels can also work, up to 1,000 ppm.

Other Fruit Flavors

Peach: δ-Octalactone only plays a secondary role in the lactone complex of peach flavors, but it is very useful to soften, and add realism and impact at around 200 ppm.

Apricot: The same sentiments apply to apricot flavors, where it is especially helpful to soften the intrusive linalool character, at similar levels around 200 ppm.

Mango: Similarly, mango flavors benefit from 200 ppm of δ-octalactone to add fleshy notes.

Pineapple: Varied but generally lower levels are useful in pineapple flavors, around 50 ppm.

Papaya: Low levels are also effective in papaya flavors. Twenty ppm is a good starting point.

Passion fruit: Fifty ppm or less is quite effective in passion fruit flavors, giving realism and depth.

Nectarine: Nectarine flavors can accept even higher levels than peach flavors, up to 500 ppm.

Dairy Flavors

Butter: The role of δ-octalactone in dairy flavors is again secondary to the role of the other lactones present, but the effect is to add depth and considerable impact. Levels vary considerably, but 1,000 ppm is very effective.

Cream: Cream flavors are milder and less lactonic than butter flavors, and 300 ppm is a useful level.

Yogurt: Yogurt flavors are usually even milder, and levels of 50 ppm make a good starting point.

Cheese: High levels, around 1,000 ppm, are needed in Parmesan and blue cheese flavors but lower levels, around 100 ppm, are better in milder cheese flavors.

Meat Flavors

Beef: Beef flavor top notes tend to be thin and often lack body. δ-Octalactone can help round out the character at subtle levels, starting at 50 ppm.

Ham, bacon and pork: The effect is similar in ham and pork flavors, but levels are often lower, about 30 ppm; however, bacon flavors can tolerate higher levels.

Chicken: Lactones are even more important in chicken flavors, and 100 ppm is an ideal level to modify the higher molecular weight δ-lactones, such as δ-decalactone.

Lamb: Lamb flavors use levels in the same range as beef flavors, around 50 ppm.

Brown and Nut Flavors

Caramel and toffee: Levels can vary dramatically, from 50–2,000 ppm, depending on the level of creamy and hay notes required.

Cereal: Much subtler levels are good in a range of cereal flavors, about 50 ppm.

Hazelnut: Levels between 10–50 ppm are optimal in hazelnut flavors, adding complexity.

Roasted almond: Higher levels, around 100 ppm, work well in roasted almond flavors.

Coffee: Coffee flavors often need added depth and body, which can be achieved by 50 ppm of δ-octalactone.

Vanilla: All the minor components of vanilla flavors play second fiddle to vanillin and serve to add creamy and haylike notes. δ-Octalactone is helpful at 20 ppm.

Chocolate: Low levels are effective in most chocolate flavors, around 50 ppm, with higher levels in especially milky examples.

Black tea: Fifty ppm is a good level to effectively add realism to black tea flavors, though it is less useful in green tea flavors.

Alcoholic Drink Flavors

Rum: Fifty to 200 ppm adds depth and softens dark rum flavors, but lower levels are better in white rum flavors.

Sherry: Oloroso-type sherry flavors benefit from the addition of 200 ppm of δ-octalactone. Fino-type sherry flavors are not helped by this ingredient.

Wine: One hundred ppm is a good starting point in wine flavors, adding depth to both white and red wine profiles.

Other Flavors

Cilantro: The dominant, unsaturated aldehyde notes in coriander leaf flavors sorely need added depth, and 200 ppm of δ-octalactone can be very helpful.

Tomato: Tomato flavors, especially those with a cooked or air-dried character, can be improved by the addition of 50 ppm.
