



Ethyl *cis*-4-octenoate

Use in tropical, stone and other fruit flavors, as well as alcoholic drinks and savory flavors

John Wright; johnwrightflavorist@gmail.com

Ethyl *cis*-4-octenoate (FEMA# 3344, CAS# 34495-71-1; **F-1**) is an unusually attractive unsaturated aliphatic ester. The character is fresh and typical of tropical fruits, generally fruity with a hint of pineapple. The effect of this ingredient in flavors, usually at a relatively modest level, is to add freshness, rather than to be highly specific to a particular fruit type. It is found in nature in relatively few natural fruits, but the serendipitous combination of an especially fresh character and relative heat stability make it potentially far more useful than its natural abundance would suggest.

Ethyl *trans*-4-octenoate (CAS# 78989-37-4) has a similar character but is slightly less attractive because of hints of fatty and melon notes. It is more widely used in fragrances than flavors, but where it is permitted it is almost as useful as the *cis* ester in flavors.

Many other similar esters can claim a rightful place in a flavorist's palette, but ethyl *cis*-4-octenoate has a cleaner and more widely usable profile in most types of fruit flavors, with the possible exception of melon.

Tropical Flavors

Pineapple: Realistic pineapple flavors have always presented an interesting creative challenge for flavorists. Allyl hexanoate (FEMA# 2032, CAS# 123-68-2) and related esters seem to capture the character of pineapple quite well, if with a rather candylike style, yet they play virtually no role in the character of pineapples in nature. The range of 3-acetoxy aliphatic esters found in pineapple in nature have interesting characters but do not



provide a very cost effective or stable solution. Saturated aliphatic esters, such as ethyl hexanoate (FEMA# 2439, CAS# 123-66-0), have the character of pineapple but miss the fresh tropical notes. The addition of modest amounts of ethyl *cis*-4-octenoate, around 100 ppm in a flavor intended for use at 0.05% in a ready-to-drink beverage, adds both freshness and authenticity.

Passion fruit: This ingredient is also very valuable in fresh passion fruit flavors. It provides an ideal tropical fruit note and a degree of freshness and juiciness. Levels of use can vary considerably but are typically in the range of 10–200 ppm in a flavor.

Papaya: Moderate levels, around 50 ppm, of ethyl *cis*-4-octenoate are very helpful in papaya flavors, adding freshness to a flavor type that can easily become too cloying and heavy.

Mango: Similar levels, in the region of 50 ppm, can add attrac-

tive freshness and juiciness to mango flavors and help offset the dominant skin character.

Soursop: Moderate additions, from 20–50 ppm, of this ingredient can be very useful in this unusual flavor category.

Watermelon: Twenty ppm makes an ideal starting point for this ingredient in watermelon flavors. In this flavor type the effect is, oddly enough, to add a little depth and complexity rather than to brighten the flavor.

Banana: Similar levels are useful in banana flavors, adding depth and a useful level of freshness and realism.

Cantaloupe melon: Lower levels, down to 5 ppm, in a flavor are advisable in most other types of melon flavors.

Stone Fruit Flavors

Peach: Adding fresh fruity notes to peach flavors can also be problematic. Many esters play a part in nature but

if they are overemphasized, the character of the flavor starts to drift away from peach. Butyl acetate (FEMA# 2174, CAS# 123-86-4) is one of the most important, but if the level of this ingredient is increased moderately the character of the flavor soon begins to resemble banana. Ethyl *cis*-4-octenoate can be used at quite high levels, typically 100 ppm but even up to 500 ppm in a flavor, adding freshness and fruity character without detracting from the resemblance to peach.

Black cherry: Like peach flavors, black cherry flavors have a quite complex fruity note, and it can be difficult to accentuate this without losing focus. Levels of use here are similarly high, up to 500 ppm in a flavor.

Nectarine: This ingredient is almost equally useful in fresh nectarine flavors. The same issues apply as those considered for peach flavors, but a typical level is a little lower, around 60 ppm.

Apricot: The effect in apricot flavors is quite similar to that in peach and nectarine flavors but the level of use is rather lower, typically around 40 ppm.

Other Fruit Flavors

Apple: Many apple flavors are too heavily reliant on ethyl 2-methyl butyrate (FEMA# 2443, CAS# 7452-79-1) and other, similarly volatile, esters. Consequently they can be unnaturally thin and bright. Ethyl

cis-4-octenoate can add much-needed depth and complexity whilst also enhancing the juicy and fresh aspects of the flavor. Levels of use can vary, but 50 ppm in a flavor makes a good starting point.

Pear: Similar comments can be made concerning isoamyl acetate (FEMA# 2055, CAS# 123-92-2) in pear flavors, but the problem is much reduced by the well-established use of ethyl *trans*-2,*cis*-4-decadienoate (FEMA# 3148, CAS# 3025-30-7).

Consequently, levels of ethyl *cis*-4-octenoate in the region of 20 ppm are more appropriate for this flavor type.

Blueberry: Blueberry flavors can also easily become too thin and light. Levels of around 20 ppm in a flavor add depth and realism.

Grape: Concord grape flavors can benefit from 20 ppm of this ingredient without acquiring an overtly tropical character. Other grape types are better served by lower levels, around 5 ppm.

Strawberry: At first sight this note would appear a little unexpected in strawberry flavors but at modest levels,

around 5 ppm, it can add attractive complexity and a degree of freshness.

Plum and damson: Five ppm is also helpful in these flavor types, again adding complexity and contributing to the perception of realism.

Alcoholic Drink Flavors

Whiskey: Only subtle additions are needed in whiskey flavors, in the region of 0.5–2.0 ppm, but the effect is a noticeable increase in realism.

Brandy: The same comments and similar, or slightly lower, dose rates apply to cognac and other brandy flavors.

Beer: The effect in beer flavors is very subtle and additions of around 0.5 ppm are quite sufficient.

Savory Flavors

Crab: Very modest additions of ethyl *cis*-4-octenoate can be useful in a number of savory flavors, but it is particularly useful in crab flavors. One ppm is a good starting level.

To purchase a copy of this article or others, visit www.PerfumerFlavorist.com/magazine. 

Ethyl *cis*-4-octenoate

F-1

