



# Ethyl Cinnamate

This ingredient's fruity, guava, balsamic aroma adds charisma to strawberry and other flavors.

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Strawberry flavors have undergone several generational changes since the advent of GC/MS analyses allowed flavorists to use nature more liberally as a source of inspiration and ideas. Many of the ingredients used in more modern strawberry flavors were newly developed as a result of their analytical discovery, but some of them were familiar raw materials for which analysis simply indicated new uses. Methyl cinnamate (FEMA# 2698, CAS# 103-26-4) belongs very firmly in the latter category. It is not exactly a modern flavor ingredient, but the discovery of this chemical's interesting fruity, guava, balsamic aroma in fresh strawberries has sparked renewed interest. Today, it would be very difficult to find a strawberry flavor on the shelf of any laboratory that does not contain high levels of methyl cinnamate.

I would never advocate using nature as a cast-iron template for flavor creation, but it is sometimes at least worth using nature as a reality check. Unfortunately, the use of methyl cinnamate fails that reality check by a wide margin. The levels of methyl cinnamate that are often used in strawberry flavors far exceed the levels of this ingredient that normally occur in real strawberries. This imbalance seems not to be too problematic at first, but it carries with it several subtle drawbacks. Most commercial strawberry flavors are a little too cloying because of the unnaturally high levels of methyl cinnamate, and they are also relatively inflexible in respect of dose rates. Excessive levels of methyl cinnamate also impose some cost penalties, especially in natural with other natural flavors (WONF) flavors.

If we take a closer look at real strawberries, we will find they also contain

ethyl cinnamate (FEMA# 2430, CAS# 103-36-6), a very attractive ingredient with an even more pronounced fruity, guava profile. When used in this combination, the two cinnamates benefit from a degree of synergy. It reduces costs in strawberry flavors and results in flavors with more realistic profiles and much more application flexibility.

The dose rates given below are the levels of ethyl cinnamate to be used in flavors that are intended to be dosed at 0.05% in a ready-to-drink taster, beverage or bouillon. With the exception of strawberry they all assume the chemical is used alone, without other members of the same family.

## Berry Flavors

**Strawberry:** It is possible to use very high levels of ethyl cinnamate in strawberry flavors, even up to 10,000 ppm, but much better effects are achieved by using lower levels, ideally in combination with methyl cinnamate. In my opinion, the range from 200 ppm to 1,000 ppm in strawberry flavors is ideal and gives the most authentic results.

**Raspberry:** Ethyl cinnamate can also be useful in raspberry flavors, adding to the depth and richness of the profile at levels ranging from 50 ppm up to 500 ppm, with 200 ppm being an ideal starting point.

**Cranberry:** The profile of this ingredient is quite important to the overall character of cranberry flavors and the ideal level of use is in the region of 200 ppm.

**Blackberry:** The effect in blackberry flavors is similar to raspberry flavors, but the ideal level is a little lower, around 100 ppm.

**Cherry:** Cherry flavors can often be overly balsamic, so moderate levels of ethyl cinnamate are most effective, usually in the vicinity of 100 ppm.

**Blueberry:** As with strawberry flavors, it is possible to get away with overdosing the cinnamate esters but the best effects are achieved with quite low levels in the region of 50 ppm.

**Black currant:** High levels of ethyl and methyl cinnamate are sometimes used in black currant flavors, but the most realistic fresh fruit effects are achieved by additions around 50 ppm.

## Tropical Fruit Flavors

**Guava:** This ingredient is so guavalike in character that it could almost serve as a stand-alone flavor. Levels of use vary dramatically but even very high levels, around 5,000 ppm, are extremely attractive.

**Star fruit:** Star fruit is quite a delicate fruit and star fruit flavors are generally nowhere near as pungent as guava flavors. Nevertheless, this flavor category can also

tolerate high levels of ethyl cinnamate, typically up to 3,000 ppm.

**Passion fruit:** Only moderate levels of ethyl cinnamate are needed in passion fruit flavors, and 200 ppm serves very well in this flavor category.

**Pineapple:** Pineapple flavors only have a very modest balsamic component and the main effect of this ingredient is to increase depth of a flavor category that is often too light and fruity at levels around 100 ppm.

**Mango:** A level of 100 ppm is also an effective level in mango flavors. Added depth is not really needed in most mango flavors, but at this level the effect is mainly to add complexity.

### Other Fruit Flavors

**Peach and apricot:** Ethyl cinnamate adds welcome complexity and realism at modest levels, around 100 ppm, to both peach and apricot flavors.

**Quince:** This is only a very minor flavor category and the flavor profile of quince is quite subtle. An effective level for ethyl cinnamate is 100 ppm.

**Watermelon:** Trace levels, in the region of only 20 ppm, are useful to round out watermelon flavors.

**Apple:** Even lower levels are needed in apple flavors but the effect at 10 ppm levels of addition is still useful.

**Grape:** Grape flavors, especially white grape flavors, benefit from similar levels of added ethyl cinnamate, around 10 ppm.

### Other Flavors

**Honey:** It is more difficult to achieve realism in honey flavors than it might appear at first sight. The complexity and richness of the natural product are elusive. Ethyl cinnamate helps considerably and high levels of addition, in the vicinity of 8,000 ppm, work very well.

**Cocoa and chocolate:** Around 200 ppm of ethyl cinnamate is the optimum range of addition in cocoa and chocolate flavors, increasing the authenticity of the flavor.

**Vanilla:** Ethyl cinnamate can play a minor role in vanilla bean extract-style

vanilla flavors to add depth and richness at levels ranging from 10–50 ppm.

**Rum:** Rum flavors, along with whiskey and cognac flavors, can be made a touch more authentic by adding 10 ppm of this ingredient.

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