Flavor Bites: *trans*-2-Decenal

Use in citrus, fruit, dairy and savory flavors

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Unsaturated *trans*-2 aldehydes represent a wide, interesting and very diverse family of aroma characters. Within each odor type it can be quite difficult to find an ideal representative because many aldehydes have characteristics that combine several different basic odors.

trans-2-Decenal (FEMA# 2366; FEMA primary name: 2-decenal; CAS# 3913-71-1) is no exception to this rule. The dominant note is reminiscent of fresh coriander leaves (cilantro) and the secondary note is fatty. *trans*-2-Decenal has unique power and diffusivity, and so—although *trans*-2-nonenal (FEMA# 3213; CAS# 2463-53-8) has a purer fatty character and *trans*-2-dodecenal (FEMA# 2402; FEMA primary name: 2-dodecenal; CAS# 4826-62-4) is more characteristic of cilantro—it is uniquely useful in a wide range of flavor types. The odor of *trans*-2-undecenal (FEMA# 3423; FEMA primary name: 2-undecenal; CAS# 2463-77-6) also combines cilantro with a minor fatty note, but with less impact than *trans*-2-decenal. *trans*-2-Tridecenal (FEMA# 3082; FEMA primary name: 2-tridecenal; CAS# 7774-82-5) is predominantly cilantro in character. It lacks the wide range of uses of *trans*-2-decenal, but it is especially interesting in tangerine and mandarin flavors.

Citrus Flavors

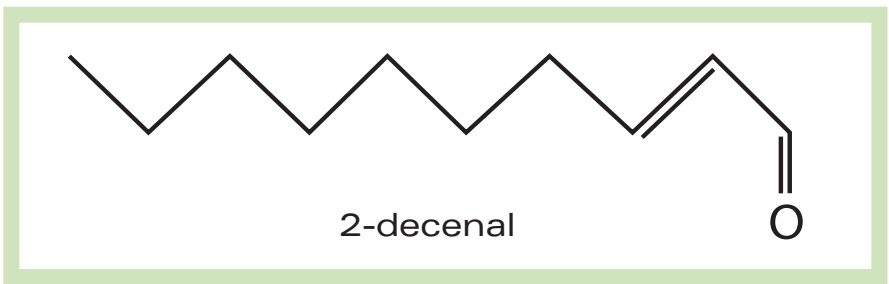
Orange: *trans*-2-Decenal offsets the harsh, simplistic character of decanal and adds a level of natural citrus peel character. A good starting use level in a sweet orange peel flavor intended for use at 0.05% in a taster or ready to drink beverage is 30 ppm. Orange flavors with more juice than peel character benefit from a lower level of addition, around 10 ppm.

Bitter orange: This ingredient is especially effective in bitter orange flavors, and the starting levels of use can be a little higher, around 50 ppm.

Mandarin orange: Levels of ~50 ppm or slightly higher can be very effective in tangerine and mandarin orange flavors.

Grapefruit: The effect in grapefruit flavors is very similar to orange flavors; up to 50 ppm is an acceptable level in peely flavors, while around 10 ppm is a better amount in juice flavors.

Lemon: Much lower levels are more useful in lemon flavors, starting around 1 ppm, unless a very peely character is desired, when the level can be increased to 10 ppm.



Lime: Like lemon flavors, lime flavors based on cold-pressed oil (rather than distilled oil) can benefit from the addition of about 1 ppm of *trans*-2-decenal.

Other Fruit Flavors

Mango: Mango flavors that aim at a realistic, natural approach can readily taste cloying; *trans*-2-decenal offsets that tendency. Twenty ppm is a good starting level.

Cranberry: Twenty ppm of *trans*-2-decenal is a good level to add skin character and naturalness to cranberry flavors.

Blueberry: The effect is similar in blueberry flavors, adding to the skin character, but the level of use is a little lower, around 5 ppm. Higher levels, around 10 ppm, can be used in European bilberry (sometimes called "wild blueberry") flavors.

Peach: *trans*-2-Decenal adds brightness, skin character and realism to peach flavors, but the level of addition is quite low, around 5 ppm.

Cherry: The effect of *trans*-2-decenal in cherry flavors is quite similar, adding realism and skin character. The dose rate is also similar, around 5 ppm.

Plum: Skin character is also desirable in plum flavors; a good starting level is 5 ppm.

Apple: Skin notes are also the key attraction for *trans*-2-decenal in apple flavors; 5 ppm is, once again, a good starting level.

Strawberry: Only subtle effects are called for in strawberry flavors, but they do serve to increase the natural character of the flavor. About

2–5 ppm of *trans*-2-decenal is a good range of use levels.

Dairy Flavors

Butter: Unsaturated aldehydes play an important part in butter flavors. *trans*-2-Decenal can be used in the range of 20–200 ppm, depending on the character desired.

Cheese: The contribution to cheese flavors is less obvious; 10–100 ppm of *trans*-2-decenal is a good dose range.

Cream: In cream flavors, the effect of *trans*-2-decenal is even more subtle; 5 ppm is a good starting level.

Meat Flavors

Beef: *trans*-2-Decenal adds realism in beef flavors and accentuates the fat character. Consequently, around 50 ppm is a good starting point in roast or boiled beef flavors, while 200 ppm is a good starting point in beef fat or tallow flavors.

Lamb: Levels of use in lamb and mutton flavors are similar to those used in beef flavors; 200 ppm is a good initial level.

Chicken: Most chicken flavors—even white meat flavors—have a noticeable fatty character; 200 ppm is a good starting point for all chicken flavors.

Pork: Fatty notes are also important in pork flavors, but the ideal level is generally lower than in other categories, around 20 ppm.

Other Savory Flavors

Cilantro: This ingredient is a major component of cilantro flavors and can be used at levels ranging 100–500 ppm.

Fried onions: The effect here is necessarily quite subtle, and so 10 ppm is a good starting level.

Celery: Ten ppm of this ingredient gives a subtle fresh character to celery flavors. Higher levels can be used successfully, especially in seasoning blends, but care should be taken, unless a cilantrolike character is acceptable.

Jalapeno: Useful levels in jalapeno flavors range around 20 ppm, but higher levels can be used when subtlety is not a dominant requirement.

Olive: Realistic olive and olive oil flavors can be quite difficult to create, and this ingredient is especially helpful at 50–100 ppm.

French fries: *trans*-2-Decenal is more heat stable than most of the alternative ingredients that are suitable for use in french fried flavors, and gives a distinctive note at around 100 ppm.

Tomato: Only trace levels are needed in fresh tomato flavors, around 5 ppm, but higher levels can be successful where a fried or sun dried effect is required.

Nut Flavors

Hazelnut: *trans*-2-Decenal can be used at widely varying levels in hazelnut and praline flavors, depending on the effect desired, but higher levels can tend to introduce a slight effect of rancidity; 100 ppm is a good starting point.

Peanut: Similar variations in dose rate are also possible in peanut and peanut butter flavors, starting at around 5 ppm and running up to 200 ppm.

Almond: Different levels are also workable in almond flavors, but 20 ppm is a good starting point.

Walnut: Thirty ppm of *trans*-2-decenal makes a good initial use level in walnut flavors.

Brown Flavors

Chocolate: Thirty ppm is a good starting point for this ingredient in chocolate and cocoa flavors, but rather lower levels—around 10 ppm—are ideal in milk chocolate flavors.

Coffee: Lower levels are useful in coffee flavors. Initial trials should be around 10 ppm.

Tea: An initial level of 10–20 ppm of *trans*-2-decenal is appropriate for black and green tea flavors.

Vanilla: Quite low levels, around 10 ppm, can add realism, complexity and lift to vanilla bean flavors.