



# Flavor Bites: 2-Phenylacetic Acid

Fruit, nut, savory, alcoholic and other flavor uses

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Like the subject of a previous article, 3,5-dimethylcyclopentane-1,2-dione (FEMA# 3269), 2-phenylacetic acid (FEMA# 2878; see F-1) combines two important characteristics. It has an intense honey aroma, lingering even to the extent of being slightly cloying, but it is also very important because it has a useful, subtle sweet taste. 2-Phenylacetic acid is found very widely in nature, but it is surprisingly little used in flavors, perhaps because the character is so substantive, but possibly also because it is quite easy to accidentally overdo the dose level in some flavor types. 2-Phenylacetic acid actually does not have a steep dose response curve, but the odor is unusually pure, representing a single odor character, and consequently the nose fatigues to it quite readily.

Alternatives are very thin on the ground, but esters of 2-phenylacetic acid are commonly used, especially ethyl 2-phenylacetate (FEMA# 2452) and methyl 2-phenylacetate (FEMA# 2733). Both chemicals are very attractive and have a strong honey character. They can be used to good effect, especially in honey and chocolate flavors, but they do not

come close to the unique character of the parent acid.

## Brown Flavors

**Honey:** The peculiar, but widespread, distaste for such a useful ingredient even extends to the most obvious use of the raw material. It is probably the most characteristic naturally occurring chemical in honey, but it is still surprisingly infrequently used in honey flavors. A good high-end dose rate in a honey flavor constructed around this raw material is 5,000 ppm. This, and all subsequent dose rates, refers to the level of use in a flavor that is intended for use at 0.05% in a taster, a ready to drink beverage or a bouillon. At this level the honey flavor will be quite heavy, with a darker, clover honey style. Much lower levels, around 500 ppm, can be used in honey flavors that are lighter and rather more floral in style.

**Chocolate:** 2-Phenylacetic acid contributes significantly to the cocoa character in chocolate flavors and can be used at higher levels in dark chocolate flavors than in milk chocolate flavors. The range of effective dose rates in flavors is quite large, starting at around 40 ppm for a very subtle effect and ranging up to 2,000 ppm for a dominant, dark chocolate effect.

**Malt:** The effect is very similar, and equally important, in malt flavors. Levels up to 1,000 ppm can be very useful in malt flavors, but lower levels, around 100 ppm, work better in milder, malted milk type flavors.

**Caramel:** The sweet effect of this chemical is particularly useful in caramel and toffee flavors. The effect adds depth and realism. Levels in the

range of 500–1,000 ppm are most effective.

**Coffee:** Coffee flavors can easily become thin and harsh, but this chemical can be used to add subtle depth and a natural hint of sweetness. A good starting level is 100 ppm.

**Vanilla:** 2-Phenylacetic acid is only a minor component of vanilla flavors, but it can add useful complexity and sweetness. Low levels, in the range of 1–10 ppm, should be used.

## Tropical Fruit Flavors

**Guava:** The cloying effect of this component can seem difficult to incorporate in fruit flavors, but it is surprisingly effective, especially in tropical fruit flavors such as guava; 50 ppm is a good starting level.

**Papaya:** Papaya is also an especially good application for this raw material. A wide range of dose rates can be used, up to 100 ppm.

**Mango:** A good initial level in mango flavors is around 50 ppm, where it adds a degree of realism. This ingredient can be less useful in “Westernized” mango flavors that rely more on melon and peach characters than on true mango notes.

**Passion fruit:** 2-Phenylacetic acid is less important in passion fruit flavors but can add depth around 10 ppm.

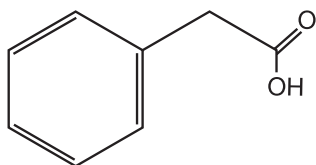
## Other Fruit Flavors

**Raisin:** Levels of about 500 ppm add considerable depth and realism to raisin flavors, which can be quite difficult to construct authentically without this ingredient.

**White grape:** Effective levels in white grape flavors are notably lower than those used in raisin flavors; 20 ppm is a good starting point.

2-Phenylacetic acid

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**Concord grape:** This ingredient should be used at even lower levels in Concord grape flavors, around 15 ppm.

**Plum:** The effect in plum flavors is quite similar to raisin flavors and quite high levels can be used, even up to 1,000 ppm.

**Cherry:** 2-Phenylacetic acid is also very useful in cherry flavors. Fifty ppm is a good starting level.

**Cranberry:** Thirty ppm of this ingredient is similarly useful in cranberry flavors.

**Raspberry:** Only low levels are helpful in raspberry flavors, starting around 10 ppm.

**Strawberry:** Even lower levels are used in strawberry flavors, starting around 1 ppm.

## Savory Flavors

**Soy sauce:** 2-Phenylacetic acid is an important component of fermented soy products and should be used around 80 ppm in soy sauce flavors.

**Thai fish sauces:** Similarly, levels of about 100 ppm are useful in flavors of fermented fish products.

**Beef:** This ingredient is only a minor component of beef flavors, but can give a very interesting effect around 30 ppm.

**Chicken:** Levels in chicken flavors are typically even lower, starting around 20 ppm.

**Pork:** This chemical can produce a useful rounding effect at 40 ppm in pork flavors, adding realism.

**Roasted bell pepper:** Different levels can be used in cooked bell pepper flavors, depending on the degree of cooking, but 50 ppm is a good starting point.

**Mushroom:** Again, widely differing levels can be used, but higher levels, around 200 ppm, tend to work better in dried mushroom flavors, especially the cep/porcini variety.

**Cheese:** It is the same story for cheese flavors, the effect being best in cooked cheeses, especially gruyere, around 100 ppm.

**Ruminant animal feed:** This can be an attractive animal food component when used around 100 ppm.

## Nut Flavors

**Hazelnut:** This ingredient works especially well in hazelnut and praline flavors, offsetting dominant pyrazine notes. Two-hundred ppm is a good initial level to try.

**Peanut:** Probably less effective in peanut flavors, but worth trying at 50 ppm.

## Alcoholic Drinks

**Beer:** 2-Phenylacetic acid is an important component of beer flavors. Forty ppm is a good starting point.

**Whiskey:** It is also useful in whiskey flavors. Use rates vary with style but 50 ppm is a good starting point for the currently popular lighter style of drink.

**Cognac:** The dose rates are generally a little lower in cognac and brandy flavors, starting around 20 ppm.

**Wine:** Lighter wine styles can benefit from the addition of 20 ppm of this material, but much higher levels can be used in heavier styles of flavors such as sake, sherry and Madiera.