4-Terpinenol

This ingredient's spicy, nutmeg-reminiscent aroma adds interest to citrus and berry types.

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4-Terpinenol (FEMA# 2248, CAS# 562-74-3), also occasionally referred to as 4-carvomenthenol or para-menth-1-en-4-ol, has a powerful spicy aroma that is very reminiscent of nutmeg, and can be seen as important within the more herbal profile of marjoram. A significant level of this chemical is present in a large number of herb and spice essential oils. This would seem to indicate a wide range of possible uses, but one that would be mostly confined to the category of spices and seasonings. In reality, this ingredient can also play a highly useful, if sometimes secondary, role in a very wide range of different flavor types especially in citrus and berry.

Citrus Flavors

Lime: 4-Terpinenol is clearly influential within the character of distilled lime oils, and can be present at levels up to 1%. A good level in lime flavors that have a predominantly distilled character is in the region of 500 ppm. Lower levels, around 100 ppm, are better in flavors that are more characteristic of cold-pressed lime oil. 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.

Grapefruit: Significant levels, up to 500 ppm, of this chemical can help to add "bite" to grapefruit flavors and bring some added differentiation from the orange notes that often dominate grapefruit essential oils.

Lemon: Lemon flavors can benefit from levels of this ingredient ranging from 100–200 ppm. As would be expected, the higher levels work best where the flavor also contains a hint of lime.

Tangerine: The ideal level of this ingredient in tangerine and mandarin flavors is higher than for orange flavors, reflecting the herbal/thyme component of their profiles. A level of 200 ppm is a good starting point.

Orange: Levels in orange flavors depend on the level of orange juice, as opposed to orange peel, character. Fifty ppm works well in juicy flavors, and 100 ppm works well in peely flavors.

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Berry Flavors

Blackcurrant: The use of this ingredient in citrus flavors is not so surprising, but the impact it has in berry flavors is quite a revelation. Nowhere is this truer than in blackcurrant flavors. A level of 300 ppm, or even higher levels, imparts a startling degree of realism, and moves the flavor satisfyingly away from the boring, and all too familiar, buchu-dominated profile.

Blueberry: The effect in the much more restrained and subtle profile of blueberry flavors is very similar, adding realism and skin notes. The ideal level of use is around 200 ppm. Although here again, higher levels are also acceptable depending on the profile.

Raspberry: 4-Terpinenol is an essential source of realistic berry and skin notes in raspberry flavors at around 100 ppm. In the realm of fruit flavors, raspberry is second only to blackcurrant as a key application of this ingredient.

Blackberry: Similar levels, up to 100 ppm, work equally well in blackberry flavors, adding notable realism by enhancing the skin and berry notes. Slightly higher levels can work well in especially ripe, musky blackberry and bramble flavors.

Cranberry: The skin note is also very important in realistic cranberry flavors, and 100 ppm of this ingredient is a very helpful when used in conjunction with 2-methyl butyric acid.

Strawberry: This chemical will certainly not benefit all strawberry flavors and may be positively unhelpful in

strawberry flavors with a "jammy" character. Nevertheless, it can be useful in wild strawberry flavors at a relatively subtle level, around 20 ppm.

Other Fruit Flavors

Grape: The best level of 4-terpinenol in grape flavors depends very much on the type of grape character. Concord grape flavors can benefit from quite high levels, around 300 ppm, and more reticent grape flavors, such as Muscat, are better served by levels in the region of 100 ppm.

Mango: In a similar way, this component can be extremely useful in mango flavors at around 200 ppm, in particular those that seek to reproduce a realistic mango skin note.

Mangosteen: The same is true of mangosteen flavors, and the ideal level of addition is also similar in this rather more exotic flavor category, around 200 ppm.

Guava: The best level of use in guava flavors depends on the profile of the flavor but a level of addition in the region of 150 ppm can be good in more authentic-style flavors.

Pineapple: Pineapple flavors can lack realism and depth, and 100 ppm of this ingredient can be a very useful addition.

Passion fruit: A level of 100 ppm also works very well in passion fruit flavors and adds a welcome hint of rawness and realism, offsetting the sulfur notes.

Peach: This component can, at best, only play a subtle role in peach flavors, although a small addition of 10 ppm adds complexity.

Redcurrant: The same is true of redcurrant flavors, and 10 ppm also works well in this pastel-shaded flavor category.

Apple: Typically 5 ppm would be a worthwhile addition to most apple flavors, with slightly higher levels possible if the character incorporated skin notes.

Other Flavors

Nutmeg: The use of nutmeg oil can sometimes raise concerns, depending on the dose rate; therefore, 4-terpinenol can be very helpful as a partial replacement. Useful levels in flavors range around 500 ppm.

Gin: This ingredient can also be used very successfully to add impact to the more "economical" type of gin flavors at around 500 ppm.

Coffee: Coffee flavors can tend to be simplistic, relying heavily on sulfur, phenolic and caramel notes. Varying levels of 4-terpinenol can be used to add complexity up to 500 ppm.

Hazelnut: More modest levels, in the region of 150 ppm, work well in hazelnut flavors. Similar or slightly lower levels also work well in other nut flavors.

Garden mint: This ingredient can help to shift simple spearmint flavors more in the specific direction of fresh garden mint at around 150 ppm. Higher levels can become too herbal.

Rose: A level of 150 ppm also works very well in rose flavors, lifting the dominant floral notes and adding realism. This ingredient does not work so well in rose flavors built around geranium oil.

Ginger: The effect of 4-terpinenol in ginger flavors can be quite subtle and 100 ppm is a good starting level, particularly in ginger varieties that contain significant levels of citral.
