3-Nonen-2-one

This material's strong, nutty character with fruity notes can enhance a flavorists' repertoire.

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The relative positions of the double bond and the ketone group in unsaturated aliphatic ketones have an important, and frequently overriding, effect on the aroma of these fascinating ingredients. Many ketones with the double bond in the 3 position and the ketone group in the 2 position possess extremely attractive combinations of fruity and nutty characters. 3-Nonen-2-one (FEMA# 3955, CAS# 14309-57-0) is an especially useful example because it can be used in such a wide range of diverse flavor types. The character is strong and nutty, with distinct fruity notes that are reminiscent of peaches, melons and avocados.

Two other closely related chemicals have similar odor profiles to this ingredient but the fruit characters are both subtly unique. 3-Octen-2-one (FEMA# 3416, CAS# 14309-57-0; CAS#1669-44-9) possesses a similar complex aroma of nuts and fruit, with a slight emphasis on an attractive, fruity blue cheese character. Meanwhile, 3-Decen-2-one (FEMA# 3532, CAS# 10519-33-2) is also nutty but the attendant fruity note shades slightly more toward citrus.

The dose rates given throughout this article are the levels suggested for use in flavors that are intended to be dosed at 0.05% in a ready-to-drink beverage or in a simple bouillon.

Nut Flavors

***Hazelnut*:** Nut flavors can often appear too thin and simplistic and 3-nonen-2-one adds realistic hazelnut character and a pleasant fruity complexity. Levels of use can vary but 100–200 ppm in a flavor is a good initial range.

***Peanut*:** Similar levels of use, around 100 ppm, are equally useful in peanut and peanut butter flavors, enhancing the nutty notes and adding realism and complexity.

***Walnut*:** This ingredient is also especially well-suited to walnut flavors but the level of use is typically lower than in hazelnut or peanut flavors, often nearer to 50 ppm.

***Almond*:** Realistic almond flavors can use 3-nonen-2-one at a variety of levels, but 50 ppm is typical.

***Pistachio*:** The effect in pistachio flavors is analogous to that in almonds and the ideal level of use is also around 50 ppm.

Fruit Flavors

***Peach*:** The fruity note of 3-nonen-2-one is especially well-suited to peach flavors, where it adds significantly to the authenticity of the profile. The nutty aspect reinforces an attractive aspect of the peach skin character. An ideal starting level in a flavor is 200 ppm.

***Apricot*:** This chemical is found in nature in both peaches and apricots and it performs a particularly useful function in apricot flavors. Levels of use range from 50 ppm in lighter floral style flavors up to 200 ppm in more assertive flavors.

***Banana*:** Banana flavors, like hazelnut flavors, can often seem too simplistic. This ingredient adds an intriguing element to the fruity note but also adds complexity and realism. Levels of use can vary from around 50 ppm up to 200 ppm in a flavor.

***Plum*:** This is only a minor flavor category for most of the world, but it can occasionally be interesting, and 3-nonen-2-one adds much needed authenticity. Ideal levels in plum flavors are quite low, in the region of 20 ppm.

***Strawberry*:** 3-Nonen-2-one is clearly not the dominant unsaturated ketone note in strawberry flavors but it can, nevertheless, exert a positive effect at a low level in blends with other unsaturated ketones at around 20 ppm.

***Lime*:** Similar levels, around 20 ppm, work well in fresh lime flavors and also in both lemon flavors and in lemon-lime blends.

***Orange*:** Only trace amounts are needed to produce a significant effect in fresh orange juice flavors, in the region of 10 ppm.

***Apple*:** A hint, around 10 ppm, of 3-nonen-2-one is also all that is required to add realism to apple flavors, subtly emphasizing the skin character.

***Black currant*:** A level of 10 ppm is also effective to add subtlety and authenticity to realistic black currant flavors.

Savory Flavors

***French fries*:** The entire family of related ketones has a significant effect in the challenging profile of French fries, with 3-octen-2-one having perhaps the dominant role. 3-Nonen-2-one is almost equally important to the freshly fried profile and because this chemical is a little more heat stable, its use in flavors is preferable. Levels of addition depend dramatically on the amount of heat processing, but 500 ppm is a good starting point. In this uniquely challenging application the presence of added antioxidants, such as tocopherol, in the flavor can improve the stability of 3-nonen-one and related chemicals.

***Chicken*:** 3-Nonen-2-one adds depth and realism to all types of chicken flavors, especially boiled and fried. Levels of use can range from 100 ppm up to 500 ppm in flavors, but 300 ppm is an ideal starting point.

***Beef*:** The same effect also applies to beef flavors of every type ranging from boiled to roast and barbeque flavors. Similar levels of use apply, and around 200 ppm is an optimum level.

***Mushroom*:** Equally relatively high levels, around 200 ppm, can also be used in all types of mushroom flavors, raw or cooked, and of almost every variety. *Boletus edulis,* or cep-type, flavors benefit most from this ingredient. As in the case of strawberries, this chemical is not exactly the dominant unsaturated ketone in mushroom flavors, but it is very useful indeed in blends.

***Ham*:** A good level in a whole range of processed pork flavors, notably ham and chopped pork, is 100 ppm, adding to complexity and realism.

***Onion*:** Most compounded cooked onion and garlic flavors are overly simplistic and artificial in character. 3-Nonen-2-one adds very welcome complexity at levels in the region of 100 ppm.

***Peppers*:** All types of pepper flavors, including bell peppers and jalapeno peppers, can benefit from the addition of around 50 ppm of this ingredient.

Other Flavors

***Vanilla*:** Every flavor ingredient that can significantly move artificial vanilla flavors away from vanillin overdependence is worth its weight in gold. A level of 100 ppm of 3-nonen-2-one in vanilla bean flavors has a significant positive effect.

***Butter*:** Between 50 ppm and 100 ppm can also be useful in the context of both fresh and cooked butter flavors to add complexity.

***Tea*:** Although 3-nonen-2-one can work in green and red tea flavors, it is ideally suited to black tea flavors. It can often be used in combination with other unsaturated ketones and 50 ppm is a good place to start.

***Chocolate*:** In all types of chocolate flavors, 20 ppm of this ingredient is useful, especially in the context of reinforcing the cocoa note in dark chocolate flavors.