# Adding Complexity to Beverage Fruit Flavors: 2-Methyl Butyl 2-Methyl Butyrate

## Use levels and effects

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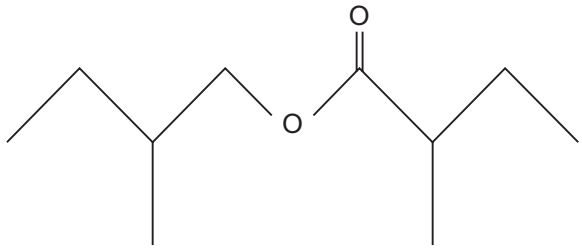

Many fruit flavors contain significant quantities of aliphatic esters. Analyses often reveal frightening complexities, like finding more than 100 different aliphatic esters in strawberries. The two most common approaches to tackling this daunting problem, however, lie at opposite ends of the creative spectrum.

One approach prizes simplicity over everything else; it would (perhaps) even go so far as to pick only one of the esters—normally the one that is most characteristic (but often relatively volatile). In the case of strawberry flavors, the most favored ester would usually be ethyl butyrate (FEMA# 2427). Some landmark flavors have been created using this raw material alone to supply the fruity note.

The other approach takes one or more analyses as an academic starting point and recreates much of the complexity found therein. This approach, too, has a good success rate, and many characteristic flavors have carved out good niches in the market using complex blends of esters. Simple flavors often have good impact and perform especially well in straightforward applications, especially those which do not involve heat processes. However, they are likely to fail in more demanding applications. Meanwhile, complex flavors frequently have a lesser impact but score well on depth of flavor and taste effects. They are often known to perform well in a wide range of applications, particularly those involving heat.

That said, in my opinion the best solution to the problem lies between the two extremes. Since simple flavors may be too limited, and very complex flavors could lose impact, the main challenge would be to select the best candidates from the higher boiling esters to add a degree of complexity. While competing choices are many, one ester that is particularly interesting is 2-methyl butyl 2-methyl butyrate (FEMA# 3359). This material has a relatively lesser "banana" character than iso-amyl iso-valerate (FEMA# 2085) and a lesser "passion fruit" character compared to hexyl butyrate (FEMA 2568). It can also perform extremely well in a wide range of flavors, some of which are listed below. (Note: All the levels given refer to the quantities used in a typical flavor that would be used at 0.05% in a ready-to-drink beverage.)

### Berry Flavors

***Strawberry:*** 2-Methyl butyl 2-methyl butyrate has a very attractive character. Most obviously reminiscent of bananas and passion fruit, it also displays hints of apple and berry. In strawberry flavors, this material provides a useful counterweight to the lighter esters and can be used at different levels—500 ppm makes a good starting point. At this level the ester adds depth and berry character, along with a degree of subtle aftertaste.

***Raspberry:*** 2-Methyl butyl 2-methyl butyrate can be used at different levels in raspberry flavors, too, but the levels are generally much lower than those used in strawberry flavors. For instance, 10 ppm makes a good starting point to add subtle depth to raspberry flavors.

***Blackberry:*** Performance of 2-methyl butyl 2-methyl butyrate in blackberry flavors is similar in many respects to that in raspberry flavors. However, a slightly higher starting level of 20 ppm works better in this case.

***Blueberry:*** Blueberry flavors can benefit from a modest level of 2-methyl butyl 2-methyl butyrate. 100 ppm would be a good starting point.

### Other Fruit Flavors

***Apple:*** 2-Methyl butyl 2-methyl butyrate is especially appropriate for use in apple flavors, because it ties in well with the character of ethyl 2-methyl butyrate (FEMA# 2443). The ideal use level in flavors containing high levels of this ester is around 500 ppm. However, in flavors that are more dependent on *trans*-2-hexenaldehyde (FEMA# 2560), a use level of 200 ppm is recommended.

***Pear:*** Pear flavors can make good use of different levels of 2-methyl butyl 2-methyl butyrate; around

20 ppm gives a very subtle effect, but levels up to 500 ppm can be equally effective, though not exactly subtle.

***Passion Fruit:*** Very high levels of 2-methyl butyl 2-methyl butyrate—even those up to 2,000 ppm—can be used effectively in passion fruit flavors.

***Banana:*** Similarly, in banana flavors, the use levels of 2-methyl butyl 2-methyl butyrate can be very high (around 2,000 ppm) without intruding on the basic character of the flavor.

***Kiwi:*** Kiwi flavors are quite subtle, and a good starting level of this material is probably around 200 ppm. Higher levels are possible, but with some sacrifice of realism.

***Melon:*** 2-Methyl butyl 2-methyl butyrate is especially useful in adding depth to melon flavors—a category of fruit flavors that suffers more than most, from a tendency to become thin and over-bright. A good starting level for a subtle effect would be 20 ppm; however, levels can go up to 500 ppm.

***Peach:*** In contrast to melon flavors, peach flavors usually possess adequate depth from their lactone components. 2-Methyl butyl 2-methyl butyrate can further add to the complexity at around 10 ppm.

***Apricot:*** 2-Methyl butyl 2-methyl butyrate can be added to apricot flavors for much-needed subtle effects; a good starting point is 5 ppm.

***Grape:*** 2-Methyl butyl 2-methyl butyrate is useful in grape flavors, especially Concord grape flavors, when used at around 30 ppm.

***Pineapple:*** Moderate levels, around 100 ppm, are useful in pineapple flavors to add depth and realism.

***Red currant:*** Red currant flavors are a minor but interesting niche. They can accommodate up to 500 ppm of 2-methyl butyl 2-methyl butyrate.

***Cherry:*** Use levels of this ester in cherry flavors can vary depending on the desired effect. For instance, flavors with an overtly wild cherry character can accommodate up to 1,000 ppm, whereas more realistic flavors would require a much lower use level.

***Lychee:*** Lychee flavors are difficult to keep realistic; they easily veer into a simplistic floral caricature. As such, around 50 ppm of 2-methyl butyl 2-methyl butyrate can be used to maintain a realistic balance.

## Alcoholic Flavors

***Rum:*** 2-Methyl butyl 2-methyl butyrate provides an interesting variation on the isoamyl esters normally used in spirit flavors, as it adds a degree of naturalness in rum flavors. A good starting level is 300 ppm.

***Beer:*** The ester is an interesting component of hops and can be used to good effect in beer flavors at around 50 ppm.

## Dairy Flavors

***Butter:*** Around 100 ppm of 2-methyl butyl 2-methyl butyrate can be used in butter flavors to offset the dominant role of lactones and add a subtle fruity note.

***Cooked butter:*** Cooked butter flavors can also benefit from this ingredient, but at rather lower levels, around 20 ppm.

***Cream:*** Cream flavors are more subtle than butter flavors. As such, subtle levels of around 2 ppm can be helpful.

## Mint Flavors

***Peppermint:*** Natural peppermint oils contain quite a number of aliphatic esters, which add depth and help to soften the harsher components of the oil. The most effective, however, is 2-methyl butyl 2-methyl butyrate; levels up to 1,000 ppm in peppermint-based oil blends are very helpful.

***Spearmint:*** The same comments apply, but to a lesser degree, to spearmint based oil blends. Spearmint oil contains fewer harsh components than peppermint oil, but it can also benefit from a modest fruity note. A good starting level is 500 ppm.