Flavor Bites: Now Match This!

Techniques for hard-to-replicate flavors

John Wright; johnwrightflavorist@gmail.com

A common belief is that advances in GC/MS analytical techniques have made flavor duplication quick and easy. The truth, however, is a little different: flavor-matching is a frustrating exercise.

A common scenario runs something like this: an important matching project arrives with a huge potential, and a short deadline. The analytical staff quickly produces a reasonable (but not great) first analysis, leaving the unfortunate flavorist to go quietly mad trying to make an acceptable duplication. Despite a shortness of time for the analytical staff to recheck the flavorist's work, a sensory panel must be involved to "validate" the match (and to spread the blame later on). Meanwhile, the customer who is initially enthusiastic, to everybody's surprise, cools down inexplicably. This process simply cuts margins for the whole industry, and it is stopped in its tracks if the flavor cannot be matched.

Common Techniques: Captives and Confusers

Two techniques that have been used for many years to make matching difficult are captive raw materials and "confusers." The use of captive raw materials is generally very effective; all large companies produce a steady flow of these ingredients. Yet they all have to toil to get their own flavorists to actually use them, perhaps due to the flavorists' obvious sense of self-preservation. New raw materials can create bureaucratic problems for even the best "system," and often cause delays and problems in production. Despite these reasonable concerns, it is always a good idea to make the push to clear numerous new, and preferably patented, captive raw materials through the system.

Confusers, on the other hand, are generally ineffective. They usually consist of a mixture of relatively neutral-tasting chemicals such as benzyl benzoate (FEMA# 2138). Unfortunately, the function of all of the components is fairly obvious and they are quite easy to isolate in an analysis. The other disadvantages of confusers are that they often detract from the performance of the flavor they are added to and most certainly add to the cost.

Other Techniques

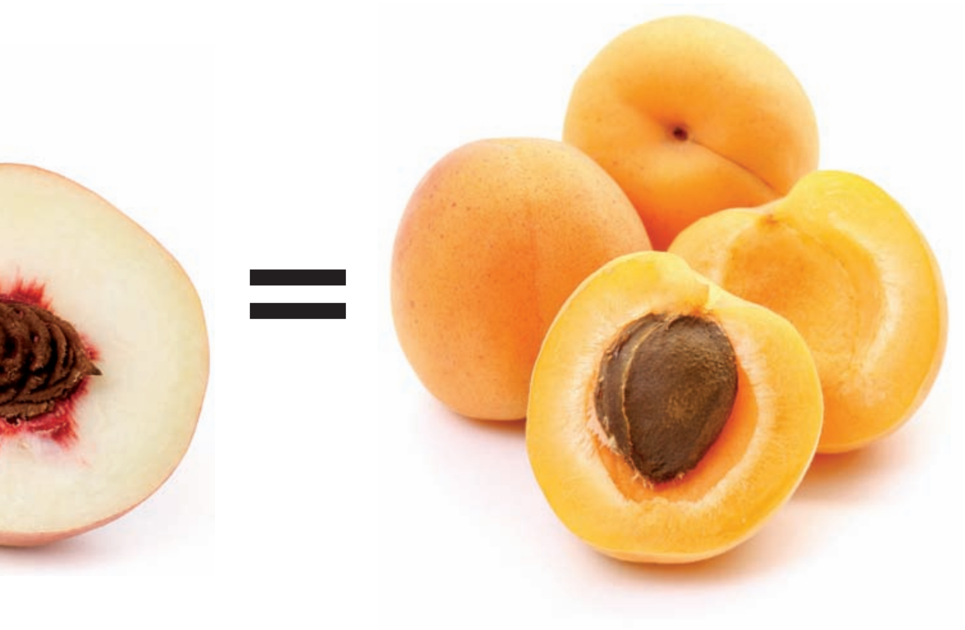
If a flavorist is not fortunate enough to work for a company that has a library of significant captive raw materials, all is not lost. There are a number of other techniques that can prove equally effective.

Variations on a theme: Quite often, important chemical raw materials are commercially produced as a fairly standard combination of different isomers or closely related chemicals. iso-Amyl acetate (FEMA# 2055) is a good example. Commercial examples of this chemical are normally mixtures, with 3-methyl butyl acetate (FEMA# 2055) as the main component and 2-methyl butyl acetate (FEMA# 3644) as the main secondary component. Adding a significant quantity of the pure form of one of these chemicals will alter the profile of the resultant mixture and present a real challenge to the flavorist trying to match it.

Ingredients: Difficult-to-analyze ingredients are always useful. Aqueous extracts are difficult to analyze, especially those with little identifiable volatile content. St John's bread extract (carob bean extract, FEMA# 2243) is a particularly good example. It has an interesting profile and can contribute positively to a wide range of brown and fruit flavors. In addition, it is virtually invisible from an analytical point of view.

Some nonaqueous natural extracts are very rarely used in flavors and can be very difficult to identify in mixtures because they lack obvious chemical markers. Flavorists also find them very difficult to identify by smell because they are not familiar with them. Mimosa absolute (FEMA# 2755) is a good example. The absolute contains around 1% each of nonanal and octanal. Analytically it is nearly unidentifiable.

Blends: Custom blends of major naturals can also play a useful part in creating a flavor that is difficult to match. Lemon peel oil (FEMA# 2625) is a good example. Oils from different geographical sources, or perhaps different parts of the plant, usually contain similar components, but often



in differing quantities. Blends sometimes offer an added advantage—they provide some latitude to adjust the quantities to deal with crop variations and availability problems. Another clever use of blended naturals is to make a blend of two completely different essential oils with major components that are somewhat similar, e.g., dill weed oil (FEMA# 2383) and elemi oil (FEMA# 2408). Both contain significant quantities of α-phellandrene and limonene.

Any of these techniques can make matching much more difficult and time-consuming, especially if several are used in combination. This is often all that is necessary, if the matching request is time-sensitive and driven by price negotiations. However, if the matching request is driven by a wish to change suppliers and is deadline-free, all these efforts can prove to be futile, given enough time and energy.

Unique naturals: One way of erecting a more permanent duplication barrier is to employ unique naturals. That can be very difficult, as trying to find a truly novel new natural ingredient is challenging and time-consuming. Add to that the difficulty of achieving GRAS status for the material, and you have a task that is normally attempted only by the largest companies.

Alternate Approach

There is, however, an alternate approach: take a commonly used natural raw material that has been obtained by one or more traditional physical processes and subject it to a further, completely different, physical process. These multiple processed raw materials become one's own personal captive ingredients. There are many possibilities, but to be effective one has to concentrate on naturals that are not only widely used, but also added at significant levels. Rose absolute (FEMA# 2988), boronia absolute (FEMA# 2167) and English chamomile oil (FEMA# 2275) are all good starting materials, but jasmine absolute (FEMA# 2598) is an especially good example of a natural raw material that is used at a significant level in a wide range of flavors. Jasmine absolute contains around 4% of benzyl acetate (most useful in raspberry flavors), 1% of linalool (most useful in peach and apricot flavors), 0.5% of *cis*-jasmone (most useful in tea flavors), 0.2% of methyl jasmonate (most useful in lemon flavors) and 0.5% of indole (most useful in blackcurrant flavors).

These components are all useful in a wide range of flavors. They have different polarities and boiling points and a number of physical processes can be used to subtly rebalance the composition to arrive at a unique captive jasmine extract. These novel naturals will make matching virtually impossible, will not impose any penalties on the flavors they are used in (other than a minor additional processing cost), and will often be more specific and effective in flavors than the starting material.