



# Organoleptic Characteristics of Flavor Materials

## Focus on essential oils

Gerard Mosciano

Gerard Mosciano is joined by Judith Michalski, chief flavorist, Edlong Flavors; Carl Holmgren, consulting flavor chemist; William Jaggard, Bell Flavors; and Douglas Young, principal flavorist, Symrise, in the organoleptic evaluations presented here.

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### Advancements in the Flavor Industry

When I started in the flavor industry, a flavor project basically was a request to compound an artificial flavor. The newly established FEMA or GRAS lists were very limited and initially populated under a grandfather clause. Natural ingredients were limited to citrus, floral and mint oils, as well as other natural botanicals and extractives. Most flavor ingredients were sourced internally, and there were few reliable outside ingredient suppliers. Today, the industry has made great strides and is vastly different. Here are some of the changes I have observed during my 40 years in the flavor industry:

- You used to be able to tell how prosperous a flavor company was by totaling its research budget. Today's automated research instrumentation that is available to everyone turns these "creative secrets" into easily solvable puzzles. In addition, flavor matching has become the most important task in a "creative" project.
- Tropical flavors once consisted of only banana and pineapple. Today, there is a multitude of these flavors, and companies are searching the jungles for more.
- We had no sulfur components except for onion, garlic and asafetida. Today, the latest GRAS lists are composed primarily of sulfur and amine compounds.
- There used to be no restrictions on kosher, while now, most flavor houses are kosher.
- When I began my career, our flavors were almost entirely artificial. These days, the majority are natural, and soon will have to conform to organic and other restrictions, as the consuming public deems warranted.
- We did not have "high-potency ingredients." Now, there are many unique characterizing ingredients provided by these specialized ingredient suppliers.
- The moderate cost of ingredients has become extreme in the current market. Some natural ingredients cost thousands of dollars per pound.
- Many of the larger flavor companies offered basic creative flavorist training programs. Today, the majority of flavor companies hire talent only if they have years of experience in the industry.
- At the beginning of my career, the flavor market was expanding continuously and usually by double digits. Today, flavor sales growth is measured in single digits, and flavor companies usually grow by acquiring other less competitive flavor companies, joint efforts or mergers.
- Our initial sample submission was usually a 2- or 4-ounce sample enclosed in a small cardboard box, with some application information. Today, if we

can get by with only a 2-ounce sample, it must be enclosed with an MSDS form, a kosher letter and other pertinent data to conform to OSHA regulations. It is more likely that the customer doesn't want a flavor sample at all—now, the customer expects to see a finished prototype suitable for a marketing presentation, either in the desired base or a reasonable approximation of the “secret” base. In order to reduce their costs, our customers have handed the responsibility of their applications back to the flavor suppliers.

Don't get me wrong. I really love my job, and I would not have changed much in my career. However, the industry is changing, and soon the genealogy tree of flavor companies will become more pointed and less populated. The food industry's demand for more and more services will become harder and more costly for flavor companies to provide competitively, which most likely will lead to the demise of smaller flavor companies. I also am convinced that because of the creative nature of the flavorist and the improved flavor ingredients available, flavorists today are better able to withstand the rigors imposed by new food and confection processing and preparation conditions.

## Evaluations

### Cocoa 25 fold

Source: Frutarom  
Natural

Odor: @ 10% PG. Cocoa

powdery, rich, characteristic cocoa with brown fudge chocolate notes.

Taste: @ 0.1%. Cocoa powdery, chocolate cakey, cocoa beany, chocolate chips with woody roasted nuances.

Possible applications: Cocoa milk beverages, mocha notes for flavored coffee, fudge notes for bakery and icings, confections.

► **Frutarom**; tel: 201-861-9500; [www.frutarom.com](http://www.frutarom.com)



### 2,5-Dimethyl-3(2H)-furanone

Source: Oxford Chemicals Ltd./Charkit  
FEMA# 4101, CAS# 14400-67-0, Natural and nature identical

Odor: @ 5%. Sweet brown, caramellic, toasted, roasted, slightly buttery and maplelike with hazelnut and cocoa nuances.

Taste: @ 25 PPM. Sweet, fruity strawberry, peach and apricot with brown caramellic and brown sugar notes with a scalded milk nuance.

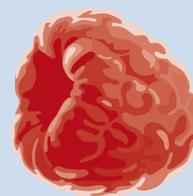
Possible applications: Cooked butter, strawberry, peach, apricot, hazelnut, cocoa, brown sugar, pecan, caramel apple, toffee, coffee, dulce de leche, tropical fruit nuances.

► **Oxford Chemicals Ltd./Charkit**; tel: 203-655-3400; [www.oxfordchemicals.com](http://www.oxfordchemicals.com)

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*flavor*  
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### Lime Oil Sesquiterpeneless

Source: MCI Miritz Citrus Ingredients  
LLC  
Natural

Odor: @ 1.0%. Sweet lime, aldehydic waxy with a citral note, woody and candy nuances.

Taste: @ 5 PPM in 5% sugar + 0.1% CA.

Fresh full citrus lime/lemon with a slightly floral estry note and a lemon drop candy nuance.

Possible applications: Lime, lemon, citrus punches, cola beverages.

► **MCI Miritz Citrus Ingredients LLC**;  
tel: 845-988-9920; [www.miritz.de](http://www.miritz.de)



### 2-Methyl Butyl Acetate

Source: Wen International  
FEMA# 3644, CAS# 624-41-9, Natural and nature identical

Natural occurrence: Apple, cocoa, grape, grape brandy, melon, pineapple, rum, sherry and wine.

Odor: @ 1.0%. Sweet overripe banana, estry and fruity with apple, pear and tutti-frutti nuances.

Taste: @ 10 PPM. Fruity overripe banana, fruity with notes of apple and melon.

Possible applications: Banana, apple, melon, pear, whiskey, lemonade and strawberry.

► **Wen International**; tel: 845-354-1773;  
[www.weninternational.com](http://www.weninternational.com)



## 2-Methyl Furan

*Source:* Oxford Chemicals Ltd./Charkit  
FEMA# 4179, CAS# 534-22-5, Artificial  
and nature identical

*Natural occurrence:* Malt, truffle, plum, pork liver, cooked pork, beef and mutton, rum, cocoa, coffee, tea, filbert nuts, black currant, tomato, peppermint oil, wheat bread, milk and boiled eggs.

*Odor:* @ 1.0%. Sharp solvent, musty and earthy, fermented fruity banana with a slight burnt cheese nuance.

*Taste:* @ 10 PPM. Sharp solvent, ethereal, old fruit such as apple and banana, cooked, fermented, potato and mushroomlike with honey nuances.

*Possible applications:* Banana, potato, mushroom, honey, cheese nuances, nut notes.

► **Oxford Chemicals Ltd./Charkit;**  
*tel:* 203-655-3400;  
*www.oxfordchemicals.com*

## 2-Methylbutyl-2-Methyl Butyrate

*Source:* Wen International  
FEMA# 3359, CAS# 2445-78-5, Natural  
and nature identical

*Natural occurrence:* Melon, ripe apple and strawberry.

*Odor:* @ 1.0%. Sweet, sharp ripe fruity apple, waxy with sweet melon, tropical mango and lychee notes.

*Taste:* @ from 10–20 PPM. Sweet, estry, fruity, slightly green apple juicy and tropical with an herbal nuance.

*Possible applications:* Apple, cantaloupe, pear, mango, lychee and other tropical nuances, tomato and strawberry.

► **Wen International;** *tel:* 845-354-1773;  
*www.weninternational.com*

## 4-Methy-2-Pentenoic Acid

*Source:* Oxford Chemicals Ltd./Charkit

FEMA# 4180, CAS# 10321-71-8,  
Artificial and nature identical  
*Natural occurrence:* Black tea.

*Odor:* @ 15% PG. Dry, sweaty acidic and sour, tangy, leafy tobacco with fruity strawberrylike nuances.

*Taste:* @ 20 PPM. Light, astringent, berry raspberry, slightly creamy with leafy tobacco and tealike nuances.

*Possible applications:* Strawberry, raspberry, tobacco and tea.

► **Oxford Chemicals Ltd./Charkit;**  
*tel:* 203-655-3400;  
*www.oxfordchemicals.com*



## 2,6-Nonadienal Diethyl Acetal

*Source:* Bedoukian Research Inc.  
FEMA# 3378, CAS# 67676-36-3,  
Artificial

*Odor:* @ 1.0%. Cucumber green, fresh melon rind, aldehydic green pepperlike with ripe pickle nuances.

*Taste:* @ 5 PPM. Green cucumber, melon rind with aldehydic vegetable notes and grassy pepper nuances.

*Possible applications:* Green pepper, watermelon, green melon nuances for honeydew, citrus nuances, tallow fried fat nuances.

► **Bedoukian Research Inc.;** *tel:* 203-830-4000;  
*www.bedoukian.com*



## Oleoresin Vanilla Bourbon Tenfold

*Source:* Danisco

*Odor:* Neat. Brown woody, beany vanilla, slightly smoky with a slight powdery afternote.

*Taste:* @ 0.08%. Sweet, premium vanilla with woody beany, creamy and dried fruit notes.

*Possible applications:* General vanilla applications, good for deep beany residual flavor for baked goods and smoothing of cola beverages.

► **Danisco;** *tel:* 800-255-6837; *www.danisco.com*



## Omega Caprolactam (synonym: 1,6-Hexalactam)

*Source:* SAFC

FEMA# 4235, CAS# 105-60-2, Artificial and nature identical

*Natural occurrence:* None found.

*Odor:* Neat. Weak, slightly meaty and vitaminlike with milky nuances and hints of white cocoa.

*Taste:* @ 20 PPM. Bitter, fruity apple with a melonlike aftertaste, slightly creamy and vegetative.

*Possible applications:* Cheese flavors, grapefruit, cranberry, apple and cucumber.

► **SAFC;** *tel:* 800-227-4563;  
*www.safcsupplysolutions.com*

## Orange Juice Carbonyls LV2

*Source:* MCI Miritz Citrus  
Ingredients LLC

Natural

*Odor:* @ 1.0%. Aldehydic, juicy orange with woody valencenelike notes and a slight floral nuance.

*Taste:* @ 5 PPM in 5% sugar + 0.10% CA. Juicy, woody valencene orange with sweet waxy and slightly spicy nuances.

*Possible applications:* Juicy orange depth notes, citrus and tropical fruit nuances for mango and papaya.

► **MCI Miritz Citrus Ingredients LLC;**  
*tel:* 845-988-9920; *www.miritz.de*



## Ortho Anisaldehyde

Source: SAFC

FEMA# 4077, CAS# 135-02-4, Artificial and nature identical

Natural occurrence: Cinnamon bark, cassia leaf oil and Tahitian vanilla.

Odor: @ 1.0%. Musty, powdery, spicy methyl salicylatelike with woody phenolic and fermented nuances.

Taste: @ from 5–10 PPM. Musty, powdery, woody, almond nutty, slightly phenolic and medicinal.

Possible applications: Root beer, celery, vanilla, smoke, bacon, sausage, barbecue nuances, whiskey and clove.

►SAFC; tel: 800-227-4563;  
[www.safcsupplysolutions.com](http://www.safcsupplysolutions.com)

## Phthalide

Source: SAFC

FEMA# 4195, CAS# 87-41-2,  
Artificial and nature identical

Natural occurrence: Tomato,  
red and white wines.

Odor: @ 1.0%. Sweet, powdery,  
celery lovage and maplelike, coumarin floral  
with a slight benzaldehyde nutty nuance.

Taste: @ 10 PPM. Sweet celery lovage, slightly bitter  
with hay and coumarinlike notes. It also has slight  
caramelized praline maplelike notes.

Possible applications: Celery, maple, coumarin  
substitutes, tropical and nut nuances.

►SAFC; tel: 800-227-4563;  
[www.safcsupplysolutions.com](http://www.safcsupplysolutions.com)



## Rice Distillate Brown Basmati

Source: Moore Ingredients Ltd.

Natural and organic

Odor: Neat. Sweet, toasted brown,  
pyrazinelike rice hull notes,  
creamy with a fatty praline  
nuance.

Taste: @ 0.20%. Slight toasted brown rice, slightly  
nutty with a fatty maltonelike nuance.

Possible applications: Savory brown notes, caramel,  
buttered popcorn, bread crust, rice, cereal and  
granola notes.

►Moore Ingredients Ltd.; tel: 513-881-7144;  
[www.moorelab.com](http://www.moorelab.com)



## Spearmint Distillate

Source: Moore Ingredients Ltd.

Odor: @ 10%. Mild, sweet uplifting  
spearmint carvone, rye bread  
with a warm herbal, minty green  
character and a fresh minty  
grassy nuance.

Taste: @ 150 PPM. Sweet spearmint top notes mixed  
with carvone, fuzzy, slightly waxy and refreshing  
with a creamy nuance.



Possible applications: Spearmint oral care  
products, herbal blends, liquid tea  
flavors, confections.

►Moore Ingredients Ltd.;  
tel: 513-881-7144; [www.moorelab.com](http://www.moorelab.com)

## Vanilla Distillate

Source: Moore Ingredients Ltd.

Natural and organic

Odor: Neat. Sweet, spicy eugenol, vanilla  
with woody and dairy creamy nuances.

Taste: @ 0.1%. Smoky vanilla, vanillin,  
brown beany with a dairy creamy  
aftertaste.

Possible applications: General vanilla  
applications, clear cordials and  
beverages, ice cream.

►Moore Ingredients Ltd.;  
tel: 513-881-7144; [www.moorelab.com](http://www.moorelab.com)

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