November 2023
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Savory Solutions and Flavoring Alternative Proteins

World Perfumery Congress Announces Theme

Mouthwatering Innovation

Industry insiders discuss how to best utilize salty, umami and kokumi modulators on page 24.

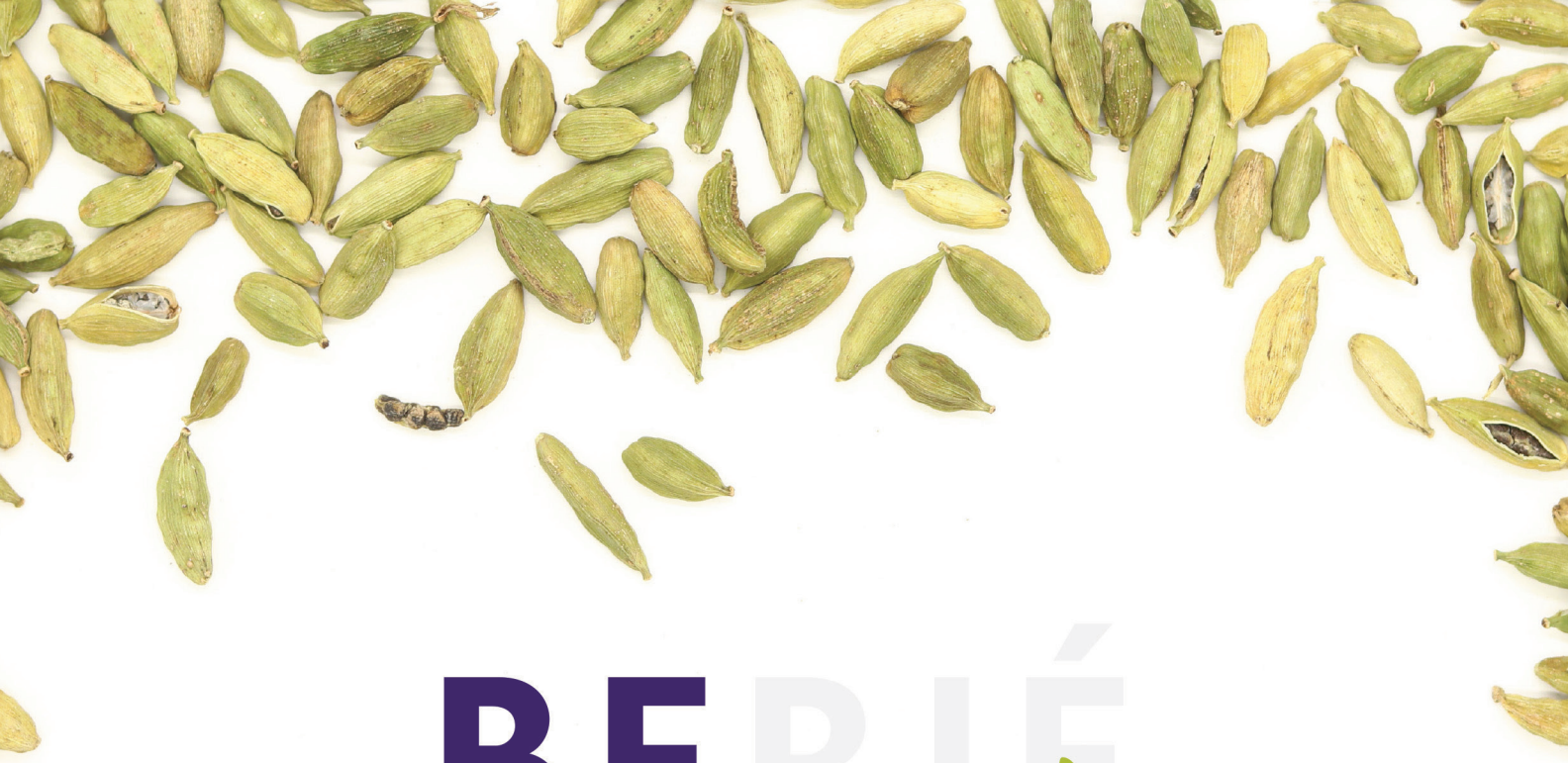
Forward Thinking: Latest Developments In Home Care & Laundry

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Emma Yao Wei · Perfumer

Flavor data sheet

Perfumery data sheet



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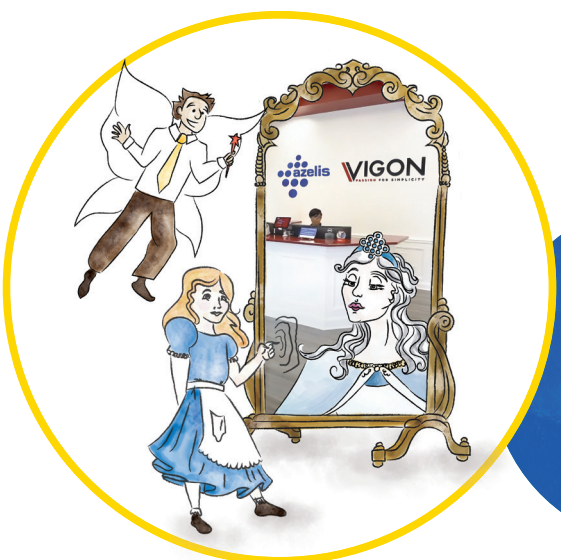
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Fostering Community & Engagement in F&F



Interested in contributing an article or study to a future issue of Perfumer & Flavorist+? Send us an email!

As we begin to prepare for 2024, the return of *World Perfumery Congress* (more on that on **page 40**), a fresh installment of *Flavorcon*, among other international travels covering all things flavor and fragrance, I wanted to put a call out to all F&F professionals to start your new year resolutions a bit early.

What do you want to accomplish in 2024? Do you want to have a study published? Or maybe you want to weigh in on a topic you're passionate about (plant-based, regulatory, supply chain woes, formulation, etc.)? *Perfumer & Flavorist+* wants to hear from you. We want to continue to build our community of F&F professionals and give them the opportunity to have their voices heard. If this aligns with your goals for the upcoming year, send me an email (jtroyli@allured.com). If there's a topic you have in mind that you want to learn more about, we will tap a seasoned professional to answer it for you. Our advisory board is ready and willing to share their knowledge.

In other news, this month marks *Flavorcon* 2023 in Cincinnati, OH. If you're catching this issue prior to November 8-9, join us at the Duke Energy Convention Center for our conference sessions and expo hall. If you've missed us, mark your calendar for *Flavorcon* 2024 set for October 8-9 in Atlantic City, New Jersey. Visit *www.flavorcon.com* to add your name to the mailing list.



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INDUSTRY INSIGHTS:

UMAMI, KOKUMI & SAVORY SOLUTIONS

Industry professionals weigh in on the applications at the forefront of innovation of these solutions.

Featured Insiders:

- CJ Food & Nutrition Tech
- Sensient Flavors and Extracts



According to Sensient's Liz Kreger, the amazing thing about the kokumi taste phenomenon is that the applications are limitless.

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When it comes to creating layered experience of flavors—umami, kokumi and savory are among the top solutions in a flavorist's toolbox to utilize. Industry professionals from CJ Food & Nutrition Tech and Sensient Flavors and Extracts were tapped to weigh in on applications pushing innovation for these solutions as well as the nuances of flavoring for vegan/plant-based products.

You can find out more about this topic on **page 24** in the article, "How to Best Utilize Salty, Umami and Kokumi Modulators" penned by *Flavorcon* 2023 speaker Alex Woo.

CHRISTINE SHIINOKI, Technical Applications Manager, CJ Food & Nutrition Tech

***Perfumer & Flavorist*+ [*P&F*+]: What are some of the applications that are at the forefront of innovation for umami, kokumi and savory solutions?**



Christine Shiinoki

Christine Shiinoki [CS]: As consumers seek and expect elevated eating experiences from their food choices, formulators are challenged to provide an array of flavors, tastes, as well as mouthfeel to elicit a "wow" reaction. Being able to provide the mouthwatering qualities of umami is essential. Whether it is a spicy flavor, slow-cooked profile, or in complex fermented flavors such as in gochujang.

CJ Food & Nutrition Tech develops and manufactures clean-label fermentation-based ingredients. CJ FNT's solution series TasteNrich is an umami flavor enhancer developed through natural fermentation. It provides the umami that customers crave while also boosting desired flavors. In sauces, dips, and topical seasonings, TasteNrich allows customers to customize the level of flavor and degree of spice. Formulating with TasteNrich in these categories, amplifies chili pepper, spice, and herb flavor notes to deliver the extra kick that makes food exciting to the tastebuds. Also, as an added benefit, umami increases the perception of salt, so formulating with TasteNrich can enable the use of less salt to control the amount of sodium in your products.

***P&F*+: How are vegan/plant-based applications driving innovation in savory flavors?**

CS: Flavor is paramount when it comes to how much we like our food and drives the decision on whether to take that second bite or make that repeat purchase. We often encounter flavor issues when formulating with plant-based proteins. There might be off notes in the finish, such as bitterness or beany-ness, or the flavor simply falls flat. CJ FNT's TasteNrich functions as a 3-in-1 vegan solution by providing the umami taste that boosts and rounds out the flavor experience, while also minimizing undesirable off-notes.

LIZ KREGER, PH.D., Flavor Innovation and Analytical Manager, Sensient Flavors and Extracts

***P&F*+: What are some of the applications that are at the forefront of innovation for umami, kokumi and savory solutions?**



Liz Kreger

Liz Kreger [LK]: The amazing thing about the kokumi taste phenomenon is that the applications are limitless. I would say innovation focuses less on specific applications and more on the generalization of making food products taste better. Kokumi has no taste of its own but transforms the flavor and taste profile of whatever it is put into. Taking a pasta sauce cooked via high-temperature, short-time pasteurization and making it taste like it was sitting on your grandmother's stove, simmering away all day. It takes a French onion dip and makes it taste like the onions were slow and low caramelized in a gourmet kitchen and made with the freshest creams. And it isn't just limited to savory; kokumi is in everything! Excited new science and analytical methodologies are being developed to help us identify the molecules that cause kokumi; in turn, we can create new flavor technologies to deliver.

***P&F*+: How are vegan/plant-based applications driving innovation in savory flavors?**

LK: These applications help drive the development of new and better vegan meat and dairy flavors. These flavor profiles are traditionally made from non-vegan named sources. Typically, a roasted chicken flavor starts with chicken meat, pushing innovation to new ways of developing these flavors without relying on actual meat and dairy, taking inspiration from other natural processes, like fermentation/enzymatic reactions, to transform plant-based sources to taste like meat.

Ingredients and Equipment



2,4-Dithiapentane

Natural Advantage, LLC

natadv.com

Natural Advantage introduces natural 2,4-dithiapentane (FEMA# 3878, CAS# 1618-26-4). This material occurs naturally in Camembert cheese, Gruyere de comte cheese, milk and truffles. 2,4-Dithiapentane can be described as having the enchanting taste of savory, earthy, mushroom—specifically white truffle—with nuances of onion and garlic as well. With a very pungent alliaceous horseradish and truffle aroma, this product would be great for truffle, onion, garlic, meat, gravies, mushroom, tomato, cheese and cream sauce. Recommended use levels are 1.7-1,000 ppb. It is U.S. natural, Kosher, vegetarian and non-GMO.



EU Natural Vanillin ex Ferulic Acid

OQEMA

www.oqema.com

Our EU natural vanillin ex ferulic acid (FEMA# 3107, CAS# 121-33-5) adds a sweet, creamy vanilla aroma for your beverage, confectionary and food needs. Suggested applications include beverages, confectionery and bakery.



Petitgrain Oil Paraguay

Berjé

www.berjeinc.com/products/essential-oils/petitgrain-oil/

Petitgrain oil Paraguay (FEMA# 2855, CAS# 8014-17-3), steam distilled from the leaves of the Bitter Orange tree, is often revered as a standout ingredient due to its unique mixture of fresh, sweet and floral notes. Berjé works directly with local farming communities in Paraguay, providing us with consistent access to high quality, farm-to-drum material.



Irisnitrile

Symrise AG

www.symrise.com/de/scent-care/aroma-molecules/ingredient-finder/#Irisnitrile

Irisnitrile (CAS# 29127-83-1) by Symrise: The overall floral performer– readily biodegradable–renewable–high impact. You can use it as a modifier and emphasizer in trace amounts. It also provides volume, power, and longevity in all applications. Irisnitrile compels elegance and efficiency. Discover the hidden treasure for your creations.



Strawberry Spark Extract

Agrumaria Reggina Srl

www.agrumariareggina.it

Our Strawberry Spark Extract is part of our range of Nature Spark Portfolio, which is composed of fruit and botanical natural extracts to apply in food and beverage solutions or to boost our customers' flavor creation. They are 100% FTNF (From The Named Fruit).



cis-4-Heptenal

Penta International Corporation

www.pentamfg.com

Now offering *cis*-4-heptenal (FEMA# 3289, CAS # 6728-31-0, JECFA# 320), containing a flavor base as sharp, green, milky, creamy dairy and tatty. Odor notes include fatty and green. Our material is food grade, Kosher and halal.



SensaCraft

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Flavors and taste technologies that allow you to mimic the taste, burn, mouthfeel and appearance of your favorite cocktails, allowing you to craft the perfect mocktail.

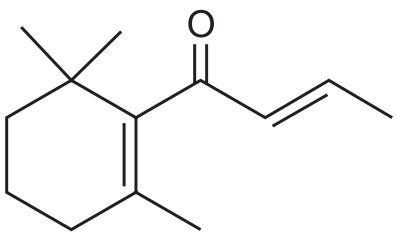


Heliotropine, Natural

Aurochemicals

www.aurochemicals.com

Heliotropine, natural presents scents of very sweet floral, warm, slightly spicy and cherry-like, which makes it the perfect choice to be used in a wide range of flavors and fragrances. It can be most commonly found in French-style vanilla flavors but offers endless possibilities to enhance your product.



β-Damascone

Hangzhou Grascent Co., Ltd

www.hangzhougrascent.com

β-Damascone (FEMA# 3243, CAS# 23726-91-2); 1-(2,6,6-Trimethylcyclohex-1-en-1-yl) but-2-en-1-one; Dihydro floriffone B; (E)-1-(2,6,6-trimethylcyclohex-1-en-1-yl)but-2-en-1-one. It features a powerful fruity floral note with a complex odor of rose, plum, blackcurrant, wine and tobacco. Suggested applications include fine fragrance, personal care, fabric care and home care with recommended use level from traces to 0.02%.

Agrumaria Reggina Debuts Nature Spark Portfolio

The Nature Spark portfolio is a collection of FTNF (From The Named Fruit) flavors. The extracts are said to be derived solely from fruits and botanicals.

The Nature Spark portfolio is segmented into three distinct families:

1. Fruit: Apple, Blueberry, Mango, Passion Fruit, Peach, Pineapple, Raspberry, Strawberry

2. Citrus Fruit: Bergamot, Bitter Orange, Cedar, Clementine, Grapefruit, Lemon, Lime, Mandarin, Orange, Pomelo

3. Botanicals: Cucumber, Ginger



The portfolio consists of three categories. One of which is Citrus Fruit: Bergamot, Bitter Orange, Cedar, Clementine, Grapefruit, Lemon, Lime, Mandarin, Orange, Pomelo.

Felice Chirico, Head of Sales & Marketing shared, "The Nature Spark line addresses the global needs of flavourists for natural extracts that can be used to develop 'Natural X Flavours' suitable for organic or premium beverages. We are extremely excited to expand our portfolio and further establish ourselves as a reference point in the F&F world."

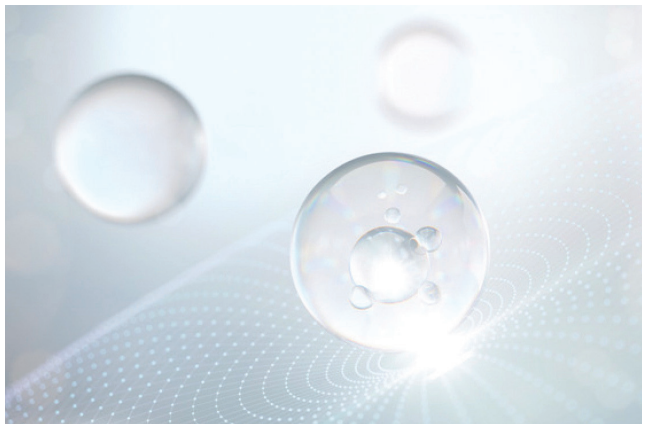
Cosmo International Fragrances Debuts ScentElligence Artificial Intelligence Platform

Cosmo International Fragrances has debuted its artificial intelligence (AI) platform ScentElligence designed to help transform perfume formulations. The platform is said to boast a deep-learning algorithm that analyzes data and delivers fragrant possibilities by combining sensoriality with performance.

The company is said to already be working on the next ScentElligence version to further integrate the sensory performance of their existing fragrant patented innovative solutions.

Marc Blaison, president at Cosmo International Fragrances, explained, "Our innovative digital tool puts consumers at the center, empowers and optimizes perfumers' creativity, and fosters fragrance performance easily and efficiently to achieve better results. With ScentElligenceTM, we push the boundaries of perfume formulation by combining science with the art of creation and the data engineering intelligence with the creative intelligence of our perfumers."

"With more than 3,000 analyzed raw materials through their molecules' physicochemical properties, we can predict the performance of a perfume. The perfumer keeps the process of creation, yet ScentElligenceTM outputs AI-generated advice so that the perfumer is able to refine the creation to obtain an advanced formula that performs effectively", shared Thomas Delmas, director of the Technology division at Cosmo Fragrances International.



The ScentElligence platform is said to boast a deep-learning algorithm that analyzes data and delivers fragrant possibilities by combining sensoriality with performance.

Delmas added, "With structured data and Artificial Intelligence, we are able to augment our perfumers' abilities to curate formulas and help guide them through their scent creation process. ScentElligenceTM facilitates the integration of technical constraints for higher application performances and optimizes the development process time."

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Symrise Perfumery School Interprets Art Through Fragrance

Symrise's Perfumery School recently took its current trainee class on an art safari to Berlin. The safari was guided by two artists, Pia vom Ende and Christian Kölbl, who translated their impressions of the forest and city into watercolors; these paintings were translated by the trainees into fragrance creations.

In a release, Symrise shared that in this year's curriculum, the Symrise Perfumery School has offered a selection of art workshops to learn about inspiration techniques.

On the first day, the five trainees explored the forest. For a stark contrast, the second day provided a look into the bustling city. The combination of both days with their impressions formed the basis of a complete watercolor series.

The trainees used these impressions to create five fragrances:

1. Alicia De Benito Cassadó from Spain calls her fragrance "Saturn 100101." Her accord combines the scent of outer space with that of new technical devices in the form of cold amber notes.

2. Christopher Pickel from the United States drew his inspiration from the contrast between nature and industry. In "Pig Sneaker," the scent impression of new sneakers mixes with animalistic gourmand notes of a street food vendor.

3. Gabriela Gerbi from Brazil combines elements of nature and city in her fragrance "Ash Garden." For her, the opposites come with something unifying – nature as a source of energy for urban life.

4. Attiya Lebogang Setai from South Africa emphasizes the soft powder notes of the lilac in the Spandau city forest in her fragrance "Lilac in the Forest of Berlin."

5. Shangyun Lu from China dives into poetry with his fragrance "Forget-Me-Not." The scent of lilac on a gloomy day reminds him of a poem by Dai Wangshu, a Chinese proponent of the symbolist movement.



The Symrise Perfumery School has offered a selection of art workshops to learn about inspiration techniques.

"Artistic activities, such as painting, can augment a special gift," explains Marc vom Ende, senior perfumer at Symrise and head of the Perfumery School in Holzminden.

"We wanted to achieve this effect with our art workshop for our budding perfumers. They learn to develop their special gift, i.e., the ability to draw inspiration from very different sources. That will help them come up with creative ideas for our customers in their creative work to come."



Givaudan Unveils "What is love?" Creative Vision Targeting Gen Z Olfactive Preferences



Creations belonging to the "What is love?" program will be showcased during an immersive, fragranced event, inviting Givaudan's customers to dive into the Gen Z universe.

Givaudan has introduced its latest creative vision, "What is love?," designed to translate Gen Z's love and seduction language into olfactive creations to be showcased in an immersive experience.

According to Givaudan's internal quantitative survey, 73% of 16-24-year-olds in the United States, and 68% in France respectively believe that fragrance is the decisive factor that seals the deal with their crush.

"What is love?" brings to life Gen Z's take on love and seduction, within the context of unfiltered digital exposure. "What is love?" is said to be the result of extensive research, driven by consumer insights and monitoring of social media, ensuring the most accurate and nuanced olfactive expression of these new love codes which prioritize inclusivity and unbridled emotion.

Arnaud Guggenbuhl, Fine Fragrance head of Global Marketing Insight and Image, stated, "By embracing Gen Z's reinvention of sensuality, gender and relationships, "What is Love?" delivers a realistic reading of what "love" means to this generation. The importance attributed to vulnerability and authentic feelings offers an outstanding inspirational playground for our perfumers, who by empathizing with this "rule-breaking" philosophy and ungendered approach, have shaken up all olfactive prejudices around attraction and love in perfumery."

Xavier Renard, global head of Fine Fragrance shared, "Givaudan's expertise in decoding the ongoing and future needs of consumers, takes a new form through this creative program. Supported by extensive research led over the last two years, "What is Love?" addresses a strategic opportunity to reclaim a core tenet of fragrance, love, while exploring new narratives relevant to a new generation."

Creations belonging to the "What is love?" program will be showcased during an immersive, fragranced event, inviting Givaudan's customers to dive into the Gen Z universe, where cozy bedrooms live alongside phone screens, and where heartfelt emotions are the new love and seduction language.

The experience was held in New York from September 18-29 and then in Paris from October 9-20.

Düllberg Konzentra Reveals My Healthy Home Trend Concept



The My Healthy Home fragrance concept color palette solely consists of muted shades designed to exude a sense of well-being.

The concept of scent-scaping took off during the COVID-19 pandemic when the world was forced to stay indoors. The concept refers to using different scents, either by utilizing candles or air fresheners, in each room or area of your home to create a different ambiance through scent. Düllberg Konzentra picks up on this trend with four floor-cleaning fragrance concepts designed to transform homes into places of well-being for all the senses called My Healthy Home.

The My Healthy Home fragrance concept color palette solely consists of muted shades designed to exude a sense of well-being.

"Against this background, it makes perfect sense that the interest in body care, health and fitness products, all of which have long been key elements in self-care routines, should now expand to encompass household products," says Christian Lüke, in charge of marketing at Düllberg Konzentra. "Modern household and floor cleaners are, essentially, an additional facet of self-care. They play an important role in preserving the longevity of our living spaces; they contribute to the sustainability concept, and they allow us to be relaxed hosts. In other words, they contribute to healthy well-being on many different levels."

"Our new fragrances are aimed particularly at people who want to enrich their homes and lifestyle by adding a new, sensual dimension with consciously chosen all-purpose and floor cleaners. Most of Düllberg Konzentra's fragrance concepts are based on natural ingredients with the purest essential oils, meaning that people can do this with a good conscience," Lüke continued.

"When it comes to appealing to the senses, the visual impression plays an important supporting role. With this in mind, we developed a color world that instantly signals naturalness and harmony", explained Lisa-Marie Achilles.

Lüke added, "These fragrance and color ideas allow the cleaning product industry to create product innovations that plug into today's key trend."

T. Hasegawa Debuts Tomato Boostract to Decrease Reliance on Tomato Paste



The new technology was developed in response to severely limited tomato crop supplies in the U.S. as record summer rains saturated California tomato fields.

C. Hasegawa USA debuted Tomato Boostract[a] technology designed to address supply chain shortages and decrease reliance on tomato paste, in response to rising material costs and product shortages.

The natural flavor modifier is said to amplify the taste and texture of tomatoes in a wide variety of products including sauces, ketchup, soups and salsa. The new technology was developed in response to severely limited tomato crop supplies in the U.S. as record summer rains saturated California tomato fields[b], shortening the planting season and diminishing supply of raw tomatoes. This is on top of already rising material costs for tomatoes, which have gone up as much as 80% since 2021 due to previous U.S. droughts and other growing challenges that impacted supply.

The R&D team at T. Hasegawa determined that use of Tomato Boostract can successfully reduce the use of tomato paste by nearly 25%.

T. Hasegawa's VP of research and development, Jim Yang, shared, "Our mission at T. Hasegawa is to improve the taste of foods and beverages, but also to solve production challenges through innovative technologies. With supply shortages increasing the cost of tomato products, Tomato Boostract is a perfect solution to amplify the fresh, bold natural flavor and texture while decreasing reliance on tomato paste."

Yang added, "Since Boostract is a natural flavor modifier, it simply brings out more of the flavor that is already in tomato paste but allows food brands to use significantly less product in their formulations."

p&f+

[a]BOOSTRACT is a trademark of T. Haseagawa

[b]*https://www.nbcnews.com/news/us-news/prices-canned-tomato-goods-rise-california-farms-stay-soggy-record-rai-rcna82509*

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PROFILE: MANOJ ARORA

The chief perfumer shares his first scent memory, advice for up-and-comers and how the job of a perfumer has evolved over the years.

Manoj Arora, managing director and chief perfumer, Sacheerome Fragrances & Flavours

This month's spotlight lands on Sacheerome managing director and chief perfumer Manoj Arora. With over four decades of experience in the flavor and fragrance industry, Arora shares his first scent memory, advice for up-and-comers and how the job of a perfumer has evolved over the years.

***P&F+*: What led you to the fragrance industry?**

Manoj Arora [MA]: When you are destined to do something, the whole universe conspires to make it happen. The realm of fragrance and perfume was my calling and I am happy to be here. I belong to the third generation of my family in this business. My grandfather was in the business of trading saffron, real musk and natural aroma ingredients. My father shifted the business toward importing and exporting aromatic ingredients and manufacturing fragrances under the name of Calcutta Perfumery Works.

I started my journey in the fragrance business back in 1980. To expand my understanding of the market, I began traveling to European countries to source raw materials. During my visits to Europe, I spent a lot of time with the perfumers as I was always fascinated with the creativity and matching of fragrances, practiced a lot, which continues. A few of these master perfumers identified a perfumer in me and enlightened me with the art of modern perfumery under their guidance and mentorship.

***P&F+*: What is your first scent memory?**

MA: Perfume is described as the art that triggers memories, and being surrounded by fragrances all my life, I have many distinct scent memories, sharing one from my early career that stands out.

At the beginning of my career, I used to travel a lot to the Middle East and discovered that oud was the most prevalent and highly valued note in the region, despite its high cost.

One of the customers wanted to launch his range of talc, toilet soap, cream, and lotions with a new fragrance for that region. I thought to capture the profile of oud by adding distinctive touch and providing fragrances for different applications. This happened almost three decades ago yet the memory and fragrance still linger. When the customer smelled the products, he exclaimed "Mashallah oud!" It brings me great joy to see that today, oud has become one of the most significant trends in the fragrance industry worldwide.



Name: Manoj Arora

Title: Managing Director & Chief Perfumer

Location: Greater Delhi Area

***P&F+*: What is the best piece of advice you've been given?**

MA: At the beginning of my career, a senior perfumer who was convinced of my abilities, advised me to "stick to it, practice a lot and always continue with new creations to remain relevant, the moment you stop, you will get obsolete." I followed his words of wisdom and shall continue to deliver new notes et accords.

***P&F+*: Are there any recent projects you're particularly proud of?**

MA: During the peak of the pandemic our new range of fragrances having cues of wellness and hygiene, curated using in-house knowledge of fragrances and Ayurveda, was very well accepted by the global clientele. Despite facing obstacles such as

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procurement and shipment due to supply chain disruptions, our team's hard work and dedication made us overcome the situation by quickly developing and delivering bulk fragrances to domestic and international customers, allowing us to touch many lives.

***P&F+*: Describe yourself in three ingredients.**

MA: The experience that envelopes me makes people think of me as a blend of various fragrance notes, akin to a complex compound. That's quite an honor for me! When it comes to scent language, my emotions are clear, my top notes are full of joy and freshness that resembles the evergreen mandarin; muguet (lily of the valley) in the middle for its strong and soft in nature qualities; and ambry in the bottom, which is stable and sturdy, doesn't fade easily.

***P&F+*: Any advice for people coming into the F&F industry?**

MA: Perfumery and flavor creation are professions that require passion and patience, and cannot be confined to a standard 9-5, five-day work week. It is a job that demands a constant presence and a willingness to explore the bounds of one's creative imagination around the clock. For newcomers entering this field, my advice is to take the time to understand what fragrance means to you-yourself first, can you live without it? Memorize notes of different ingredients, by connecting them with anything which exists, experiment a lot, first by making new accords and building a story around it, and pursue this career path only if your key virtue is dedication and great enthusiasm. The world of perfumery is challenging and competitive, but if you love this from the heart, you will shine through your work.

***P&F+*: How has the job of a perfumer changed during your career?**

MA: Over the past four decades, I have witnessed the fragrance industry in India and worldwide grow and evolve exponentially. When I first started, the nose and the library in your memory and lab were the main tools available, there was a lack of data on product performance and limited literature and equipment to evaluate and choose the ingredients.

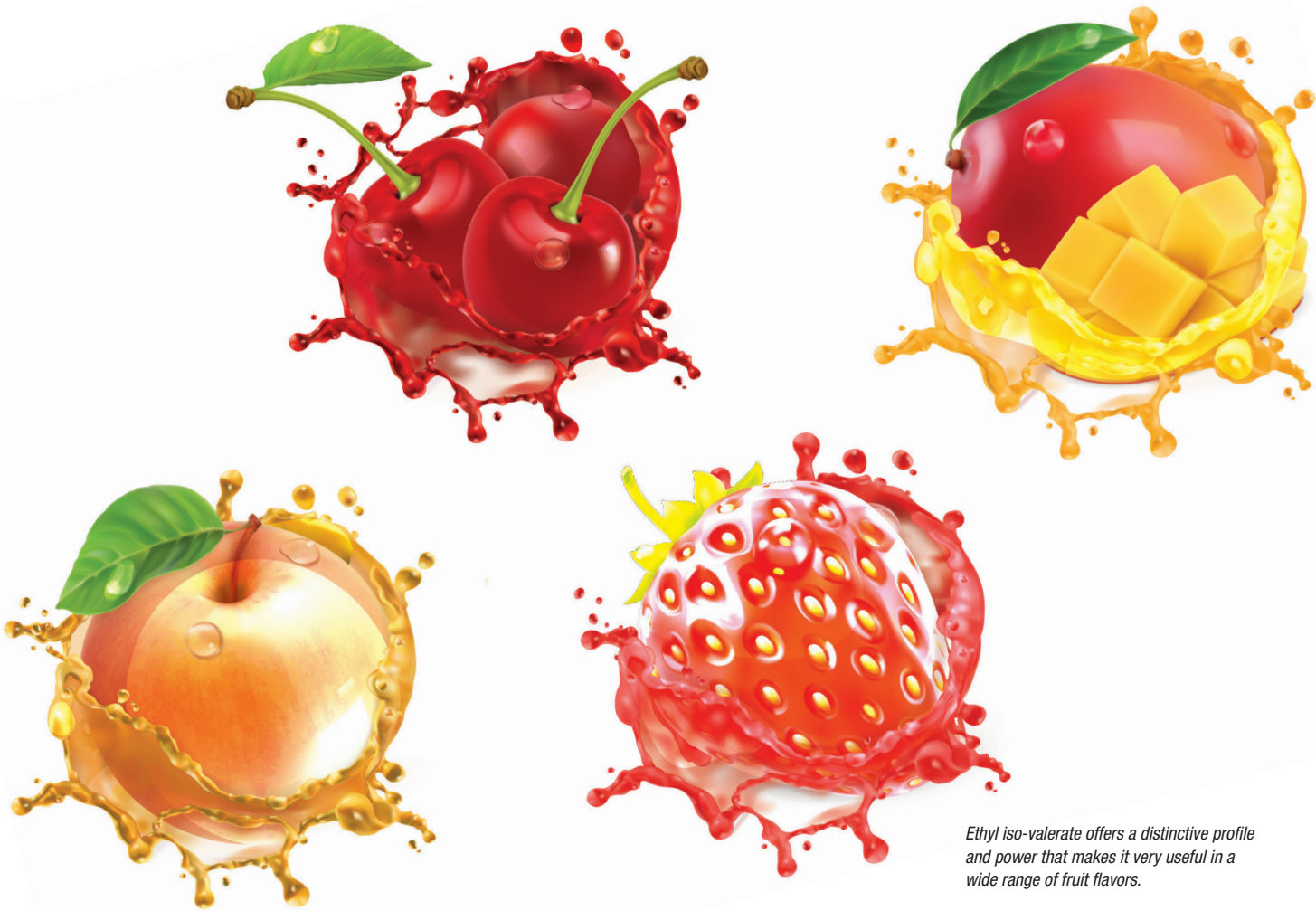
Although the nose remains the ultimate, nowadays with the availability of advanced gadgets, GC and GCMS, research and development have become faster, and a wealth of data is available on product performance. However, the safety guidelines for creating fragrances are much more stringent, making it more challenging to be creative.

***P&F+*: Are the types of projects you're working on changing over time? How are the creative demands of the job evolving?**

MA: The fragrance and flavor industry now requires high stability and performance in addition to keeping up with industry trends. Our primary focus now is to ride high on the new technology-driven fragrances and flavors to deliver an even better customer experience. With the revolution in the marketing, technology, and packaging of end products, we are working hard not only to maintain the pace with the change but to remain one step ahead. There is a complete shift due to generational change, especially in India which has 70% Gen Z with much better affordability and exposure, which changed the landscape 360 degrees. For food and nonfood grade FMCG products people have become more conscious about wellness, hygiene and health and expect products with functional benefits.

The availability of new molecules with high performance, and creative capabilities have increased. As our volumes have exponentially increased, we are able to allocate a larger budget for research and development to create captivating and innovative fragrances and flavors that elicit strong emotions and sensory experiences.





Ethyl iso-valerate offers a distinctive profile and power that makes it very useful in a wide range of fruit flavors.



■ BY JOHN WRIGHT
johnwrightflavorist@gmail.com

Flavor Bites: Ethyl Iso-valerate

Ethyl iso-valerate in tropical, berry, fruit and other flavors.

Ethyl iso-valerate, also known as ethyl 3-methyl butyrate, (FEMA# 2463, CAS# 108-64-5) is, to a limited extent, something of an exception to the common perception that saturated aliphatic compounds exhibit very predictable odors. The odor similarity to the subject of the last article, ethyl 2-methyl butyratea, is much less than would be expected from the close similarity in structure. Ethyl 2-methyl butyrate has a very distinct apple character, ethyl 3-methyl butyrate does not. Instead it has a more powerful and substantive version of the fruity note of ethyl butyrate, backed by a less obvious note of pineapple.

This ester is found widely in nature, but not as frequently as some of its counterparts. It is the distinctive profile and power that make it very useful in a wide range of flavors. It also makes it a great partner for a number of related esters, especially ethyl butyrate, ethyl 2-methyl butyrate and ethyl hexanoate.

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

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Tropical Fruit Flavors

Cherimoya: Cherimoya, or custard apple, needs a mixture of esters for authenticity and ethyl iso-valerate plays a significant part. Levels vary considerably, but can range up to around 500 ppm.

Jackfruit: Higher levels of addition, even up to 3,000 ppm, are better in jackfruit flavors, adding real impact.

Kiwi: The main esters in kiwi flavors are very light. Ethyl iso-valerate adds depth without straying away from the kiwi profile. One hundred ppm is a good starting point.

Lychee: Ethyl iso-valerate works well in combination with ethyl 2-methyl butyrate to freshen lychee flavors. Twenty ppm is a reasonable level of addition.

Mango: The fruity note of authentic mango flavors should ideally be dominated by ethyl butyrate. A moderate addition, around 500 ppm, of ethyl iso-valerate adds depth and impact.

Passionfruit: Top ester honors in passionfruit flavors are shared between ethyl butyrate and ethyl butyrate. Now ethyl iso-valerate can make a bigger contribution. Two thousand ppm is very effective.

Pineapple: Pineapple flavors have a similar, but rather more complicated balance of esters. Ethyl iso-valerate is most useful in fresh pineapple flavors, where the level of addition can be up to 3,000 ppm.

Berry Fruit Flavors

Blackberry: This raw material can play a modest role in blackberry flavors, brightening the profile and adding impact at levels around 800 ppm.

Blackcurrant: The effect of ethyl iso-valerate in blackcurrant flavors is more subtle. One hundred ppm is a reasonable level.



Blueberry: Ethyl iso-valerate is, arguably, the most significant ester in blueberries in nature. Hence, its level can be increased up to 8,000 ppm or 10,000 ppm.

Cherry: The main role of esters in cherry flavors is to balance, as far as possible, benzaldehyde. Two hundred ppm of ethyl iso-valerate is decidedly helpful.

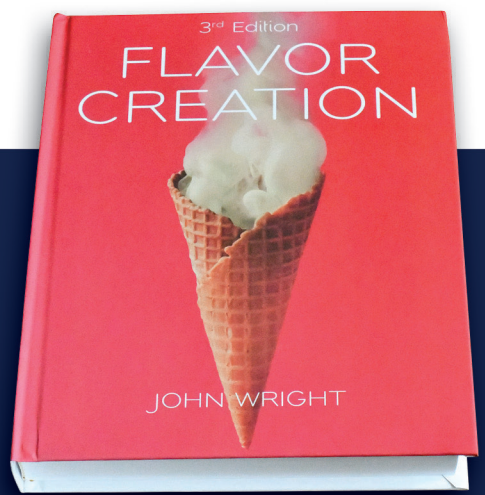
Cranberry: 2-Methyl butyric acid is an important component of cranberry flavors, so it comes as no surprise that ethyl 2-methyl butyrate also plays an important part. Ethyl iso-valerate can enhance the effect of ethyl 2-methyl butyrate at moderate levels, around 500 ppm.

Raspberry: Five hundred ppm of ethyl iso-valerate can be very helpful in raspberry flavors, adding a little complexity and more than a little impact.

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Strawberry: Strawberry flavors are often over reliant on ethyl butyrate and can come across as too light. Ethyl iso-valerate keeps to a similar profile, but adds depth and attack at 1,000 ppm.

Other Fruit Flavors

Apple: We saw that ethyl iso-valerate could be an effective adjunct to ethyl 2-methyl butyrate in cranberry flavors. The same is true, to an even greater extent, of apple flavors. One thousand ppm is an effective level of addition.

Apricot: Butyl and hexyl esters often dominate the fruity aspect of apricot flavors, but ethyl iso-valerate can add interesting complexity at 300 ppm.

Grape, Concord: Ethyl iso-valerate help balance the fruity note in Concord grape flavors and increases the impact at 200 ppm.

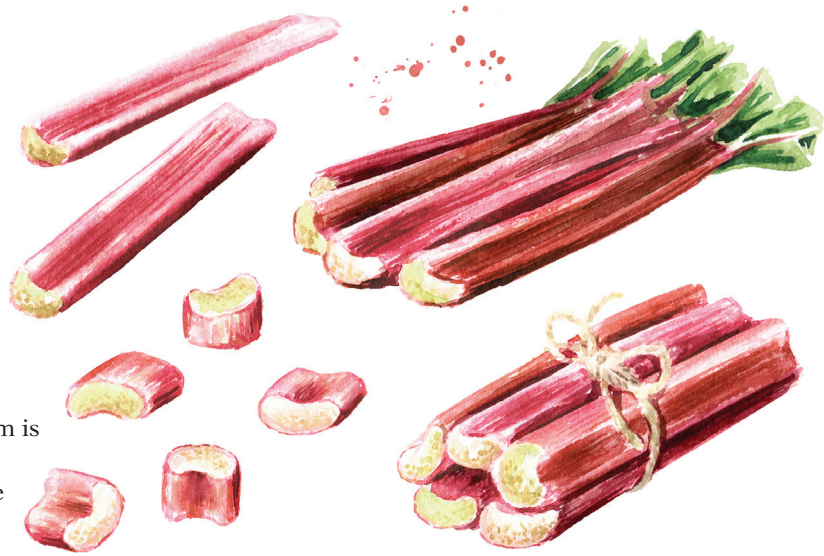
Lemon and Lime: One hundred ppm of this ingredient adds fresh character to all lemon flavors and also cold pressed lime flavors. It is not helpful in distilled lime flavors.

Orange: Ethyl butyrate is the natural choice to add fresh character to peely orange flavors. Ethyl iso-valerate can further enhance the fresh, juicy notes. Levels up to 200 ppm are effective.

Watermelon: The ester complex of watermelon flavors often relies on the simplistic note of iso-amyl acetate. One thousand ppm of ethyl iso-valerate can brighten things up significantly.



Ethyl iso-valerate, at 100 ppm, can provide a fruity hint to elderflower very effectively.



The fruity character effect is made more authentic by the addition of 300 ppm of ethyl iso-valerate working in tandem with methyl phenyl carbinyl acetate.

Other Flavors

Beer: Good beer has a modest fruity note, irrespective of the style of beer. A small addition of ethyl iso-valerate, around 20 ppm, is ideal.

Butter: Fresh butter should have a modest fruity note. There are a number of ways of conveying this. Ethyl iso-valerate, at around 30 ppm, is one of the best.

Elderflower: Elderflower flavors are increasingly popular, especially in the cocktail sector. The dominant note is obviously floral, but a hint of fruit helps, especially in blends. Ethyl iso-valerate, at 100 ppm, can provide that fruity hint very effectively.

Maple: Ethyl iso-valerate would probably be an unnecessary complication in a patently synthetic maple flavor. Authentic style flavors are a different matter. As little as 50 ppm of this ingredient rounds out the profile.

Olive: Realistic olive flavors also have a subtle fruity aspect. Ethyl iso-valerate, at 20 ppm, adds this note in a very authentic way.

Rhubarb: Methyl phenyl carbinyl acetate might seem to be all the fruity character needed for a good rhubarb flavor. That said, the effect is made more authentic by the addition of 300 ppm of this ingredient.

Rum: Ethyl iso-valerate is interesting in most spirit flavors, especially rum flavors. One hundred ppm is a reasonable starting point in light rum flavors, rising to higher levels in dark rum flavors.

Soy Sauce: Fruity notes are not terribly obvious in soy sauce flavors, but they can help. Thirty ppm of ethyl iso-valerate goes some way to counterbalance the heavy, savory notes.

Vanilla: The profile of vanilla bean extracts enhances with age, to some extent because of ethyl ester formation. Fifty ppm of ethyl iso-valerate contributes to this attractive character.



OCEANS of POSSIBILITIES

Methyl Propyl Disulfide, Natural

FEMA 3201

- onion, garlic, tomato, potato, vegetative

Dimethyl Trisulfide, Natural

FEMA 3275

- strong, onion-garlic, meat

2-Methyl-3-Furanthiol, Natural

FEMA 3188 *dilutions available*

- roasted meat, sweet beef broth

Dipropyl disulfide, Natural

FEMA 3228

- alliaceous, sulfurous, green, vegetative

Trimethylamine, Natural

FEMA 3241 *dilutions available*

- pungent, fishy odor and flavor

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HOW TO BEST UTILIZE SALTY, UMAMI AND KOKUMI MODULATORS

Understanding various methods to utilizing flavor modulators in formulations.

BY ALEX WOO, CEO, W2O Food Innovation



According to author Alex Woo, there are four strategies to make things saltier without adding more table salt.

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Saltiness

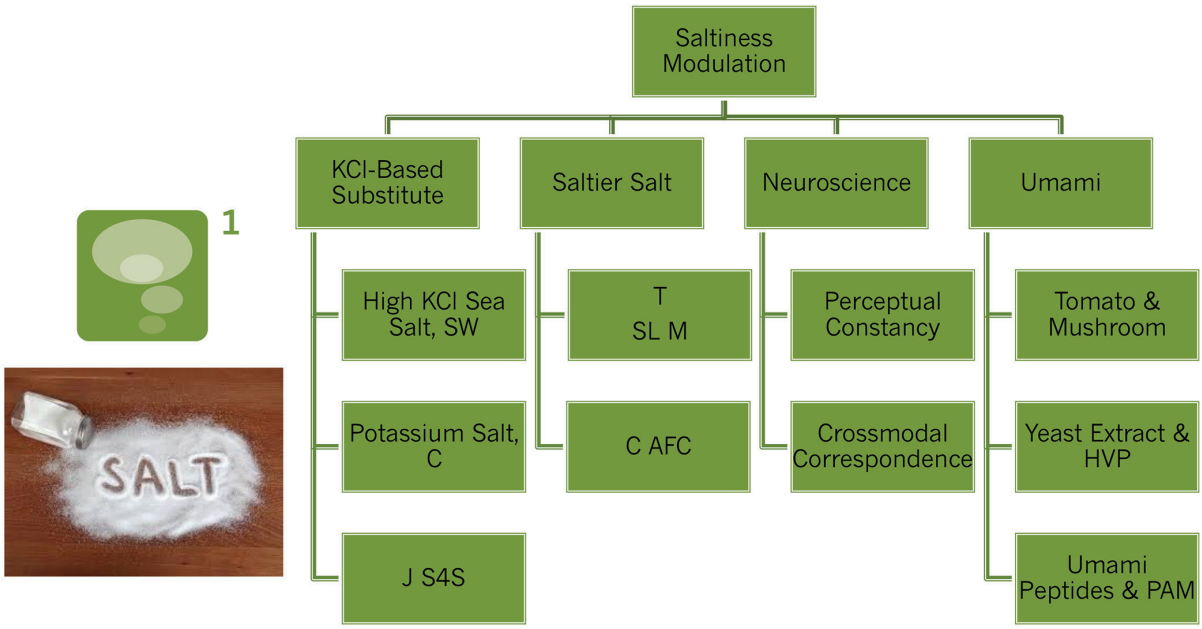
Low salt does not mean it has to be low flavor. We just need to learn a few things in saltiness neuroscience and apply them to create salty perception without salt. Flavor is a crossmodal integration of all five sensest—taste, smell, sight, sound and touch.[1,2] The five basic tastes in the mouth are sweet, sour, bitter, salty and umami.

Taste bud is a cluster of about 100 taste cells. Each taste cell is dedicated to one taste so one taste, one cell. There are Type I, II and III cells. Type II cell are dedicated to either sweet, bitter or umami. Type III cells are for salty and sour detection.[3] Thanks to rapid advances in neuroscience, all 40 taste receptors in the mouth have been found in the past 20 years. Umami taste (delicious) is detected by a primary receptor T1R1/T1R3 that responds to monosodium glutamate (MSG) in Type II taste cells. Saltiness is detected by a primary ion channel Epithelium Sodium Channel (ENaC) selective for sodium in Type III taste cells.[4,5] Kokumi, which has not been proven a basic taste, mysteriously triggers Calcium Sensing Receptor (CaSR).

Aside from the primary ENaC, there is also a secondary pathway responding to both high level of sodium chloride (NaCl, table salt) and any level of potassium chloride (KCl). That's why K is also salty but much less salty than Na. There is also a separate 2nd pathway for chloride and together making NaCl the saltiest substance in the world. Salty detection in the mouth leads to salty perception in the brain. The more we understand saltiness neuroscience, the more we know how to make thing salty without table salt.

> “Flavor is a crossmodal integration of all five senses—taste, smell, sight, sound and touch. The five basic tastes in the mouth are sweet, sour, bitter, salty and umami.”

F-1 Saltiness Modulation: There are 4 strategies which are substitutes, saltier salt, neuroscience and umami.



Salty Modulators

Salt reduction is really about saltiness modulation. There are four strategies to make things saltier without adding more table salt (**F-1**). The first approach is to use natural salt substitutes. This includes sea salt and potassium salt by at least three suppliers.

Second approach is "saltier salt." Rather than solid crystals, salt was made into a porous microstructure with higher surface area for faster kinetic release from foods during eating. A little bit of salt tastes like a lot more salt, allowing up to 50% salt reduction. It tastes like salt because it is salt, but it works only for dry topical applications.[6]

The third approach is to leverage neuroscience: Perceptual Constancy and Crossmodal Correspondence. Perceptual constancy can be reduced to a practice called "layering." Layering or taste contrast such as high sodium-low sodium-high sodium layers in savory bakeries can be explored for up to 30% sodium reduction. Crossmodal correspondence can also be practiced by adding salty aroma (beef aroma for example) which enhances salty taste perception in the mouth via retronasal smell-taste interaction.[7,8]

The fourth and last approach is to use umami substances via another neuroscience finding called prior association. Salty and umami if perceived together earlier in life, umami taste perceived later in life will call up salty taste. This can be done with vegetable extracts naturally high in MSG, or by natural umami peptides found in nature.

Umami Modulators

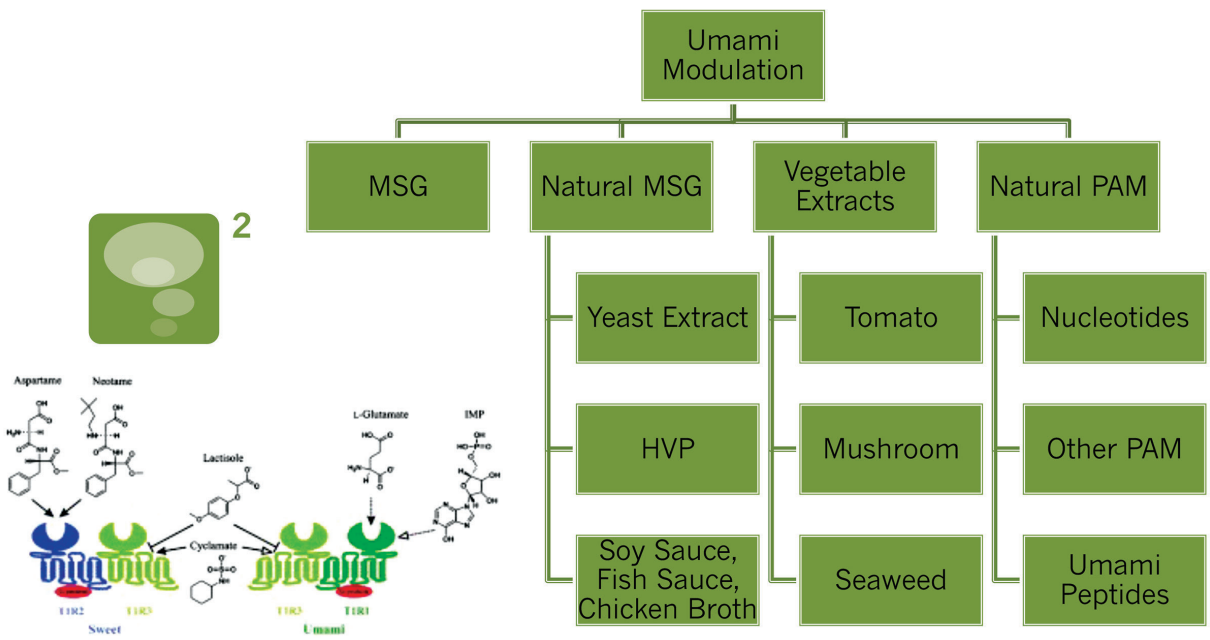
The more we understand how umami works, the better we know how to use ingredient to increase umami directly and increase saltiness indirectly. Umami taste (delicious) is detected by a primary receptor T1R1/T1R3 that responds to MSG, it's the taste of MSG. Umami is also detected by five different secondary pathways responding to other amino acids and peptides.

There are four approaches to make foods more umami (**F-2**). First approach is to use pure MSG. Nothing is wrong with MSG when used in moderation and below legal and safety limits. 1/3 MSG+2/3 salt delivered 25% sodium reduction. Label in EU is flavour enhancer (MSG) or flavour enhancer (E621).

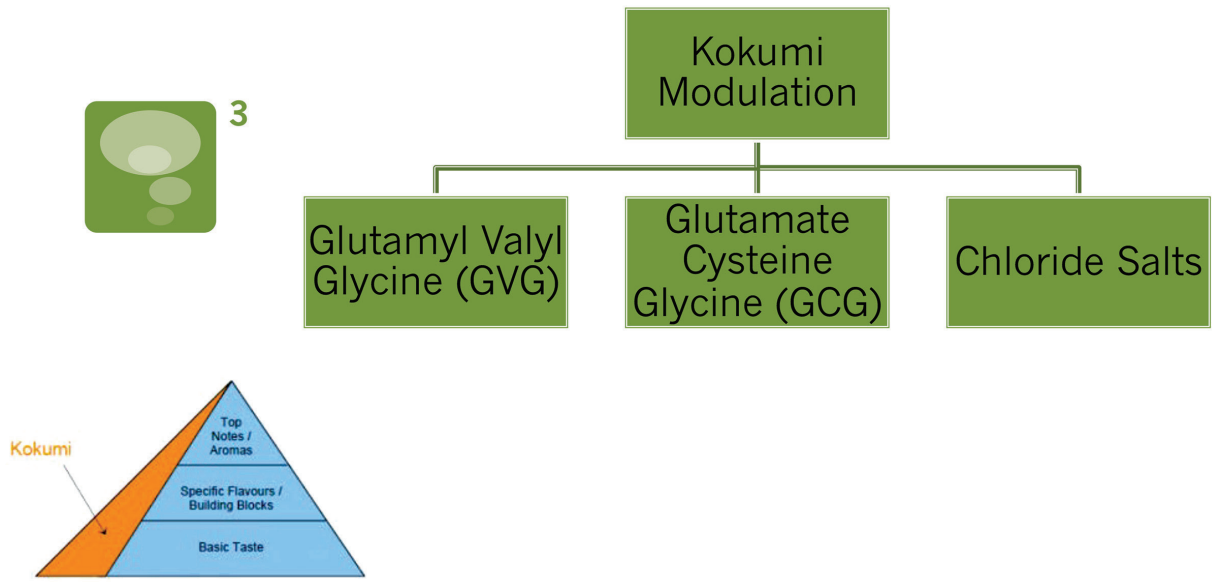
Second approach is to use Natural MSG (**F-2**). It can be plant-based such as yeast extract or hydrolyzed vegetable proteins (HVP). It can also be animal-based including fish sauce. All of these are high in both naturally present MSG and nucleotides.

The third approach is vegetable extracts naturally high in umami such as tomato, mushroom, and blends thereof (**F-2**). Dosage is typically 0.5% as consumed.

F-2 **Umami Modulation: There are 4 strategies which are pure MSG, natural MSG, vegetable extracts and natural PAM**



F-3 Kokumi Modulation: There are at least 3 kokumi substances which are GVG, GCG and chloride salts



The fourth and last approach is Natural PAM (**F-2**). PAM stands for Positive Allosteric Modulators. These are compounds that bind on the outside of the T1R1 VFT and close to MSG that binds inside of the T1R1 VFT, making MSG binding tighter thus 4X to 8X more potent. The trick is combining plant-based "basal umami" (that is, MSG) with animal-based "synergistic umami" (they are nucleotides IMP+GMP).[9,10] Nucleotides, traditionally called MSG potentiators in food science, were recently proven to be MSG PAM in neuroscience.

Umami and salty peptides could also be PAM.[11] Umami peptides were isolated from fermented Asian foods. Some of the "salty" peptides were Maillard reacted peptides found in nature. They probably are not really "salty" but triggered umami secondary receptors and perceived as "salty" via prior association.

Kokumi Modulators

Kokumi is a Japanese sensory term refers to the sensation for overall thick, hearty, mouthwatering, balanced, and a long finish. Or "rich" in short. This is the mouthfeel in slow cooked stew or aged cheese. It had not been proven as a basic taste (**F-3**).

The most potent kokumi substance is a tripeptide Glutamyl-Valyl-Glycine (GVG) found naturally in garlic, onions and scallops. It is 10X more potent than glutathione, the first ever kokumi substance discovered in garlic, Glutamate-Cysteine-Glycine (GCG). GVG has a FEMA number 4709 with a beverage limit of 50ppm. Both GVG and GCG were reported to be PAM for CaSR, a secondary receptor for umami.

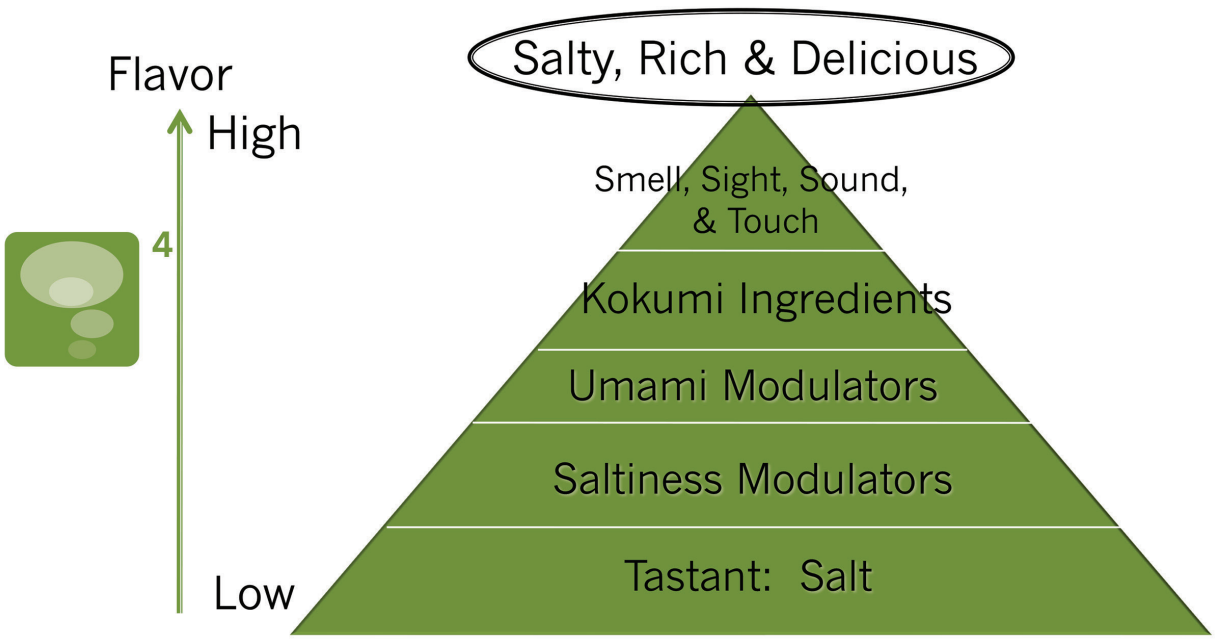
High kokumi sensation can be created by formulating with high-kokumi soy sauce or yeast extract, both dosed at less than 1% as consumed. Kokumi peptides not only increased kokumi but also enhanced salty and umami. In other words, salty umami kokumi come together in our perception via prior association and perhaps it could be considered "intra-modal" correspondence.

It's interesting to note a new three-way chloride salt blends for sugar mouthfeel in sweet beverages, could be the same CaSR PAM for kokumi sensation in savory foods. It has a FEMA number of 5000, a gravies limit of 1,424ppm, and labeled as natural flavor.

Stacking

Taste detection is at the receptors in the mouth. Taste transduction in taste cells involves conversion of a junction potential to an electrical signal that goes through the taste nerves to the taste cortex in the brain. Smell Transduction goes from odors receptor binding in the nose to olfactory bulb and eventually to the olfactory cortex in the brain. These taste and smell signals are integrated to form "flavor"

F-4 Stacking is a clean label sodium reduction strategy for blending plant-based ingredients to make foods salty, rich and delicious



in orbitofrontal cortex.[12] This is the neuroscience foundation why salty, umami and kokumi come together in our perception. Stacking is a clean label salt reduction strategy by blending salty, umami and kokumi ingredients together to make low sodium foods rich and delicious (**F-4**). We should use less salt and use umami and kokumi ingredients to make a little bit of salt taste like a lot more.

Summary

Clean label taste modulators is the field of changing and adjusting basic tastes with plant-based ingredients in reduced salt foods. There are four strategies to make foods saltier without adding more table salt which includes KCl and salty aroma. There are also four strategies to make foods umami such as vegetable extracts and natural PAM. All these ingredients increased umami directly and saltiness indirectly. Finally kokumi sensation can be created with kokumi peptides. Stacking is a clean label salt reduction strategy based on blending these three types of plant-based savory ingredients to make foods salty, rich and delicious.

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Approved by Ecocert, Diptyque's La Droguerie eco-friendly cleaning line is available in Cedarwood Perfumed Ceramic, Dishwashing Soap with Orange Blossom, Leather and Wood Care Lotion with Beeswax, and Multi-Surface Cleaner with Vinegar; courtesy of Diptyque.



BY AMY MARKS-MCGEE,
Trendincite LLC; amy@trendincite.com

Forward Thinking: Latest Developments In Home Care & Laundry

Sophisticated scents and iconic scents outside of the home care category are spilling into cleaning products, dish care and fabric care.

The COVID-19 pandemic altered consumer attitudes towards cleaning and their cleaning habits. An NIQ[a] survey shows that buyers of home care products want their homes to be clean and sanitized, and their chief concern is health. 45% of consumers indicated looking for products with safety precautions such as antibacterial properties, non-toxic ingredients, and disinfectant abilities. Furthermore, home care items are a necessity in every household because consumers want clean surfaces, washed laundry, and fresh households. NIQ's[b] data revealed that 59% of respondents maintain that rising prices would not impact their home essentials spending, while 84% of consumers worldwide plan to spend the same or

[a]*https://nielseniq.com/global/en/insights/analysis/2023/home-care-trends-what-consumers-are-looking-for-and-how-innovations-deliver/*
[b]*https://nielseniq.com/global/en/insights/analysis/2023/innovation-in-home-care-market-overview/*

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more on home care essentials. Cleaning concerns extend to college parents with children living away from home. According to a June 2023 American Cleaning Institute (ACI)[c] survey with 500 parents of college undergraduates, nearly 3 in 4 (74%) of college parents admit their kids are not completely prepared to clean on their own. Out of the parents surveyed, 64% expressed concern that their child did not know how to effectively use cleaning products and 1 in 4 parents (26%) worried their kids lacked the proper cleaning supplies or know-how.

With health being a top concern, consumers are upgrading their home care routines with better-for-you and better-for-the-planet plant-based and natural products. Sophisticated scents and iconic scents outside of the home care category are spilling into cleaning products, dish care and fabric care. In response to consumers' frustration with rewashing dishes because of food remnants, dish care brands are formulating with enzymes to help break down the stubborn protein and starches. Laundry sheets, plant-based, biodegradable formulas, and products to reduce microfibers are fueling fabric care innovation.

Self-Care Spills Into Home Care

As discussed in Trendincite's *Perfumer & Flavorist+*[d] "Forward Thinking: 5 Trends Shaping The Bath & Body Industry," article, which appeared in the October 2023 edition, self-care is on trend and a mainstay. Consumers are upgrading their home care routines to promote health and well-being, which includes the cleaning products individuals use. Inspired by beauty products, cleaning products are ditching harsh chemicals and replacing them with better-for-you and better-for-the-planet plant-based and natural formulas and sophisticated scents.

Kris Jenner and Emma Grede are steadily growing their plant-powered cleaning brand Safely. The line is free of stabilizers, sulfates, parabens, phthalates, dyes, PFAS and animal by products and this summer became Green Seal Certified. Last year, the brand released the Calm Collection exclusively at Walmart. The Calm Collection features Dish Soap, Everyday Laundry Detergent, Hand Soap, and Universal Cleaner. The scent "is designed to resemble an iced lavender latte on a warm, sandy beach" and includes notes of lavender, vanilla, lemon, coconut, rose and dry musk. In July, Safely expanded its distribution to Kroger and created an exclusive Sunrise scent for their Universal Cleaner, which contains gardenia, tuberose, saffron, mint, and sage accords. Recent scent releases include Bright with notes of pink grapefruit, cassis, rose, violet, amber, and cedarwood and Fresh with basil, mandarin, lime musk, amber, violet, and lily accords. The brand also added Scent Diffusers in Bright, Calm, and Rise scents housed in glass jars with a paper wick. In September, Safely received certification as a B Corporation (B Corp). Approved by Ecocert, Diptyque launched the La Droguerie eco-friendly cleaning line in four SKUs: Cedarwood Perfumed Ceramic, Dishwashing Soap with Orange Blossom, Leather and Wood Care Lotion with Beeswax, and Multi-Surface Cleaner with Vinegar. The liquid formulations contain ingredients that are 99% natural or of natural origin and are biodegradable. The brand offers an Odor-Removing

[c] *https://www.cleaninginstitute.org/newsroom/2023/parents-and-teens-agree-college-students-need-more-know-how-how-clean*

[d] *https://perfumerflavorist.texterity.com/perfumerflavorist/october_2023*



Candle With Basil and refills for the Cedarwood Perfumed Ceramic, Dishwashing Soap and Multi-Surface Cleaner.

San Diego-based health and wellness company Cymbiotika has unveiled Cymbiotika Home in probiotic Hand Soap and Lotion, Laundry Detergent, and Multi-Purpose Spray. The dual-action concentrated Laundry Detergent contains a stain-lifting enzyme blend with banana extract. The Multi-Purpose Spray is made with a powerful blend of five enzymes and the streak-free formula breaks down stains and grime while neutralizing unwanted scents and odors with zinc salts. Bona has introduced a USDA Certified Biobased and US EPA Safer Choice-certified Bona All-Purpose Cleaner. The hydrogen peroxide formula is infused with essential oils and is available in two scents: Lavender White Tea and Lime Basil and is safe for all non-floor surfaces in the home such as countertops, cooktops, and cabinets. The packaging is made from 30% post-consumer recycled materials and is accompanied by a new sustainable microfiber cloth made from 80% post-consumer recycled material that can be washed and reused up to 300 times. Zep, known for professional cleaning products, has expanded into consumer products with Home Pro. The new line uses "superior cleaning technology" with seven spa-like aromas and refreshing scents: Eucalyptus, Fresh Rain, Lavender, Lemon, Orange Zest, Sandalwood, and Sea Salt.



Sustainable brand Dirty Labs has expanded its range with the Bio Enzyme Dishwasher Detergent. Additionally, the brand has added Murasaki Bio Enzyme Laundry Detergent and Hand Wash and Delicates Detergent to its lineup; courtesy of Dirty Labs.

Dishing It Out

The dishwashing category has been active with a variety of new products. Procter & Gamble's brand Cascade commissioned a survey[e] of dishwasher users. The data revealed that at least once a week, consumers do extra work when running the dishwasher, including rewashing (57%) their dishes; manually drying (68%); or pre-rinsing/prewashing (86%). Nearly half (49%) of people feel stressed or overwhelmed when dishes are not clean enough to immediately be put away when the dishwasher is done. Having to correct a dishwasher failure causes 48% of people to miss out on personal time. In response to consumers' frustrations, Cascade debuted Cascade Platinum Plus. The dual-power cleaning formula features "50% more protein-fighting enzymes to break down protein-rich foods; two times the amount of a new, proprietary enzyme to better fight stubborn starches; and two times the grease cleaning power of Dawn to remove grease, deliver improved shine and help dry dishes." Dawn, also a Procter & Gamble brand, added Lemon and Lavender scents to its Powerwash Dish Spray refillable line.

Dirty Labs launched Bio Enzyme Dishwasher Detergent, a 2-in-1 detergent + booster that is formulated with Dirty Labs' patented Phytolase® enzyme "to break down stuck-on food and get a brilliant, spot-free finish—all while being non-toxic, biobased, biodegradable, vegan, cruelty-free, and free of dyes, parabens, synthetic preservatives, and 1-4 dioxane." The detergent comes in two varieties: Aestival (yuzu, geranium, and lemon balm scent) and Free & Clear (fragrance-free).

A Load of Laundry

According to Technavio[f], the laundry care market is estimated to grow at a CAGR of 4.28% between 2022 and 2027 and is forecast to increase by $23.85 billion. According to ACI's survey nearly half of parents (49%) predict their college kids will bring home laundry expecting someone else to do it for them, more than a third (36%) think their kid will wear dirty clothes because they forgot to do the laundry, and almost 1 in 4 (24%) suspect students will go a semester without changing their sheets. In response to these behaviors and to keep individuals healthy and clean, the ACI created the Class of Clean: A College Student's Guide to Cleaning and The Laundry 101 guide. Fortunately, there is an abundance of laundry care products available on the market. Iconic scents, laundry sheets, plant-based, biodegradable formulas, and products to reduce microfibers drive innovation.

Pleasant fragrances make the tasks of laundry and cleaning easier and more enjoyable. Iconic brands

[e]*https://news.pg.com/news-releases/news-details/2023/New-Cascade-Platinum-Plus-Raises-the-Standard-for-Clean-Dishes-with-Breakthrough-Innovation/*

[f]*https://www.technavio.com/report/laundry-care-market-industry-analysis*

outside of the home care market are translating their signature scents into laundry products. For example, world-renowned perfumer and artistic director Francis Kurkdjian of Maison Francis Kurkdjian has translated his bestselling scent Aqua Universalis into fabric care. The range contains Scented Laundry Detergent and Scented Fabric Softener. Described as "a fresh and breezy fragrance which unites skin and clothing," the scent is a delicate and subtle, intimate blend of bergamot from Calabria, citron from Sicily, Lily of the Valley, and mock orange leaves. Cult-followed hair care brand Ouai has collaborated with DedCool and launched a limited-edition laundry Dedtergent. DedCool's Dedtergent features Ouai's Melrose Place scent with notes of champagne, pink peppercorn, berry, lychee, peony, rose, freesia, jasmine, bergamot, amber, sandalwood, white musk, and cedarwood. Bath & Body Works announced plans to launch its first-ever fabric care collection. In May, members of the My Bath & Body Works loyalty program voted for their preferred fragrance among 14 scents. The top five fragrances that received the most votes were available in an exclusive early-access shopping event for loyalty members before the full collection launched this fall.

This summer, the Laundress (acquired by Unilever in 2019), relaunched its entire line with reformulated products. The brand's signature scents Classic, Cedar, and Lady remain. The new detergents are transparent, concentrated, and crafted with the highest quality, bio-based ingredients. The Laundress Signature Detergent was optimized to clean in cold water and formulated for improved cleaning and targeting stains. The Delicate Wash and Wool & Cashmere Shampoo are both now



In response to customer requests, Bath & Body Works extended 14 of its popular fragrances into fabric care. Cactus Blossom, Eucalyptus Mint, and Mahogany Teakwood scents shown; courtesy of Bath & Body Works.

2x more concentrated and have a "softer" scent. The Laundress Stain Solution has been added to the range and is "a pretreatment that targets new and old, set-in protein, tannin, and oil stains with minimal color lifting." Procter and Gamble rolled out Downy Rinse & Refresh, a "groundbreaking" deep-cleansing fabric rinse designed to help remove malodor. The formula removes the source of odor-causing residues and hard water metal buildup that get trapped in fibers three times better than detergent alone. Available in Cool Cotton and Fresh

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Lavender fragrances, the product is safe for all fabrics, including activewear, towels, delicates, and baby clothes, and contains no dyes.

Across product categories, consumers seek cleaner, plant-based formulas. Laundry care is no exception. Brands are creating plant-based products with biodegradable ingredients focusing on sensitive skin. Dirty Labs has added Murasaki Bio Enzyme Laundry Detergent and Hand Wash and Delicates Detergent to its lineup. The Murasaki Bio Enzyme Laundry Detergent uses the brand's proprietary Phytolase® technology formulated with natural, non-toxic, and biodegradable ingredients that are safe for sensitive skin, free of dyes, sulfates, parabens, and all California Prop 65 chemicals. It has notes of jasmine, matcha, and vetiver. The Hand Wash and Delicates Detergent is specially formulated for fine wools, silks, and hand wash-only garments. German aesthetics Dr. Barbara Sturm, known for her anti-inflammatory philosophy and her non-surgical anti-aging skin treatments, has debuted a Laundry Detergent. The Laundry Detergent is an ecological, plant-based, biodegradable product that effectively cleans clothes and protects sensitive skin. The formula is free from preservatives, enzymes, microplastics, dyes, brighteners, and artificial fragrance, and enriched with purslane, aloe vera, and panthenol.



Ecos offers 100% dissolvable Detergent Sheets made with plant-powered ingredients and stain-fighting enzymes and packaged in a 100% recyclable paperboard box. (Magnolia and Lily scent shown); courtesy of Ecos.

As consumers look to reduce their carbon footprint and use less plastic, laundry sheets are becoming a popular alternative to liquids and capsules with a slew of new launches. Ecos, a pioneer in eco-friendly cleaning, launched Detergent Sheets in 2020 in three variants: Free & Clear, Lavender Vanilla, and Magnolia & Lily. "With Ecos Laundry Detergent Sheets, we have removed the water from laundry detergent and eliminated the need for plastic jugs. They are 100% dissolvable, made with plant-powered ingredients and stain-fighting enzymes, compact to fit in your home or on the go, and packaged in a 100% recyclable paperboard box to lessen the carbon footprint," states Chief Innovation Officer, Jenna Arkin.

According to Unilever[g], online searches for and about laundry sheets have grown fast over the last few years - up 116% in the U.S. and 129% in the UK. Unilever brands Dirt Is Good (Persil in the UK) and Robijn introduced laundry sheets that are self-described as an "ultra-convenient, sustainable format." Formulated with biodegradable ingredients with a plant-based main active ingredient, the brand uses slow-release fragrance technology to retain a more intense aroma within the fabric after washing. The sheets are packaged in a recyclable, paper-based box, and dissolve in less than 15 seconds, leaving no residue. Carbona released lightweight, pre-measured Laundry Detergent Sheets to simplify the cleaning experience. According to Carbona, the sheets dissolve completely and leave no residue behind in regular or short wash cycles in cold, warm, or hot water. Arm & Hammer Power Sheets Laundry Detergent with a Fresh Linen scent launched on Amazon in the U.S. Using Quick Dissolve technology, the sheets dissolve in water even during cold wash cycles and are concentrated to combat stubborn stains, odors, and dirt. Each box contains 50 detergent sheets, which are said to clean 50 medium loads and up to 100 small loads.

Developed in Sweden, Spot Detergent introduced eco-friendly Spot Detergent sheets featuring a plant-based formula free from parabens and phosphate. The sheets are packaged in plastic-free materials and dissolve in less than 60 seconds upon contact with water, leaving no waste behind. LastObject launched biodegradable and vegan Laundry Detergent Sheets "free of sulfates, pesticides, and other harmful ingredients." The plastic-, liquid- and ethoxylates-free sheets are marketed for sensitive skin.

Not a sheet, but a notable pilot is Procter & Gamble's European brand Lenor (Downy in the U.S.) and the Paper Bottle Co.'s new sustainable paper bottle for the Lenor Liquid Cloth Conditioner. The Lenor paper bottle contains paper fibers from Forest Stewardship Council (FSC)-certified sources and the first retail trial is expected to launch in the Netherlands.

In addition to plant-based biodegradable formulas and eco-friendly laundry sheets, products that reduce

[g]*https://www.unilever.com/news/news-search/2023/unilever-brings-innovation-to-laundry-sheets-in-mass-market-first/*

microfiber pollution are emerging. According to an Ocean Wise[h] study, researchers estimate that the average household in Canada and the U.S. releases 533 million microfibers into wastewater systems yearly through home laundry. Spanish fashion brand Zara in collaboration with BASF Home Care and I&I Solutions Europe, has developed Laundry by Zara Home, a laundry detergent that reduces microfiber shedding by up to 80% depending on the type of fabric and how it is washed. The product is formulated with 73% natural origin ingredients.

In partnership with Patagonia and Ocean Wise, Samsung designed the Less Microfiber Filter to combat microplastic contamination. The external filter can be hooked up to any washing machine and is said to capture 98% of microplastics that would otherwise flow into the wastewater system and potentially onward into rivers and oceans. The filter connects to Samsung's SmartThings platform to inform users when fibers build up and to clean the filter. The device is made with recycled plastics and is available in Korea and the U.K. with plans to roll out to other countries.

A Fresh Future

Of the various fragranced consumer products available, the household category is the most technically challenging to formulate because of the high pH levels and expected efficacy. Green chemistry has been advancing over the last decade propelling home care and fabric care innovations. The term "household" is evolving into "home care," with a blurring of the lines between cleaning and home fragrance. According to NIQ BASES Innovation Measurement: Home Care for 52 weeks ending April 23, 2023, innovations in the home category in Western Europe (France, Germany, Italy Spain, and the UK) marked a 36.4% growth in dollar sales, while the U.S. showed a 21.1% growth in dollar sales. As witnessed in other consumer packaged goods categories, consumers are demanding better-for-you and better-for-the-planet formulas and sustainable packaging. In response, home care and laundry care brands are ditching harsh chemicals and replacing them with better-for-you and better-for-the-planet plant-based and natural formulas with biodegradable ingredients and packaging. Kline's[i] research echoes this behavior and found that end users of Industrial & Institutional cleaning products are interested in using more concentrated formulas, products with fewer perfumes and dyes, and those that come in recycled content packaging



LastObject's biodegradable and vegan Laundry Detergent Sheets are "free of sulfates, pesticides, and other harmful ingredients" and are marketed for sensitive skin; courtesy of LastObject.

or use less plastic in their packaging. Fragrance is credited with enhancing moods. As consumers focus on health and well-being, scent has become a focal point. Adjacent brands known for signature scents are extending their iconic fragrances into home care and fabric care. Consumers will continue to incorporate the health and wellness lifestyle into their cleaning rituals. This behavior encourages brands and manufacturers to continue to create cleaner, better-for-you and better-for-the-planet home care formulas to meet consumers' growing needs.

p&f+

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[h] *https://ocean.org/blog/canadian-and-us-laundry-releases-trillions-of-plastic-microfibers-into-the-ocean/*

[i] *https://klinegroup.com/articles/five-industrial-and-institutional-cleaning-trends-that-will-define-2023/*

SAVORY SOLUTIONS AND FLAVORING ALTERNATIVE PROTEINS

Product development challenges, mouthfeel enhancement and the future of expectations for plant-based.

BY WARA PIRZADA, Application Technologist IV, Sensient Technologies



Wara Pirzada

While 2020 saw a rise in plant-based products' innovation and launches, the taste, texture and price shortfalls when compared with conventional products meant that plant-based businesses fell short of outperforming conventional producers.

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In today's enlightened world, consumers actively look for products that are good for them while also embracing the well-being of humans and animals as a whole.

Why plant-based?

Plant-based foods had a golden era in 2019 and 2020. As the industry tried to cater to growing demand for plant-based food, they targeted flexitarians who wanted to reduce meat consumption for ethical, animal welfare, environmental or health reasons—kicking off the race to make plant-based food that was indistinguishable from meat.[1] Flexitarians would alternate between animal and animal-free products, and that's where the challenges lay. They struggled with comparing the plant-based product to conventional meat or dairy, and most customers found that the plant-based products didn't quite do justice to the thing being imitated—despite claims like "almost real." Then when the meat alternatives tended to cost more than meat and nondairy cheeses failed to provide the same nutritional value as conventional cheeses, customers tended to not be repeat buyers of the plant-based products.[2,3]

Product Innovation

But technological advancements have allowed for incredible innovation in the plant-based product market. Whether genetically engineering compounds critical to animal protein or using precision fermentation to turn cells into protein-making machines, the industry has come a long way. Early on, some alternative meat companies could mimic "heme"-like compounds found in blood. Now some dairy alternative companies claim to have successfully created "casein"-like protein modeled after that in animal milk that gives stretch to cheese products. And now there are hybrid products—between meat and plant-based—that can give consumers the best of both worlds.

Product Development Challenges and Solutions

Flavor and texture play crucial roles when it comes to repeat sales. If developers claim that something is "chicken," consumers want to see the juicy muscles and taste the white meat. If they claim they created "cheese," buyers want to see it stretch and brown, and they want that cheesy mouthfeel.



Dryness is one of the major problems faced by companies producing vegan products, so ingredient developers have devised modulation technologies to combat that issue and make these products more juicy, succulent and enticing.



Fortunately, various taste modulation technologies can help product developers cut the amounts of sodium, sugar and fat in their products without compromising taste—which helps developers achieve their health claims.

Masking the Undesirable

One of the biggest challenges faced by companies producing plant-based products is off notes, some of which are inherent to plant proteins. Whether it's bitterness, astringency, chalkiness or just generic beany and earthy protein taste, developers want to eliminate these and make the desirable flavor notes shine. Luckily, taste modulation tools like off-note maskers can create a neutral playing field that lets the desired flavors overpower the off-notes for a consumer-pleasing taste.

Making It Juicy and Mouthwatering

Turning a soybean into a meat fiber-like structure is quite a task. As plant proteins are made to look like "meat" through extensive processes like extrusion, the resulting product tends to be very dry. Dryness is one of the major problems faced by companies producing vegan products, so ingredient developers have devised modulation technologies to combat that issue and make these products more juicy, succulent and enticing.

Enhancing Mouthfeel

Eliminating dairy fat compromises the milky and creamy mouthfeel of dairy alternatives, making the products appear flat, and substituting plant-based fat can give an oily, undesirable mouthcoating. Flavor technologies existing today, however, offer solutions that boost creamy mouthfeel and taste, giving the product more body — even in low-fat systems — without any off-putting oiliness. Products are richer in taste and texture.

Flavor Differentiation

Creating a “meat-like” or “cheese-like” product may be easy, but differentiating “cheddar” from “Parmesan,” or “breast meat” from “thigh meat,” is more challenging—though essential. This type of problem often exists with vegan seafood. Nitrogen compounds—amines—are widely used in vegan seafood to make the product taste and smell “fishy.” And making a “cod” taste different than “salmon,” instead of everything being generically fishy, is where flavorists’ expertise plays a key role.

Better for you?

With the word "plant-based" comes the inherent expectation of a product being healthy or better for you. While some products make claims on protein content, some protein sources may not have a high enough PDCAAS to make such declarations. This leads to widespread practices of mixing proteins for nutritional value or functionality. Since the basic ingredients of the products may not be able to fulfill that “healthy” expectation alone, many product developers have opted for fortifications to achieve nutritional claims. When it comes to taste, table salt, sugar and fat make products taste good. But they come with health risks. Fortunately, various taste modulation technologies can help product developers cut the amounts of sodium, sugar and fat in their products without compromising taste—which helps developers achieve their health claims.

Expectations for the Future

While 2020 saw a rise in plant-based products' innovation and launches, the taste, texture and price shortfalls when compared with conventional products meant that plant-based businesses fell short of outperforming conventional producers. But 2020 was not the end. Plant-based food has been increasing its territory on foodservice menus. According to the Plant Based Foods Association, current plant-based offerings on food service menus are expected to remain stable, in fact, four times more foodservice operators plan to increase their plant-based offerings in 2023.4 And it’s not just in the U.S. Plant-based innovation is growing in Europe and Asia, with more and more technologies being developed to get closer to the “real deal.”

Another aspect of plant-based food production is the goal of reducing the environmental impact of feeding the world. Conventional animal protein production has a significant impact on the environment—it has more significant water, land and energy

> “One of the biggest challenges faced by companies producing plant-based products is off notes, some of which are inherent to plant proteins.”

consumption and higher greenhouse gas emissions than the production of plant-based products. So environmentalists are looking to plant-based protein production as an alternative that could reduce the consumption of animal protein. That reduction in demand could have the added result of reducing antibiotic resistance, animal-borne diseases and animal suffering.

While plant-based products were never designed to completely replace conventional meat and dairy, consumers today want healthier and more sustainable options for themselves and for the planet. As awareness of these products grows, there is sure to be a sustainable demand for plant-based foods and ingredients.

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WORLD PERFUMERY CONGRESS ANNOUNCES THEME

Take a glimpse at what's on the agenda for the three-day event in Geneva.



Mark your calendar for June 24-27 to experience the return of World Perfumery Congress *happening at Palexpo in Geneva.*

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The *World Perfumery Congress* (*WPC*)—produced by *Perfumer & Flavorist+* and presented by the American Society of Perfumers— is set to return to Europe in 2024! The theme is Fragrance Forward: Where Global Innovation & Creativity Meet.

Scheduled for June 24-27 at Palexpo in Geneva, Switzerland, the event hosts an expo hall, networking opportunities and conference sessions. Sign up to be first on the list to learn about speakers, special features and more (*www.worldperfumerycongress.com*).

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World Perfumery Congress' expo hall highlights the latest technologies, ingredients and services the fragrance industry has to offer.

WPC is the global stage for fragrance creativity, ingredients, technology and business—providing the ideal forum for discussing the industry's latest issues and breakthroughs.

Agenda

Monday, June 24, is dedicated to the Welcoming Cocktail Reception. Don't miss your chance to get in early to network with international movers and shakers in fragrance.

Tuesday, June 25, through Thursday, June 27, will be reserved for expo hall exploration of the latest technologies, ingredients and services the industry has to offer. Want to showcase your company? Contact Paige Crist (pcrist@allured.com) to discuss sponsorship and expo hall booth opportunities.

Conference Sessions & Awards

The same three days will also host conference sessions highlighting the current and projected trends across market segments, the debate on artificial intelligence's role in formulation, regulatory updates and a new-to-*WPC* "nose to nose" segment where pairs of perfumers will take the stage to discuss their careers and the state of fragrance.

The American Society of Perfumers (ASP) Awards will wrap the conference. Shining a light on perfumers who have made substantial contributions to the industry. More to come regarding honorees. For more information on the ASP, visit *www.asp.org*.

> "WPC is the global stage for fragrance creativity, ingredients, technology and business."

After Party Details

The evening of June 27, is reserved for the *WPC* 2024 Afte Party. Stay tuned for the destination announcement! There will be dinner, dancing, drinks and celebrating the reunion of the finest in fragrance.

Visit *www.worldperfumerycongress.com* today to add your email to the mailing list for upcoming conference and expo hall details.



Peanut kiiNote might be worth looking at for fried flavors, and roasted garlic, onion or roast beef.



Flavor Materials Report

Flavorist panel evaluates *cis*-4-heptenal, peanut kiiNote, *cis*-3-hexenyl acetate and other materials.

BY CYNDIE LIPKA
Principal flavorist,
Bell Flavors and Fragrances

Organoleptic Evaluation Panelists

- **Bill Aslanides**, Senior Flavorist, Synergy Flavors, Inc.
- **Deborah Barber**, Senior Flavorist, FONA
- **Nicole Hernandez**, R&D Manager and Senior Flavorist, FlavorChem
- **Christina Hook**, Flavorist, Bell Flavors and Fragrances
- **Judith Michalski**, Senior Flavorist, abelei flavors
- **Andrew Petrou**, Flavorist, Savory, Bell Flavors and Fragrances

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cis-3-Hexenyl Acetate, natural

Source: Millipore Sigma
FEMA# 3171, CAS# 3681-71-8
Natural occurrence: Apple, apricot, banana, black currant, cauliflower, celery, bergamot, kumquat, yuzu, dill, grape, guava, mangosteen, melon, nectarine, olive, parsley, passionfruit, peach, pear, plum, pomegranate, raspberry, sage clary, starfruit, strawberry, tea, thyme, tomato, walnut, wine.
Odor: @ 1%. Bright, fresh, green, juicy, grass, pear, herbal, sweet, leafy, fruity.
Taste: @ 0.5 ppm. Fresh, green fruity, apple, pear, tropical, sweet, leafy.
Taste: @ 1 ppm. Sweet, fresh, green, fruity, pear, apple, herbal, grassy, tropical fruit.
Possible applications: I don't know a soul who doesn't love this compound. Many flavorists I know say this is their favorite. It brings them joy and makes them smile. But other than fulfilling that role, this can be used in so, so many places. If we think of fruit that has green notes such as apple, pear, pineapple, grape, all the berries cherry, kiwi, honeydew, watermelon, mango, banana, guava, passionfruit we would start that list pretty well. But the panel also felt this would work nicely in wine, cognac, tomato, zucchini, green bell pepper and jalapeño.
➤**Millipore Sigma:** *https://www.sigmaaldrich.com/*

L-Piperitone, natural >85%

Source: Millipore Sigma
FEMA# 3107, CAS# 121-33-5, natural
Natural occurrence: Celery, cinnamon, cornmint, cumin, eucalyptus, pennyroyal, peppermint.
Odor: @ 0.1%. Minty, mild, reminiscent of licorice, musty, phenolic, buchu, cooling, herbal on dry out.
Taste: @ 0.2. Vague, minty, slightly cooling, pulegone, herbal.
Taste: @ 0.5 ppm. Minty, cooling, herbal, phenolic, buchu.
Possible applications: With the cooling aspect to this compound, most panelists felt this would potentially have a home in minty, eucalyptus and oral care products. There is also an aspect to it where it could fit into some of the stone fruits such as peach, apricot and nectarine. One panelist thought of lavender which I think is a great add.
➤**Millipore Sigma:** *https://www.sigmaaldrich.com/*

3-Mercapto-3-methyl-1-butyl Acetate

Source: Treatt/Endeavour
FEMA# 4324, CAS# 50746-09-3
Naturally occurring in hops.
Odor: @ 0.1%. Green, roasted, sulfurous, alliaceous, sweetness, candy banana, cooked liver/kidneys, roasted meat, buchu, very complex.
Taste: @ 0.1 ppm. Roasted, alliaceous, vegetative, green, sulfurous, over-ripe, cruciferous, sautéed, earthy, tropical fruit.
Taste: @ 0.2 ppm. More roasted, meaty, tropical, skunky, boiled meat, tropical fruit.
Possible applications: All kinds of onions come to mind and even throw leek in that mix as well. Roasted garlic showed up in the panel comments. And cooked beef, pork, lamb, shrimp, chicken, liver, and gamey meats were mentioned. I think that because there is an ester as a part of the structure, there is some sweetness that most of us could see in tropical profiles at very low levels. This would be a great note for wood-fired leaning profiles.
➤**Treatt/Endeavour:** *www.omegaingredients.co.uk*

t, t-2,4-Hexadienal

Source: Bedoukian
FEMA# 3429, CAS# 142-83-6
Natural occurrence: Apple, beef, capers, caraway, clam, coffee, fish, guava, kiwi, malt, melon, olive, peas, pomegranate, strawberry, tea, thyme, tomato.



With the cooling aspect to l-piperitone, most panelists felt this would potentially have a home in minty, eucalyptus and oral care products.

Odor: @ 1%. Sharp, green, impactful, almost acrid, herbal, fatty, earthy, slight mushroom, heavy, citrus.
Taste: @ 1 ppm. Sharp, green, impactful, waxy, melon, fatty, mild.
Taste: @ 3 ppm. Sharp, green, impactful, heavy, fatty, leafy.
*Possible application*s: This chameleon can go either way: sweet or savory. The panel found chicken, cilantro, parsley, olives, tomato, pea, green beans and other vegetables as possible uses for this. On the sweet side, we saw apple (apple cider), pear, all melons, lemon, orange, lime, pineapple, guava, kiwi, berries and cherry uses.
➤**Bedoukian:** *https://bedoukian.com/*

cis-4-Heptenal

Source: Bedoukian
FEMA# 3107, CAS# 121-33-5, natural
Natural occurrence: Bread, butter, sour cherry, clam, fish, milk, oyster, peppermint, potato, shrimp, spearmint.
Odor: @ 0.1%. Raw green potato, fatty, buttery, earthy, vegetative, melon rind, pumpkin, mushroom, on dry out becomes more brown and seafood-like.
Taste: @ 0.1 ppm. Impactful, green, oily, potato, slightly sour, earthy, mushroom, seafood, cheesy, vegetative.
Taste: @ 0.2 ppm. Oily, green aldehydic, starchy, fatty, vegetative, clam, buttery, potato, mushroom, melon rind.
*Possible application*s: If we stroll down the seafood aisle, we could imagine this being used in salmon, clam, shrimp, lobster, caviar, and oyster profiles. We think it has a home also in kimchi, pumpkin, fried potatoes, and mushroom profiles. We could see this in dairy such as milk, butter and some cheeses due to the oily notes. Lastly we see this in pineapple, bread (especially sour dough) and maybe lime and green tea.
➤**Bedoukian:** *https://bedoukian.com/*

Peanut KiiNote

Source: Robertet/Omega
FEMA# N/A, CAS# N/A
Odor: @ 100%. Heavy, oily, impactful, nutty, peanut, slightly phenolic, creamy, nutmeat, slightly roasted, sweet, brown.
Taste: @ 2%. Peanut, roasted, oily, clean, phenolic, slightly brown.
Taste: @ 5%. Peanut, roasted, oily, nutty (generic), brown.
*Possible application*s: Yes, indeed I am talking about percentage and not ppm for this material. And likely a bit high for use in practical applications, but this not only presents as peanut, at lower levels it would fit into cashew, hazelnut, pecan, sunflower,



We think cis-4-heptenal has a home also in kimchi, pumpkin, fried potatoes, and mushroom profiles.



and macadamia nut. It might be worth looking at for fried flavors, and roasted garlic, onion, or roast beef. But I think that this would work remarkably well in water soluble applications.

➤**Robertet/Omega:** *https://www.robertet.com/*

Corn Infusion 75% volume

Source: Robertet

FEMA# N/A, CAS# N/A

Odor: @ 100%. Dry, hay-like, silage, wheat, grain, cooked, waxy, vegetative, slightly bready, some sulfur and sweetness on the back end.

Taste: @ 10%. Corn, wheat, oat nuance, sweet, vegetative, generic grain note.

Taste: @ 15%. Dry, wheat, corn, oats, earthy, brown, nutty, vegetative, waxy, sweet.

*Possible application*s: If we stare right down the old grain barrel (or silo) we can find that this would work in the following profiles—corn, wheat, oats, sunflower, cookies, toast, bread, popcorn, and muffins. We could also use this ingredient in elote, masa, tamale, asparagus, broccoli, and maybe some nuts.

➤**Robertet:** *https://www.robertet.com/*

p-α-Dimethyl Styrene

Source: Bedoukian

FEMA# 3144, CAS# 1195-32-0

Natural occurrence: Anise, bay leaf, coffee, curry, dill, eucalyptus, juniper/gin, laurel, distilled lime, finger lime, kumquat, lemon, mace, mandarin, oregano, parsley, sage.

Odor: @ 0.1%. Phenolic, heavy, herbal, smokey, waxy, musty, earthy, leathery. There is not much left on the dry out.

Taste: @ 0.1 ppm. Herbal, phenolic, weak, slight cooling.

Taste: @ 0.2 ppm. Herbal, phenolic, spices, slightly cooling.

*Possible application*s: Affectionately referred to as Habanene, my guess is that they believe this to be habanero like. The panel found this to be heavy herbal such as rosemary, oregano, thyme, laurel, sage, savory (both winter and summer). There is a smokiness that is associated with this compound as well. Some felt that this could potentially be used in citrus profiles, but mostly directed towards lime.

➤**Bedoukian:** *https://bedoukian.com/*

Hop Oil CO_2 MD P&N

Source: Excellentia
FEMA# 2580, CAS# 8007-04-3
Odor: @ 1%. Terpenic, green, CBD, clean, fresh, slightly skunky and waxy, floral, spicy, herbal boozy.
Taste: @ 1 ppm. Clean, green terpenic, characteristic, boozy, woody, waxy, viney, fruity, slight citrus.
Taste: @ 2 ppm. Slightly waxy, green, terpenic, characteristic, slightly skunky, some citrus (lemon), piney, herbal, boozy, beer-like.
Possible applications: This is a lovely source and many boozy applications come to mind such as ales and stout and all the types of beer profiles but also champagne, and possibly gin at a certain level and of course cannabis profiles. But we can see this working well in tropical profiles such as mango, guava, passionfruit and at a very low level in watermelon. We could see it working in jalapeno, gochugaru for kimchi and gochuchang profiles.
➤**Excellentia:** *https://excellentiainternational.com/*

2,5-Dithiahexane

Source: Treatt/Endeavour
FEMA# 4298, CAS# 6628-18-8
Not naturally occurring.
Odor: @ 0.01%. Sharp, alliaceous, creamy, milky, fatty, mushroom, buttery, cheesy, earthy, cruciferous, sautéed, dairy, roasted.
Taste: @ 0.01 ppm. Truffle, mushroom, generic savory, slight alliaceous, cruciferous, sautéed, earthy, garlic.
Taste: @ 0.02 ppm. Strong, earthy, mushroom, garlic, alliaceous, work fried, cruciferous, vegetative.
Possible applications: Very close in structure to truffle sulfide, it's no real surprise that this compound has similar characteristics. People saw use in mushroom, truffles, broccoli, cauliflower, Brussel sprouts, zucchini and sun-dried tomato. Cheddar, limburger, and brie cheeses were mentioned as well. We thought of fried, sautéed, wok and fire-roasted profiles. There is a buttery component to this that the panel was enamored with but maybe we were thinking about the things we sauté in butter!
➤**Treatt/Endeavour:** *https://www.treatt.com/*

p&f+





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