**Information about the World of Fragrances**

*A **Sense** of the **Scents**...*

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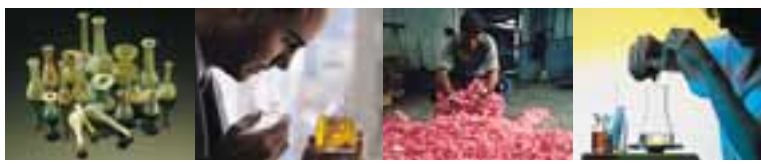

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# A Sense of the Scents ...

Information about the
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# The History of Perfume…

**Of the five senses, the sense of smell is undoubtedly the one of which we are least aware – why? Fragrances are a difficult subject to talk about – so descriptive terms have to be borrowed from other sectors, such as "green" from the world of color or "fruity" from the field of taste. And yet fragrances have the magical ability to enchant. In this brochure, we'd like to explain why that is.**

A rudimentary kind of olfactory system played a crucial role in the development of life: Water served as the medium that transported information to the first living organisms, which they assimilated with the aid of a mechanism that can be termed a "sense of smell" in the broadest sense of the world. The life forms that later developed on land were forced to adapt: It was now the air they breathed, and not water, that supplied them with vital information. So it was necessary to find a filtration system, i.e. an actual olfactory organ.

**Vessels for storing fragrant oils and ointments from Egypt…**

It was with this first nose that the prehistoric quadrupeds were able to sniff vital information about enemies and mates, sources of nutrition and territorial borders.

When the first human-like beings set out to conquer the world on two legs, though, they lost their "olfactory contact" with the ground – their eyes and ears provided them with faster and more effective information about friends, foes and prey. Yet right down to this very day, our noses tell us much more than we realize: – if we equate enemy with a warning odor, mating with eroticism and prey with nutrition…

## *The Egyptians already knew about perfume*

Through their pictures and writings, the annals of ancient cultures suggest that fragrant substances from nature enjoyed a firm place in the daily lives of the Etruscans, Sumerians, Egyptians, Greeks, Romans and Chinese. Fragrance as a sacrificial offering to the gods – Frankincense, myrrh and blossoms like jasmin were initially the exclusive domain of the high priests. It was thought that it was possible to communicate with

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the gods through the rising smoke produced by burning fragrant substances. Incense is still ceremoniously burned today in the Catholic Church, and this ritual presumably has the same roots. Per fumum – the Latin idiom meaning through smoke – is therefore the origin of the modern word Perfume. In the Old Testament, Exodus 30 contains a reference to a perfume recipe, in this case an anointing oil.

Yet it was the desire for beauty and care that brought fragrant resins and blossoms into daily life. A Roman fresco, for example, depicts a young maiden filling perfume into a little bottle. On an Egyptian wall panel from a grave in Thebes, it is possible to distinguish a lady smelling a perfume. On her head, she wears a typical perfume cone, which is slowly melted by the body's heat.

An Indian poem by Kalidasa contains the following description:

**…the Roman Empire…**

*In the summer, the beautiful ladies perfume their busts with the oil of sandalwood, their hair with jasmin water, their bodies with rose water, to prepare themselves for love.*

In Europe, the culture of fragrances first began to spread during the twelfth century. Amulets in the shape of a small apple, with gaps that could be individually opened and filled, were in common use. Since the customary fragrant waxes were called "ambre", these often highly artistic items of jewelry were called fragrance apples – pommes d'ambre – pomander.

**… and Greece.**

Also popular were potpourris that were made from blossoms, fruits and spices to mask bad odors in the home. Even utilitarian items were perfumed – like the leather gloves that fine ladies could hold under their sensitive noses when they had to cross the litter-strewn roads.

## *The "Water" from Cologne – a classic is born*

In France, the profession of perfumer & glove-maker emerged, whose center quickly became the city of Grasse in the south of the country – the capital of fragrant plant cultivation and leather-making. Brought to the French court by Catherine de Medici in the 16th century, perfume remained a royal fashion and was used all the more extravagantly. It was believed that water had the power to extract the life force from the body, and hygiene was exchanged for fragrance – the very first deodorant. The situation was different in England under Oliver Cromwell – "Perfume is the work of the devil", it was said, and was banned and even prohibited for an entire century. The seventeenth century brought with it "Eau de Cologne" – "Cologne Water" – whose "recipe" had been brought to Germany by a young Italian named Farina. This refreshing blend of citrus oils, rosemary and alcohol went on to spread throughout Europe – however not just as a fragrance, but also as a cure-all for both external and internal use. It would be left to Napoleon to finally clear up the situation – under his reign, a legal distinction was made between the professions of a "Perfumer" and an "Pharmacist."

**4711 – genuine "Kölnisch Wasser". One of the first branded perfumes, which is still important today.**

In those days, fragrance compositions consisted solely of natural ingredients, of resins, leaves, peels and blossoms that were treated in a variety of ways to capture their fragrant principles. One well-known technique was to place plant parts in alcohol to produce so-called tinctures or infusions. If blossoms were placed in animal fat to produce perfumed pomades, the process was called "enfleurage."


**Royal letters patent for a method of producing coumarin (Karl Reimer, 1876).**

## *Synthesis brought variety*

In the mid nineteenth century, modern perfumery evolved with the advent of modern chemistry. Innovative techniques of extraction and distillation supplied highly fragrant plant extracts – it was even possible to isolate specific fragrance molecules from botanical isolates – and – even more exciting – it was possible to replicate fragrance molecules in the laboratory – to synthesize them. One of the first molecules of kind was vanillin – in 1874, the principle of vanillin synthesis was patented, and chemists Haarmann and Reimer founded the company of the same name. Further important molecules were coumarin (woodruff) and ionone (violet). In one fell swoop, the perfumer's palette became incomparably richer – and for the first time perfumers were not only able to blend fragrances from nature, but also to replicate them, to interpret them, to impressionistically translate them.

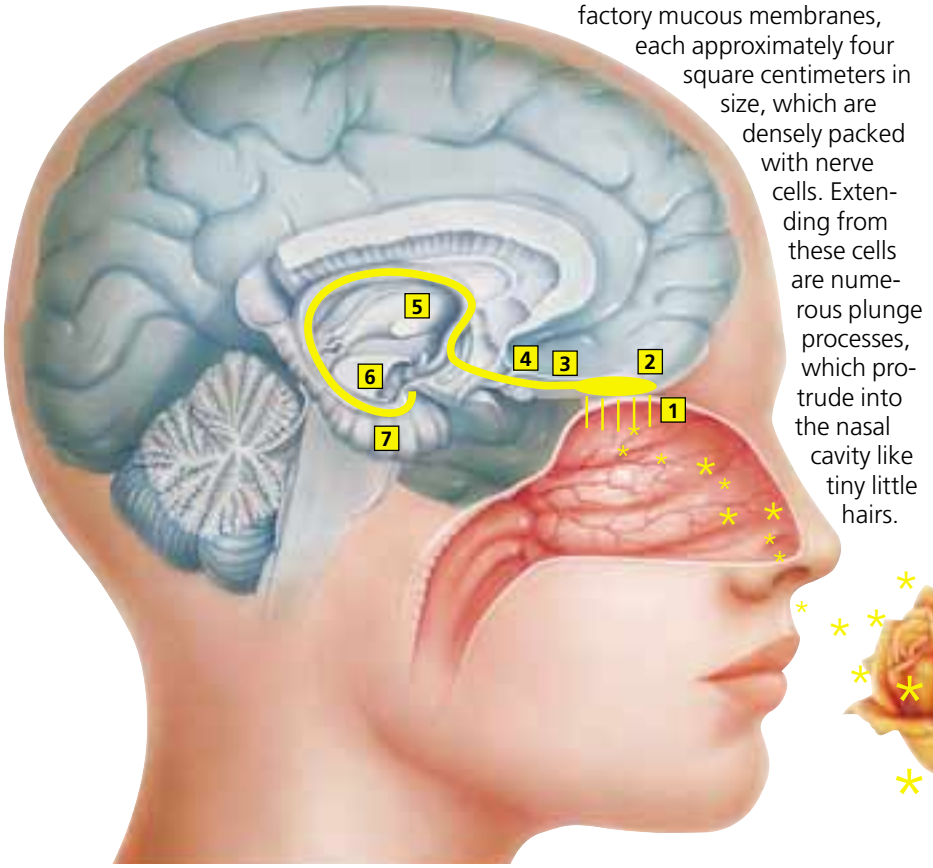
# The Sense of Smell...

**For a long time, science paid only little attention to this most mystical and emotional of our senses. In Greek philosophy, the sense of smell was disqualified as being imprecise and emotional. Only in recent decades has this sense been more thoroughly researched.**

## *What do we know about it today?*

First of all, it is only possible to smell what reaches the nose together with the air we breath – i.e. the substances have to be an a gaseous state. When we smell a fragrance strip, for example, we do not smell what is on it but what is no longer on it, i.e. what has evaporated and can be inhaled.

Located in the nose are two olfactory mucous membranes, each approximately four square centimeters in size, which are densely packed with nerve cells. Extending from these cells are numerous plunge processes, which protrude into the nasal cavity like tiny little hairs.




**The olfactory system with its primary and secondary paths to other regions of the brain: 1. Olfactory nerve cells in the nose, 2. Spoon-shaped olfactory bulb, 3. Olfactory tract, 4. Olfactory trigone, 5. Stalk leading to the thalamus, 6. Hypothalamic region, 7. Amygdala.**

Contained on these cilia are differently shaped receptors. When the air we inhale carries a molecule to the nasal mucous membrane, the molecule attaches to a matching receptor, like a peg in a hole. Both its geometric shape as well as its electrical charge, its polarity, play a role in this connection. When a molecule "docks" with a matching receptor, an electrical signal – a stimulus – is sent to the brain.

## *We smell with our brain*

Extending from the multitude of nerve cells in the olfactory mucous membrane are numerous appendages – processes – that are bundled in the upper nasal cavity in the form of nerve fibers. These nerve fiber bundles extend through the ethmoid plate, a bone behind the root of the nose, and into a part of the brain that is called the olfactory bulb. If subjected to strong shear forces such as those caused by a heavy blow, for example, this bone can slice through the bundle of nerve fibers like a knife – resulting in a loss of the sense of smell. In the olfactory bulb, each of these hundreds of nerve fibers, which serve as a continuation of the nerve cells with their olfactory cilia, terminates in an olfactory brain cell. Following preselection here, the stimuli are then advanced to portions of the midbrain and to the so-called olfactory brain.The olfactory brain was one of the earliest portions of the

**Only his enormous olfactory memory enables this perfumer to translate a fuzzy sensory perception into a concrete fragrance.**

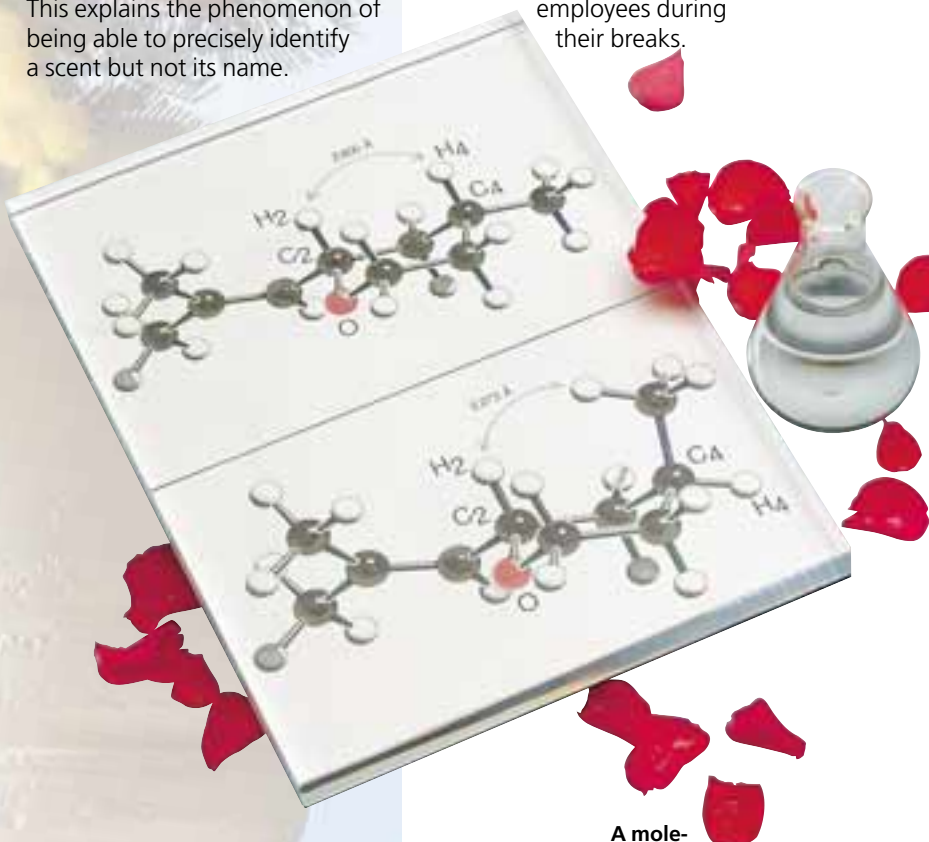
cerebrum to develop, which in turn is linked with the limbic system, the system that controls our feelings and emotions.

Interestingly enough, nerve impulses do not travel in only one direction – this area also contains nerve cells that work in the opposite direction. This means that there are a variety of ways in which a kind of feedback can modulate and modify the way a scent is perceived. Consequently, the expectations of the person who is smelling can exert a strong influence on the way a scent is experienced – yellow is associated with freshness, red with fruity sweetness. If this expectation is not fulfilled, the scent is frequently rejected, even though it is not really unpleasant. So a product's olfactory acceptance is also highly dependent upon the right kind of packaging!

The intensity of a scent, too, can influence its acceptance. This is because not every stimulus that is triggered by a molecule actually reaches the brain. The number of molecules that are necessary for this to happen (which is termed the olfactory threshold) depends upon the fragrance material in question. In highly concentrated form, fragrance materials are often perceived as pungent. In this case, the nose would appear to be overstimulated – molecules are also deposited on the "wrong" receptors, thus triggering olfactory confusion, a "blurry" smell. In diluted form, on the other hand, they seem delightfully floral or fruity! A floral fragrance would have to be diluted to 2 to 5% to equal the strength of its natural counterpart.

The sense of smell addresses both our emotions and our intellect. A scent's stimuli are advanced to the right half of the brain, where it is recognized, while intellectual activity or the ability to associate a name occurs in the left half. This explains the phenomenon of being able to precisely identify a scent but not its name.

Aromatherapy utilizes the emotional side of our sense of smell and employs essential oils to produce a calming effect, e.g. through vanilla extract, or to stimulate the mind, e.g. with citrus oils. Scents can also be used as a source of subconscious manipulation. In Japan, for example, it is not infrequent for essential oils to be distributed through the air conditioning system in order to relax employees during their breaks.



**A molecule serves as the origin of a fragrance impression.**

# Raw Materials and Processing...

**The palette of ingredients that is available to perfumers for use in their compositions is differentiated into three different product groups. The first two are of natural origin, essential oils and absolues, while the third consists of synthesized aroma chemicals.**

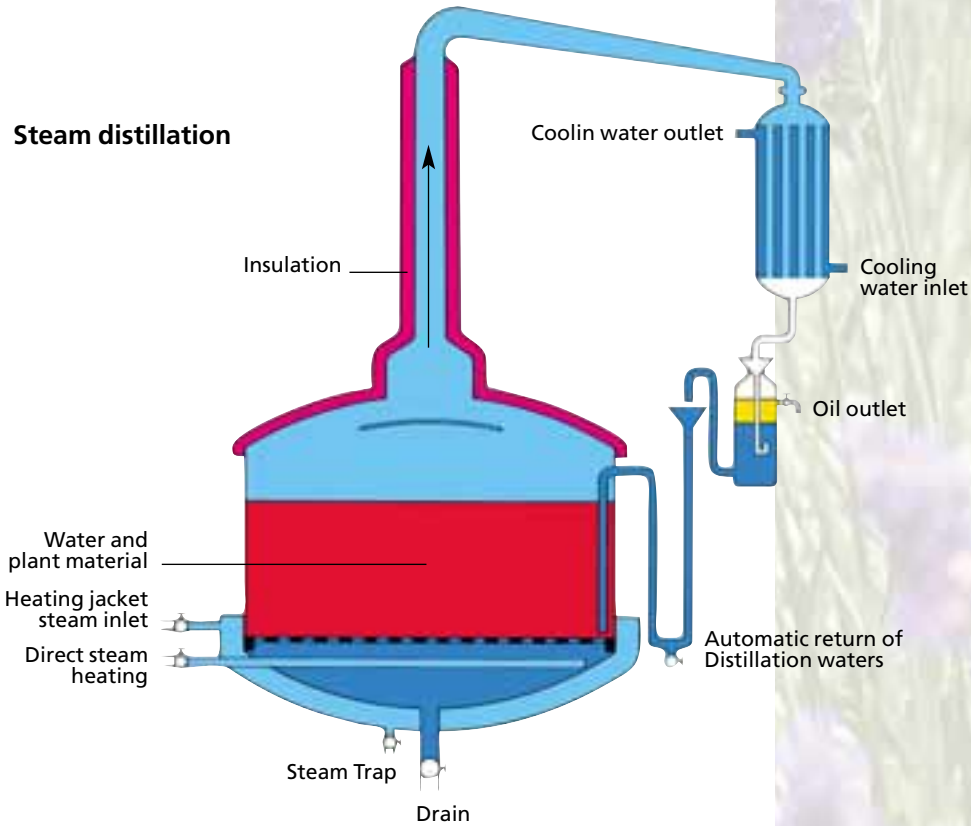
## *Essential oils*

Steam distillation is employed to obtain these substances from fragrant plants. Heating dissolves the plant's fragrant oil from its cells and carries it along with the steam. During the subsequent cooling process, the water and oil become liquid again and separate, as they cannot mix with one another. There is one exception: Citrus oils are not obtained through distillation, they are squeezed out of the peel (expression).

## *Absolues*

A two-step extraction process is employed to obtain these substances from fragrant plants. In the first step, a solvent is used to dissolve the fragrant oil from the plant. What is left after the solvent has been separated is the concrete, which is often waxy and highly colored, since – as opposed to distillation – the pigments and plant waxes are also dissolved during the extraction process. To remove them, the

**Steam distillation**



Southern France: The center of lavender cultivation.

**Overview of various perfume raw materials – Yield, price, plant part**

| Product | Yield from 1 ton of raw product, in kg | World market price per kg in Euro* | Extracted Plant part |
|---|---|---|---|
| **Rose oil** | 0,2–0,5 | 5.000 | Petals |
| **Jasmin concrete** | 2,0 | 3.000–5.000 | Petals |
| **Iris root butter** | 0,1 | 9.000 | Roots |
| **Tuberose absolue enfleurage** | 0,3 | 20.000 | Blossoms |
| **Sandalwood oil** | 40–65 | 450 | Wood |
| **Orange blossom absolue** | 1,5 | 5.000 | Blossoms |
| **Ylang-ylang oil** | 15–25 | 100 | Blossoms |
| **Patchouli oil** | 30 | 20–60 | Herb |
| **Ginger oil** | 40–44 | 75 | Roots |
| **Cedar oil** | 30–35 | 20 | Wood |

* Prices are approximate and can fluctuate on the basis of grade and market situation.

concrete is washed with alcohol; what remains after this alcohol has been removed is a liquid product that now has less color and is called an absolue.

Essential oils and absolues are complex mixtures of a wide variety of molecules that are produced by the plant's metabolism. Chemical processes can also be employed to create these molecules, producing what are called aroma chemicals.

## *Aroma chemicals*

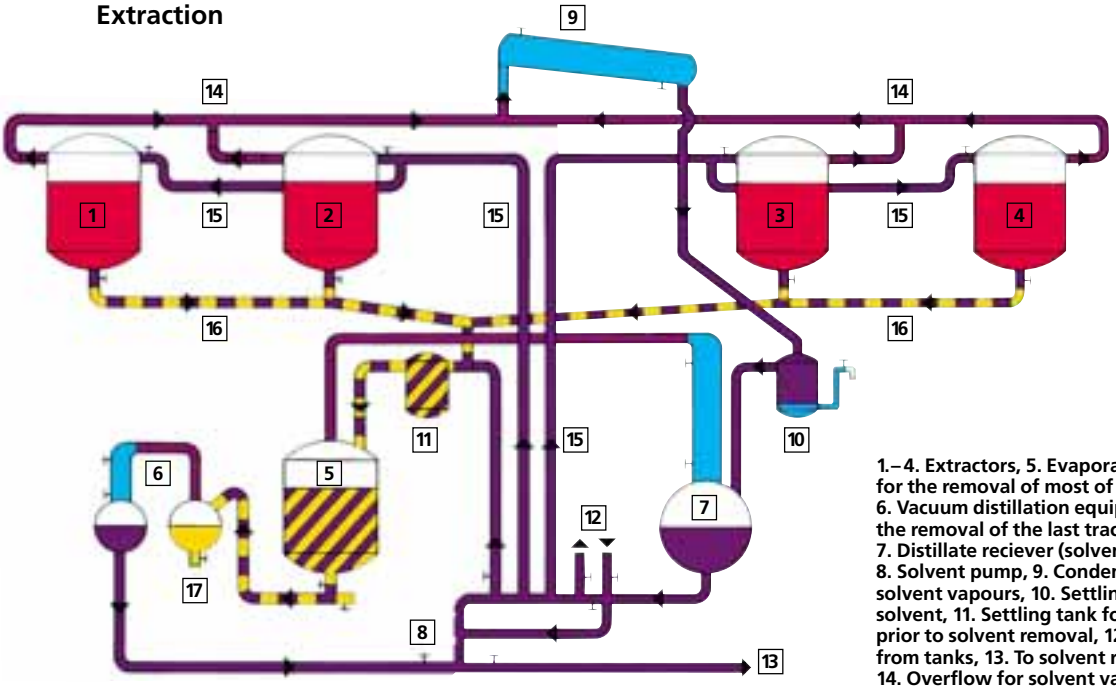
Aroma chemicals are often replicas of molecules that occur in nature. If they have the same chemical structure as the molecules produced by the plant's metabolism, these aroma chemicals are termed nature-identical. If the molecules have not yet been found in nature, they are called synthetic.

Modern fragrance compositions are typically blends of these three product groups, because this is the only way to achieve the desired standards of quality and keep within the price that has been stipulated for the perfume oil.

Natural raw materials – essential oils and absolues – are very expensive, as a great deal of manual labor is involved in obtaining them. Weather conditions can cause the quality of the products to fluctuate from year to year; in addition, available quantities are limited by

Processing lavender.

## Extraction




yellow: concrète, violet: solvent, red: material to be extracted, blue: water

1.–4. Extractors, 5. Evaporator – for the removal of most of the solvent, 6. Vacuum distillation equipment for the removal of the last traces of solvent, 7. Distillate reciever (solvent), 8. Solvent pump, 9. Condenser for solvent vapours, 10. Settling tank for solvent, 11. Settling tank for extracts prior to solvent removal, 12. To and from tanks, 13. To solvent rectification, 14. Overflow for solvent vapours from the extractors, 15. Solvent flow to extractors, 16. Extract flow from extractors to the evaporators, 17. Outlet for Solvent – free extracts (concrète).

the potential area available for cultivation. In fact, only 2% of all raw materials and ingredients that are employed today consist of natural products.

Nature-identical aroma chemicals can often be produced at very low cost, in unlimited quantity and in uniform quality. Moreover, they do not contain any environmental impurities, i.e. they are "cleaner."

Synthetic aroma chemicals, finally, offer perfumers an additional source of ingredients for their creative work and enrich fragrance compositions by providing unknown sensory impressions. They enable unusual and highly esthetic creations to be developed; combinations of pure natural substances would undoubtedly be too one-sided for today's "consumer noses."

To simplify their work, perfumers also employ so-called bases. These are fragrance compositions that can be added to a creation in the form of ready-made fragrance modules. Originally developed to imitate the scents of plants from which no extracts can be obtained, like lily of the valley, lilac or fruits, bases are also employed today as a substitute for costly natural products.

**Modern fragrance compositions usually contain both natural and synthetic raw materials and ingredients.**

In addition, fantasy bases can lend a unique, special nuance to a composition.

One special sub-group of bases consists of Vitessences. These are natural and near-natural bases that are made possible by a special analytical method, headspace technology. Under this method, the fragrant oils are very gently removed from the plant and then analyzed. The perfumer can use the results to develop especially attractive fragrance modules, Vitessences.

**In the headspace technology version shown here, fragrance oils are very carefully removed from the plant for analysis.**

# The Creative Work of the Perfumer...

**Perfumers are members of a very special guild in which professional knowledge, routine and craftsmanship are every bit as important as intuition and creativity. In spite of a five-year training curriculum, there is no official professional profile for a perfumer. He – or increasingly she – has usually already completed an education. He or she may formerly have been a chemist, laboratory technician, pharmacist or simply someone from a truly unrelated profession who has found his or her way to the world of fragrance by chance.**

Those who become perfumers often first came into contact with this profession through their immediate surroundings: In their own family, as an employee of a perfume shop, a fragrance or cosmetics house. In addition to the training courses that are conducted in these companies to assure a supply of new blood, there are also independent schools of perfumery in France and the United States, for example.

Although prior intellectual and professional training are desirable, what counts first and foremost in this profession are artistic talent and a pronounced ability to experience on a sensual plane. A perfumer does not have to be able to play a musical instrument, write poetry or paint, for example. Important traits, though, do include a curiosity about beauty, harmony, sounds, pictures, nature and – above all – people. Perfumers "compose" their creations, they take tiny bottles of ingredients from a set of shelves that is termed a "fragrance organ." In describing perfumes, in fact, they speak of "accords."

## *What does autumn smell like in Tuscany?*

Although many people are able to recognize their favorite perfume or distinguish between the scent of a rose and a lily of the valley, they possess virtually none of the skills that characterize "professional sniffers." Perfumers are able to compose their own creations from some 2,000 available fragrance ingredients. They are able to draw upon their memory to theoretically compose a perfume from the ingredients and "smell" the fundamental fragrance impression in their mind before ever reaching for the first ingredient to begin compounding the actual composition. After being written down on a sheet of paper, or on a computer today, the resulting formula is then physically compounded.

Over the course of numerous attempts, a process that can last for days, weeks or even months, the perfumer refines this composition until it reflects his or her ideal. This ideal is usually dictated by the customer's instructions – summarized in a so-called briefing – that precede the work of the perfumer. These instructions are often very narrowly defined: The price of the perfume oil, its subsequent flacon, advertising

**Perfumer and trainee work closely during the training curriculum.**

campaign and marketing strategy have already been stipulated, and the perfumer can only work within the narrow bounds of this framework. Sometimes, though, the assignment is very broad, and the briefing might call for only "a scent that is reminiscent of an autumn stroll in Tuscany." It is precisely these "free" assignments that often serve as the nucleus for great perfume classics.

## *Training that always "follows the nose"*

The training curriculum is divided into two parts: During a basic training period of approximately three years, trainees learn to know and differentiate between natural and synthetic fragrance substances, and become familiar with their chemical properties and olfactory qualities.

They learn composition techniques, not just for what are called the fine fragrances but also for the broad field of utility fragrancing of cosmetics, hair care products, toiletries, household cleansers and innumerable chemical-technical products. A great deal of attention is naturally paid to educating the future perfumer's sense of smell and olfactory memory. Even an experienced perfumer practices daily. Typically, two colleagues will prepare various smelling strips for one another; each must then identify the scents the other has prepared, and vice versa. As an orientation aid, many perfumers create mnemonics or associate images with the fragrances, such as: Iris = powder, patchouli = Oriental market, geranium = Egypt, jasmin = erotic. Because, as described above, only their olfactory memory, the ability to imagine entire fragrance complexes, to recall them from memory and to rearrange them in their mind, is what constitutes the true talent of a perfumer. The nose is simply the most important "inspection instrument" for the task.

During the second half of their training, the fledgling perfumers have an opportunity to prove themselves by working on actual customer projects. This often involves a stay in a foreign country, which is intended to strengthen their global understanding of their work, while also offering them a opportunity to get to know the regional peculiarities of the country or continent in question in order to broaden their horizon for their future work.

**A perfume formula.**

# Fragrance Families...

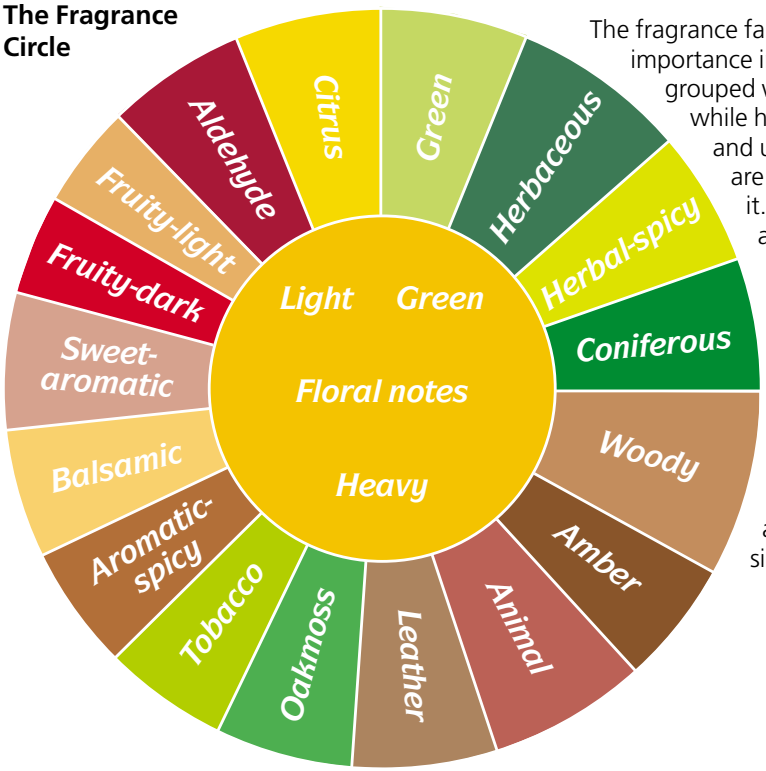
**There is no doubt that olfaction is fundamentally a subjective sensory impression. "I like lavender because it reminds me of my grandmother's dresser drawers. No, I don't like lavender because it always reminds me of having to stay after school." Is it possible to objectively assess scents at all? Is there an olfactory language that rises above subjective perceptions and memories?**

Just as we learn to give names to colors as children, we can also assign names to the various olfactory impressions. This produces an olfactory language with an extensive vocabulary that can also be scientifically underpinned.

As described above, molecules with differing structures only fit on their intended receptors, thus evoking a wide variety of stimuli. Molecules with similar structures can be combined into olfactory families, as shown in the Fragrance Circle.

The fragrance families that are of importance in perfumery are grouped within the circle, while highly specific and unpleasant odors are located outside it. Smokey warns against fire, sour against spoiled foods. As we near the center of the circle, the fragrance notes become more complex and are apparently perceived as being increasingly harmonious.

**The Fragrance Circle**




## *The Fragrance Circle*

Located in the outer circle are the above-mentioned fragrance families, at the center only one large group – that of the floral notes, which can be combined from the families in the outer circle. To a certain extent, the Fragrance Circle corresponds to the structure of a perfume. A perfume consists of a top note, a heart note and a base note, and thus lives from the different ways in which its fragrance compounds evaporate. And both evaporation as well as the olfactory effect it triggers are governed by the perfume's chemical structure – thus, related chemical structures also have related olfactory effects. Consequently, adjacent fragrance families are related to one another in terms of both their chemical structure and their olfactory characteristics. Nor were the colors in which the fragrance families are depicted selected merely by chance. Consumers were asked to associate colors to their olfactory impressions. The left side of the Fragrance Circle tends to contain feminine colors – as well as feminine fragrance families – while the right side tends to be masculine.

**Hexylacetate imparts the fragrance impression of ripe pears.**

**"Green" smells like freshly mown grass.**

So what are these families all about?

**Top note:**

Serves as the first impression of a fragrance, is intended to arouse curiosity and vanishes quickly. The families positioned in the upper third of the circle are employed in composing the top note.

**Heart note (bouquet):**

Forms the actual fragrance character of the perfume and lasts for hours. It usually consists of floral notes that can be accentuated with the adjacent families.

**Base note:**

Serves as the foundation upon which the perfume is based, is intended to pleasantly underscore the fading scent, and can last up to a day. It is composed from the fragrance families positioned in the lower third of the circle.

## *Top notes*

**Citrus**
Fresh, invigorating scents of citrus fruit, like lemon, orange, bergamot or grapefruit.

**Aldehyde**
Olfactory chain of the long-chain fatty aldehydes. This is a typical, fatty-sweaty, somewhat pungent and soapy olfactory note. The spectrum ranges from almondy-fruity green nuances to ironed laundry fragrances and metallic nuances right through to ozone, ocean-like and waxy scents. Some of the aldehyde fragrances are related to the smell of human skin and perspiration.Aldehyde C10 offers citrus aspects, while Aldehyde C11 undecylene produces an animalic effect and Aldehyde C12 Lauric a cool, almost ozone-like note.

**Fruity-light**
Lively, light fruit fragrances, especially those from fruits with green and yellow peels. This group includes apple, pear, melon and pineapple scents, for example. As we have already seen, citrus fruits do not belong to this group. Fragrance examples include hexyl acetate, which has a pear-like scent, or melon bases.

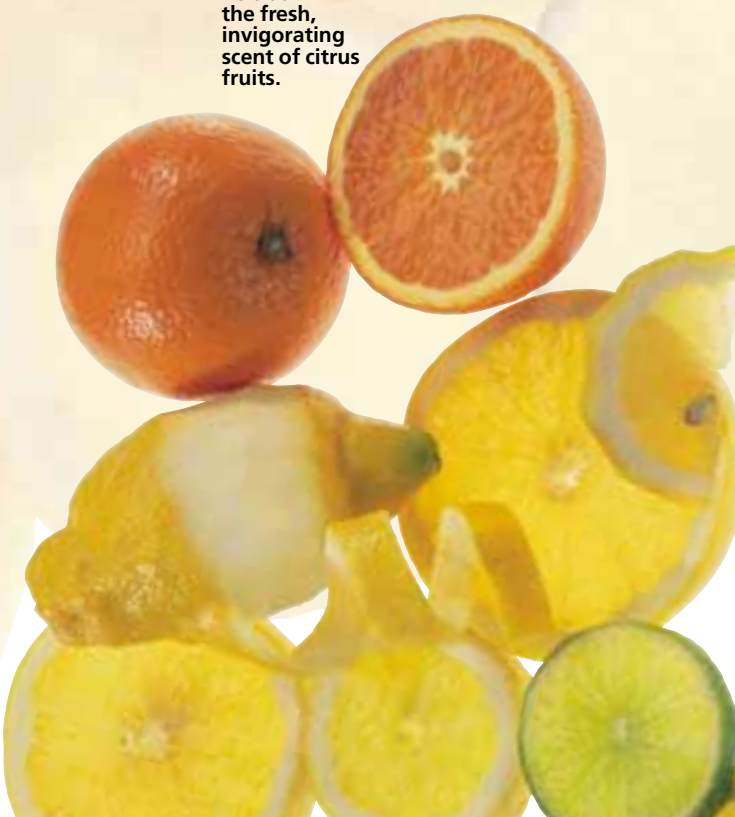
**Green**
This group characterizes typical botanical fragrance notes, like those of leaves, stalks or freshly mown grass, as well as cucumbery-violet-like green. Vertocitral is reminiscent of leafy green, cis-hexenol of green grass, while nonadienol tends to be reminiscent of violet and cucumber.

**Herbaceaous**
Fragrance notes from the plant kingdom that are closely related to green. More complex than the actual green scents, herbaceous fragrances are more aromatic, generally with camphorous, minty, eucalyptus-like or earthy nuances. They are usually found on low-growing, unobtrusively blossoming plants, i.e. herbs. Typical examples include rosemary or sage, as well as peppermint and lavender, a fragrance that is both herbaceous and floral at once.

**Herbal-spicy**
The typical fragrance notes of such herbaceous kitchen herbs as thyme or mugwort. In addition to its herbaceous underlying scent, there is also a pronouncedly unique-spicy element, which produces an aromatic impression.

**Coniferous**
The fragrance note of whole or crushed conifer needles or resins, which can also display citrusy, herbaceous or aromatic-spicy elements, in addition to its typically earthy note. Moreover, these fragrances are more or less pronouncedly resinous and green. Pine needle oil is coniferous with citrus-like accents, while fir balsam tends to be aromatic-resinous with sweet aspects.

**"Citrus" – the fresh, invigorating scent of citrus fruits.**



## *Heart (bouquet) notes*

**Fruity-dark**
This group includes the sweet, sultry fragrance notes that mainly influence the heart and base notes of perfume compositions and have high substantivity. Examples include raspberry and peach.

**Floral notes**
Floral notes usually form the heart of a perfume. They, too, can be classified into light, green, floral and heavy. "Light" includes typical springtime flowers like lily of the valley (Muguet), lilac, freesia and light rose notes, often with citrusy or fruity elements. "Green" includes violet, for example, as well as other blossoms in which a leafy note dominates but can often have herbaceous, earthy nuances. Narcotic floral fragrances that are more often found in southern climates than in more northerly regions are considered "heavy." These include, first and foremost, jasmin, tuberose, orange blossom and narcissus. In addition to the floral note, this group often contains pronouncedly balsamic, spicy and animalic notes. There are also hybrid notes, like hyacinth, that tend to be floral-heavy, but also have clear green notes, as well as violet, which is very green but can also be given a floral-woody interpretation.

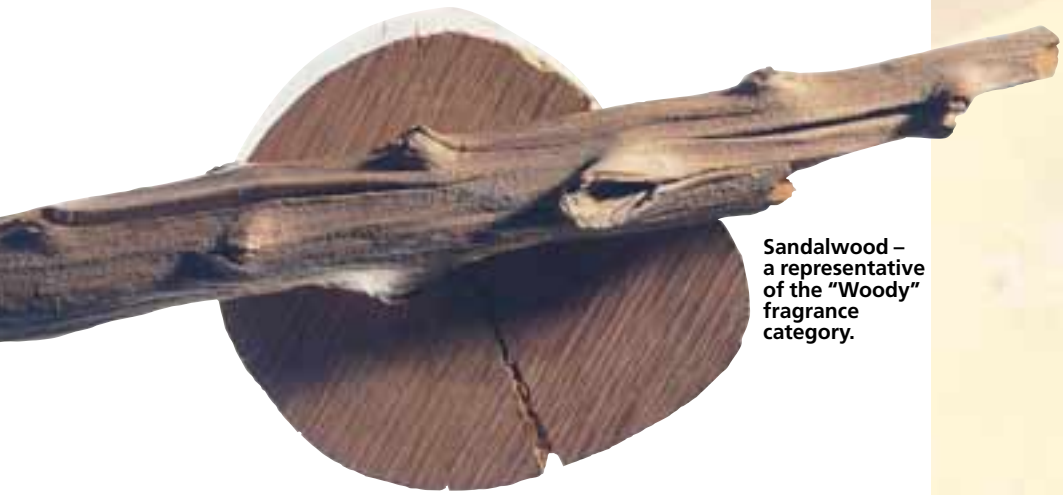
## *Base notes*

**Woody**
This is a group of highly differing fragrances that are reminiscent of chipped wood. One of the differentiations that is made is cedar, which smells like a pencil with a camphorous off-note. Sandalwood tends to smell sultry, warm and somewhat animalic. Vetiver has a pronouncedly earthy root note. Patchouli also smells earthy, but also sweet with fruity nuances.

**Amber**
Fragrance notes that are similar to natural amber. This olfactory note is difficult to describe: Oily-woody with metallic elements, but also slightly nutty with a nuance of seawater. The scent of amber is somewhat reminiscent of human hair. Natural amber consists of pathological secretions of the sperm whale. Since this whale population has unfortunately been decimated, true amber is a rarity today and very expensive. However there are imitations that come quite close to the natural note, such as amber Vitessence, as well as amber notes of botanical origin, such as labdanum. The Ambre 83 base has a very sweet amber note.

**Animal**
In addition to amber, there are three further notes of animal origin that are still employed in perfumery today – although they display the typical note of excrement, they offer an incomparable erogenous rounding-off effect in diluted form and in compositions.

**Lilac is a floral note.**



**Sandalwood – a representative of the "Woody" fragrance category.**

Musk was originally obtained from the olfactory glands of the musk deer that is native to Asia. This tincture smells sweet and urine-like, as well as somewhat medicinal. Genuine musk tincture is priceless today and is very rarely used. When speaking of musk notes today, what is generally meant are aroma chemicals that are largely reminiscent of this note, although they typically have a more powdery and significantly less animalic scent. Civet absolue is obtained from the secretions of the olfactory glands of an African cat, the civet. As these animals are captured to obtain the secretions, without causing them any harm, civet is still in very widespread use today as an animalic note. Its scent is fecal-acidic with a slight honey note.

**Leather**
The fragrance notes of genuine leather and Russian leather. This term is interpreted very broadly. The typical components of leather compositions include birch tar oil, for example. Isobutyl chinoline often serves as an important leather element. The leather Vitessence offers a clearly leathery smell.

**Oakmoss**
This fragrance class refers to extraction products of specific lichen – especially those that grow on oak trees. The typical oakmoss note smells uniquely dry, algae-like, with a cheese-rind note and a tar-like, phenolic element, in addition to green nuances. Lichen that grow on other types of trees supply extraction products (tree moss) that smell woodier and more resinous.

**Tobacco**
Fragrance notes that are inspired by all tobacco-like notes, ranging from aromatically sauced pipe tobacco to cigar tobacco right through the smell of a stale ashtray. Tobacco absolue offers a typical scent.

**Aromatic-spicy**
Invigorating aromatic spice notes that can also contain bitter and/or piquant elements. Typical examples of these fragrances include cardamom, nutmeg, curry, clove and cinnamon.

**Balsamic**
Heavy, sweet, rich fragrances with chocolate-vanilla-like, cinnamon-like to resinous fragrance elements. These scents were already popular "Oriental" notes in ancient times, such as Peru balm or olibanum, i.e. frankincense. Nuances of this family can also be found in many orchid notes. The name is derived from the word "balsam," which is used to denote certain kinds of resins.

**Sweet-aromatic**
Pronouncedly sweet fragrances that smell like honey, almond, marzipan, anise or woodruff, e.g. coumarin, often with rich-fruity or spicy nuances. In Spite of the segmentation in the Fragrance Circle, it should be remembered that the first impression of a perfume is produced by the interplay between all of the fragrance materials that are employed in it – while leather, for example, is a base note, it is responsible producing the overall character of the perfume, and is not just present in the after-scent.

**"Tobacco" in all of its facets is an interesting fragrance element.**

**Cinnamon is a typical representative of invigorating aromatic Spice notes.**

# Perfume Oils for a Wide Range of Applications...

**It would be a mistake to think that the work of perfumers relates only to the development of perfume oils for the "fine fragrances" that are offered so elegantly on the shelves of perfume shops. Almost every time they use a personal cleansing product or a toiletry or a household cleaner or care product, consumers encounter the perfume oils that these products contain.**

As a result of the differing needs and objectives that perfume oils have to satisfy, they are classified into the following product groups:

**Fine fragrances**
This segment is also termed "alcoholic perfumery," as alcohol serves as the carrier for the fragrance. What are meant are perfumes, eau de colognes, eau de toilettes, after shaves and other fragrant splashes, which typically have a relatively high perfume oil concentration of between 8 and 20%.

**Toiletries**
All products intended for cleaning or grooming the body are grouped in this category, although it also includes perfume oils for cosmetic or sunscreen products.

**Household products**
This category comprises all of the products that are employed in the household. These include cleansers and care products, all laundering and fabric care products, as well as air fresheners.

## *A perfume's wide range of tasks*

The purpose of the perfumes from the fine fragrance group is to use harmonious fragrance development to reflect and underscore the wearer's individuality and personality. In selecting a fragrance, consumers often also identify with a brand, a fashion trend or a philosophy of life. They associate their favorite fragrance – either consciously or subconsciously – with the emotional brand image they have seen from advertisements or TV commercials, which is usually also reflected in the product's packaging and flacon design.

If, for example, an extraverted woman reaches for a transparent bluish or greenish flacon, she expects a fresh-floral fragrance that reflects her temperament. An introverted consumer will likely select a flacon in red or gold, which means she wants a warm, Oriental scent. So the perfumer's creations not only have to be esthetically upmarket "olfactory garments" for the wearer, they also have to blend in harmoniously with the accustomed brand image.

A product fragrancing has a different purpose. In this case, the fragrancing is intended to make the product pleasant for the consumer to use. The hands should smell fresh and clean after they have been washed with soap. And a freshly mopped floor should smell clean – but it should be a different kind of "clean" than freshly washed hands.

In product fragrancing, the scent is expected to impart a message – a product's effect or effectiveness should not only be visible, it should also be "smellable." The importance of this fragrance-effect relationship was demonstrated by a simple experiment. Consumers were asked to test three "different" laundry detergents. What they did not know was that while the fragrance was different, the other ingredients in the laundry detergent were identical in all three cases. The results were as unambiguous as they were surprising: Depending upon the fragrance effect, the effectiveness of the detergent was assessed as "washed especially gently", "washed especially clean" or "was hard on the laundry".

**Perfumers develop fragrances for widely differing product groups.**

## *A finished perfume oil is not created over night*

If a new product from one of the above three segments is to be brought to market (launched), the manufacturer usually turns to a fragrance producer, a fragrance house, to obtain a perfume oil that is custom-tailored to its needs. Only few companies that use perfume oils in their finished products have their own in-house perfumers.

A "briefing" is used to explain the assignment to the perfumers from the fragrance house. The briefing contains information about the nature and design of the new product, about the defined target group for which the product was developed and, of course, about such technical requirements as usage rate and fragrance profile. And the price that will have to be paid for the perfume oil also plays a major role.

The briefing serves as the basis for the work of a team that consists of a perfumer, evaluator, marketing specialist and usually a product specialist. The members of this team work together to translate the briefing into a

**The amount of a perfume in the finished product, e.g. in a shower gel, ranges between 0.1 and 2.0 %.**

fragrance composition that will satisfy all of the desired criteria. In doing so, the first step is to select a fragrance theme that will do a good job of esthetically underscoring the effect of the product. Only then does the perfumer set about to transform this idea into a perfume oil. In addition to esthetics, two additional aspects are also very important – the masking power of the fragrance and its stability.

Masking power means a composition's ability to cover up the inherent odor of the medium to be fragranced, for example a soap or a cleanser, without significantly altering the selected fragrance theme. This can naturally only be assessed within the context of the application itself, i.e. the fragrance has to be added to the medium in question and then tested. This is why perfume houses usually have product specialists, often chemists, who work in their own laboratories to develop a wide range of media, such as soaps, shampoos, creams or dishwash detergents. The perfume oil concentrate is appropriately added to the medium in a typical concentration (usage rate) of between 0.1 and 2.0 % of the finished product in the case of toiletries and household products.

An evaluator then assesses the fragrance in a sample of the finished product. Evaluators are fragrance specialists who have a specially trained nose and can speak the professional language of the perfumers, on the one hand, as well as a very good knowledge of the market segment they serve. They thus act as a link between the perfumer, who develops the new fragrance with a view to creative aspects, and the marketing specialist, who provides conceptual support in developing the fragrance and maintains an objective, marketing-oriented view.

## *The fragrance has to prove itself in the finished product*

Guided by the evaluator's assessment, the perfumer then varies and modifies his or her composition until optimum fragrance development has been achieved in the product. Realistic application tests are an absolute necessity in this connection: A laundry detergent, for example, should not just have a pleasant scent when it is added to the washing

**An Evaluation staff member testing the fragrance development of a shampoo.**

**Both the scent of the fabric softener itself as well as the scent of the washed laundry are assessed.**

machine. When the wet laundry is removed from the machine, the dried laundry is hanging on the clothesline and is later ironed – the fragrance always has to be noticeable and pleasing. The same also applies in developing a fragrance for a shampoo: It is necessary to assess fragrance development and substantivity on both wet and dry hair. Air fresheners or cleansing agents, too, are assessed with respect to their effect in the room in standardized, individually ventilated olfaction chambers. Only when all of these tests have produced satisfactory results is the first step in the development of a fragrance completed.

In addition, the perfumer also has to keep an eye on the stability of the fragrance composition as it is being developed. In this case, stability means that only minor changes in the fragrance may occur throughout the long weeks and months that the product spends on a supermarket shelf and in the consumer's home. Although this would appear to be obvious, it does necessitate good knowledge and experience on the part of the perfumer. Yet in spite of this professional knowledge, only a final test can provide definitive information about stability, because a perfume oil is a blend of a wide range of substances that can react with both one another as well as with the medium that is being fragranced. In either case, this could cause the fragrance to change significantly, and often in an unpleasant way. Discoloration of the product is also possible. To avoid both of these risks, special endurance tests were developed in which the fragrance composition is subjected to weeks of exposure to heat and light in the product. Only when the evaluator and the perfumer have given their thumbs-up to the aging sample is the fragrance development process concluded. Only now will a presentation be made to the customer. If the customer is satisfied with the fragrance, the composition – which has thus far been compounded only on a scale of grams – can now be produced on a production scale. Fully automated, computer-controlled compounding equipment then uses the perfumer's formula to produce batches of up to several tons in size.

**Computer-controlled production systems compound even huge volumes of perfume oils with an accuracy of a single gram.**

# Cosmetic Ingredients...

**The history of cosmetics is inseparably linked with that of perfume. The Egyptians, Greeks, Romans and Chinese – all of the high civilizations of the ancient world – not only endeavored to capture the magic of fragrance in tiny bottles and vessels, they also had a pronounced knowledge of the healing and beautifying effects of natural extracts, which were the only cosmetic ingredients that were available to them.**

**The ancient Egyptians used the green of malachite as eye shadow. Today, a greater selection is available.**

The ancient Egyptians bathed in ass's milk and were the first to master the art of producing ointments. Lavishly perfumed ointments were stored in artistic vessels and traded by the Phoenicians. Decorative cosmetics were also very widespread – the black of animal-based kohl was used to accentuate the eyes, the intense green of crushed malachite to color the eyelids.

Like perfumery, modern cosmetics as we know it today is closely linked with the emergence of synthetic chemistry, which enabled new and more effective ingredients to be produced in larger quantities and purer quality. Today, the wide variety of cosmetic ingredients enables sophisticated cosmetic products with a complex product profiles to be manufactured, prompting lawmakers in Germany, for example, to issue a clearly defined definition:

"Cosmetic ingredients in the sense of this Act are substances or substance preparations which are intended to be employed externally or in the oral cavity of human beings for the purpose of cleansing, grooming or influencing appearance or body odor or to impart olfactory effects, unless they are predominantly intended to ease or remedy illnesses, afflictions, injuries or pathological infirmities."

Today's consumers, though, not only use cosmetics for utilitarian purposes – in addition to wanting mildness and environmental compatibility, their focus is predominantly on protection and sensory experience. Modern cosmetic ingredients are available for achieving this kind of product profile. Just as malachite lent color to the eyelids of the ancient Egyptians, precisely defined products can be employed to create a highly specific, desired effect today.

Several examples from daily life will now be used to illustrate the interrelationships that exist between cosmetic ingredients and the subject of fragrance materials and aroma chemicals:

## *Sunscreen products*

It might come as a surprise to consumers to learn that fragrance compounds and sunscreen absorbers – two classes of products to which a cosmetic ingredient is added, but for entirely different reasons – possess similar chemical structures. However this is also the case in cinnamic acid derivatives, for example. Since fragrance compounds with this kind of structure had already been produced for use in perfume oils, it was an obvious step to develop light-absorbing substances for use in cosmetic products.

As late as the beginning of the past century, white skin was considered to be a mark of the

**Aroma chemicals and cosmetic ingredients can often have a very similar chemical structure.**

upper classes, while tanned skin characterized the working and farming classes. Parasols and hats were used to protect the face against tanning, and freckles were doggedly combated. Cosmetics that were intended to whiten the face had already been created in previous centuries – the employment of such powders and ointments sometimes had serious consequences though: Whitening lead derivatives could lead to the loss of hair and teeth, and ultimately to serious poisoning as well.

Changes in social structure have made travel to sunny regions a symbol of recreation and prosperity today – tanned skin is considered to be a sign of health and youth. The invisible portion of sunlight, ultraviolet (UV) radiation, produces a protective reaction in the skin: It darkens. The pigment that is produced in this process, melanin, acts as a natural sunscreen absorber and protects the layers of skin beneath, although its protective effect is in no way comparable to that of synthetic sunscreen absorbers.

The UV-A radiation in sunlight penetrates deep into the skin and causes direct pigmentation (tanning), while the UV-B radiation produces indirect pigmentation and, in the event of excessive intensity, an inflammatory reaction in the skin that is commonly termed sunburn. This reaction, which is highly dependent upon skin type, can be viewed as an early warning system to safeguard against excessive exposure to the sun. UV radiation generally leads to premature skin aging and damage, and in extreme cases to skin cancer.

There are various ways to safeguard against the negative effects of sunshine: The skin can naturally be covered with clothing. To produce the "healthy" that is usually desired, but without negative side-effects, sunscreen filters (UV filters) were developed that absorb a certain portion of the ultraviolet radiation before it can penetrate into the skin. These are defined organic molecules that absorb UV-A and/or UV-B radiation. They are added to a cosmetic agent in order to enable them to be uniformly applied to the skin. Naturally, just like colorants and preservatives, they are governed by detailed official regulations. There are also inorganic sunscreen products. Zinc oxide or titanium oxide are used in the form of microfine pigments in cosmetic formulations. Their protective effect is based upon a combination of reflection and absorption of the UV light.

The sun protection factor (SPF) defines the level of protection the product offers before erythema (sunburn) occurs. A sun protection factor of 12, for example, means that the user can stay in the sun 12 times longer than with unprotected skin. Standardized methods for quantifying sun protection factors in a sunscreen product have existed in Europe and the United States since the 1970s. The best method today is biological, directly on the skin. Given the present state of the art, comparable physical measurements provide only clues to efficacy.

**Tanned skin is popular, but the right protection is important.**

To not only safeguard against sunburn but also against premature aging of the skin caused by sunshine, UV absorbers are not only being used in sunscreen products, but are today increasingly also being added to such daily cosmetics as day creams or make-up bases. In order to satisfy this wide range of requirements, the producers of cosmetic ingredients today usually offer an extensive portfolio of intercoordinated sunscreen absorbers that are suitable for widely differing fields of application and absorb defined spectra of ultraviolet radiation.

## *Botanical extracts*

Back in the seventeenth century, English apothecary Nicolas Culpeper published a work that is still in existence today, "Culpeper's Herbal," which listed all of the effects of medicinal plants that were known at the time. Even though this book might tend to make for historical reading today, it does demonstrate that plants and plant (botanical) extracts have enjoyed a firm place in pharmaceuticals and cosmetics for centuries in Europe as a result of their beneficial and therapeutic effect.

These tradition-steeped products, which are obtained either through steam distillation or alcoholic extraction, are specially designed for use in washing and personal care products for the skin, hair and oral cavity.

The extensive spectrum of products ranges from extracts of well-known domestic plants, like arnica (antimicrobial effect and promotion of circulation) or ivy (antibacterial and antirheumatic effect), to such more exotic products as ginseng (stimulating) or ginkgo biloba (promotion of circulation and vitalizing effect). The botanical portion of the extracts, which ranges between 3 and 15%, depending upon the product in question, can also consist of a mixture of various plants, whose ranges of effectiveness are optimally matched to one another. Examples include products that contain a mixture of chamomile, nettle, rosemary, lemon balm, horse chestnut, sage, horsetail and coltsfoot. In a comparison study, it was possible to demonstrate a clear sebum-reducing effect, i.e. a reduction in the amount of sebum the scalp secretes.

The beneficial effect of chamomile has also been able to be scientifically evidenced: The employment of chamomile measurably retarded the formation of erythema (sunburn), while it accelerated healing of the skin.

**Botanical extracts are a natural form of cosmetic ingredients.**

**Peppermint leaf and synthetic l-menthol.**

## *Cooling agents (peppermint and menthol)*

Around 40–50% of peppermint, Mentha piperita, consists of one chemical substance: Menthol. The specific structure of this substance produces a feeling of freshness and coolness on the skin and oral mucous membranes. This effect is highly valued, and not just in toothpastes and lozenges – in hot climates, hot sweetened peppermint tea is drunk for its strengthening and cooling effect.

The active ingredient, l-menthol, can be obtained from peppermint, which is cultivated on a large scale in India and China, for example. However synthetic l-menthol offers a significantly higher level of purity. But since pure l-menthol poses disadvantages when employed in cosmetic products, scientific findings have been used to develop new generations of cooling agents: Certain lactic acid esters of menthol, for example, which are employed in skin and hair care products in the acid to neutral pH range (pH 4–8), in particular. Or menthyl glycerinacetal, which can be employed in alkaline media (pH 8–12), e.g. in a deodorant. While l-menthol is also employed as a fragrance material because its minty-herbaceous scent, its derivatives are usually odorless, which makes them superbly suited for employment as cooling agents in cosmetics.

What produces this cooling effect? We know that it is not a physical phenomenon. Its effect is biochemical in nature. The feeling of heat and cold is produced by sensory nerve cells that terminate directly beneath the surface of the skin. When a stimulus is triggered, the impulse is electrochemically transmitted via the nervous system. When this happens, so-called neurotransmitters, which are controlled by the discharge of calcium ions, react. Cooling agents influence the release of these calcium ions; they indirectly stimulate electrochemical transmission of the stimulus, and therefore produce the impression of coolness.

Sunscreen products, botanical extracts and cooling agents are but three examples of how fragrance compounds and cosmetic ingredients can be combined. Identical sources of raw materials, similar processing or production methods and employment in the same consumer products are what relate these two product categories, which are taking on increasing significance in the cosmetics segment.

**Cooling agents are often added to men's grooming products and cosmetics.**

# Quality Assurance and Product Safety...

**"To err is human," goes the old saying. And it is precisely because of this that a responsible company not only has to respond to potential sources of problems but must also work proactively to identify and prevent them. This is one of the goals of quality management, which has become a crucial aspect of operational processes.**

In order to produce perfume oils of consistently high quality, potential sources of problems must be ferreted out, from purchase of the raw materials right through to delivery of the finished products, with ongoing tests and inspections being performed at these critical points in the production process in order to assure the stipulated standards of quality.

## *Testing and managing quality*

The foundation for this consists of a documentation and administration system that governs operational procedures. Under this concept, all process steps conform to standardized, traceable "standard operating procedures" in order to assure a consistently high level of quality in all areas of operation. Quality coordinators in the individual departments assure that this quality management system is instituted and followed. The proper functioning of a system of this kind can be reviewed in an audit. Satisfaction of all stipulated requirements is confirmed through the issuance of a certificate under ISO 9000ff. This certification is reviewed every three years through a new audit, and then either confirmed or withdrawn.


The quality management documentations are implemented in the form of quality testing. These tests are performed by the Chemical and Physical Analysis, Sensory Analysis or Microbiology service departments. The test data developed there are consolidated in a cross-departmental information technology system, where they are compared with the customer specifications. Testing is performed in Receiving, Shipping and in intermediate Production stages.

Incoming consignments of goods consist of natural substances, fragrance materials and aroma

chemicals, which are initially subject to an identity inspection. The correctness of the supplied product is first checked by reviewing its appearance and determining its specific gravity. In addition, random samples are taken, which are then subjected to the same tests and inspections as the products that are later shipped, i.e. the finished perfume oils.

**Both raw materials and ingredients, as well as finished perfume oils, undergo numerous quality tests and inspections.**

Whether they are raw materials or compositions – both product groups have a defined analytical and sensory profile that is stipulated in a product specification. This specification is either defined in-house or contractually agreed with the supplier or customer. It serves as a kind of "product passport," which is checked during quality testing. Fast, precise work is crucial in connection with the testing, because this is a critical point in the operational process and the goods will not be released for further processing or shipment until all inspection data have been tabulated.

## *The individual inspection and testing stations*

### Chemical and Physical Analysis

The Chemical and Physical Analysis Department reviews the physical-chemical data of the products. Largely automated data capture systems afford swift testing and evaluation of the samples. In an analytical laboratory that is air conditioned to a temperature of 20°C, such standard data as optical rotation, refraction and specific gravity are determined; automatically sampling gas chromatographs, so-called autosamplers, continuously check the "electronic fingerprints" of the incoming samples. The instrumentation, which is calibrated daily in accordance with ISO instrumentation standards, automatically compares the analysis results with a computer-controlled database, enabling around 90 % of all tests to be automated. Only if there is a variance is the result displayed, and the staff then determines – and eliminates – the source of the problem.

Further analyses, such as acid value, peroxide value, pH measurement or determination of the flashpoint, are performed at the customer's request or for special products. The results of the inspections are input into cross-departmental databases, in which the tested status of the goods is administered.

### Sensory Analysis

In spite of cutting-edge analysis methods, the nose continues to be the most sensitive testing "instrument." Trained specialists perform olfactory assessments of some 150 samples a day. Around half of these tests consist of so-called in-process controls. These controls occur between two process steps. If random samples are taken from supplied containers in a receiving operation, every container is again subjected to an olfactory inspection when a supply tank is filled. Intermediate stages within the production flow, such as when raw materials are dissolved, also have to pass the critical noses of the fragrance specialists before further processing can occur.

Impurities caused by outside odors, which could falsify the olfactory impression, represent a


**Every sample has an analytically measurable "fingerprint", which has to coincide with the reference standard.**

**The most sensitive testing is still performed with the nose.**

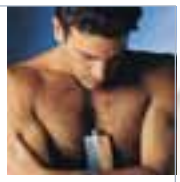
problematic aspect of the olfactory assessment. Consequently, in-process samples are sent to an "olfactory lock," which separates the production or receiving area from a neutral sensory analysis room that is equipped with its own ventilation system. Here, the fragrance specialists can evaluate the sample and pass on the results directly. Outgoing consignments of products, i.e. finished perfume oils, are also inspected in this kind of room. In this case, the samples are olfactorally compared with a standard consisting of previously produced products that have been found to be of proper quality. Depending upon the size of the perfume oil producer, some 50,000 to 75,000 of these standards, so-called consignment reference samples, are kept in a storeroom that is air conditioned to a temperature of 18°C. They can naturally also be employed for any other desired kind of analytical comparison. This collection also includes samples of raw materials and ingredients, which are employed as the reference standards for receiving inspections.

Both a fine nose and experience are important factors in reliable olfactory sensory assessment. The scent of the finished perfume oils always has to agree with that of the standard. However perfume oils typically consist of complex blends of natural fragrance materials and aroma chemicals, which "mature" with storage, while a freshly compounded perfume oil usually seems somewhat "rougher." In performing their sensory analysis work, the fragrance specialists have to take these naturally occurring fluctuations in the fragrance impression into account and be able to distinguish them from a possible compounding error. But it is not just the first impression, the impact, that is compared. The olfactory impression of the finished product must also agree with that of the standard after two hours. Assessment by two different testers guarantees the most objective possible results. However the work of Sensory Analysis includes more than just a critical assessment of odor: Color and appearance, too, are checked, and these results, too, are stored in the database.

**Microbiological testing of fragrance materials.**

## Microbiology

In Microbiology, selected products are tested for the amount of certain microorganisms they contain. There is no problem of microbial impurity in the case of aroma chemicals. And most of the natural substances that are employed in the production of perfume oils, such as essential oils or absolues, generally have an inherent preservative effect. What are tested, though, are thick plant extracts, for example, which are processed upstream in the production of cosmetic ingredients. Close collaboration between the individual testing departments enables quality testing to be performed quickly and comprehensively on the basis of the defined quality management system. Any problems that do occur are swiftly remedied and sources of problems avoided. The mission and objective is to assure the consistently high quality and traceability of all steps in the production of perfume oils.



# Product Safety and Responsibility...

**It is not just quality that plays an important role in selecting the raw materials and ingredients that are used in the creation of perfume oils. The safety and harmlessness of the employed substances for both people and the environment are of key importance.**

Like the cosmetic ingredients described in the preceding chapter, perfume oils, which represent a complex blend of raw materials and ingredients, are also used in cosmetic products. The employment of both is subject to national and European legislation relating to cosmetic products.

In Germany, for example, the European Commission's cosmetics directive is implemented in the Cosmetics Code ("KVO"), which is annexed to the Food and Notions Act ("LMBG"). In addition, numerous national and European laws and regulations govern the development and production of fragrance materials and perfume oils with respect to environmental protection and job safety.

However the responsibility exercised by fragrance houses goes beyond legal requirements. Back in 1973, the national associations of the fragrance industry formed an international self-regulating body, the International Fragrance Association (IFRA). One of its most important objectives is to draw up guidelines that assure the safety of people and the environment in connection with the production and use of perfumes and perfumed products.

Why is an international organization needed? Since the fragrance industry is also experiencing a globalization of its markets, the logical consequence has to be rules that apply worldwide. International self-regulation enables the latest scientific findings to be instituted faster than would be possible through legislation in various countries on different continents.

The IFRA uses the latest scientific findings to develop minimum requirements for the safe development and employment of perfumery raw materials and ingredients and to formulate industry guidelines that are viable in actual practice. Its members, the national associations of the fragrance industry, receive constantly updated lists indicating which raw materials and ingredients are subject to restrictions or may not be employed at all. In certain cases, their employment is only permissible if precisely defined quality guidelines are observed.

## *Research mission: Product safety*

The most important source that is drawn upon when the Science Committee of the IFRA develops

**Perfume oils are a complex blend of raw materials and ingredients – however their production and employment are governed by international rules.**

**Skin compatibility tests of aroma chemicals are conducted by independent pharmacologists, toxologists and dermatologists.**

these guidelines is an independent science institute in the United States. In 1966 – even before the IFRA was formed – the non-commercial Research Institute for Fragrance Materials (RIFM) was founded with the objective of compiling data on all popular perfume oil raw materials and ingredients that would be of relevance for the safe use of these products. An international team of experts, consisting of pharmacologists, toxicologists and dermatologists with no economic ties to the fragrance industry – to assure their independence – develops this scientific data. If such data are unavailable for a specific raw material or ingredients, the RIFM conducts the required studies. Safety assessments of the raw materials and ingredients used in perfumery are always based upon existing data.

In addition, the members of the national associations, the individual fragrance producers, naturally work in close collaboration with independent pharmacologists, toxicologists and dermatologists – e.g. from the university community – to steadily supplement safety assessment findings.

Today and in the future, these efforts are aimed at assuring that the fragrance experience can be enjoyed without any worries with respect to ill effects on people and the environment. This desire for fragrance experiences, which is not a fad of recent years, had already been sung by the Mayan Indians:

*How could we live without fragrances?*
*Who would carry our prayers to God?*
*Who would sanctify birth, marriage and death,*
*And who would lend so much more bliss to love?*