



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 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

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





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

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

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

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.





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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

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

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.

