



Contradictory aspects of natural in cosmetics



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Modern CosmEthics

Modern CosmEthics is an association of cosmetology professionals whose mission is to build and promote natural, sustainable, ethical and cosmetically active products with a special emphasis on:

- scientific evidence,
- physiological compatibility, and
- the rational formulating of cosmetics.

Modern CosmEthics awards the CosmEthically ACTIVE certification mark.

<https://cosmethicallyactive.com/>

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Webinar

The lecture entitled, 'Contradictory aspects of natural in cosmetics' was given by Katja Schoss, M. Ind. Pharm., BSc. Cosm. Sci.

Abstract

The concept of natural can be understood in very different ways and has no generally accepted (legal) definition. Natural cosmetics represent an alternative to conventional cosmetic products, in which completely synthetic ingredients typically prevail. Ingredients of natural origin have proven physiological and cosmetic effects. However, generalising the concept that natural ingredients are better for the skin simply because they come from nature has no scientific rationale.

Progress in natural cosmetics is moving in the direction of scientific approaches. Cosmetically active ingredients of natural origin have become the cornerstone of evidence-based formulating in terms of cosmetic effects and successful marketing. However, many aspects of quality must be considered to achieve high-performing cosmetics.



Everybody is going natural but...



What does natural really mean?



Definition of natural ingredients

- Ingredients that are found in nature and are not manmade
- Ingredients that are found in nature
- Ingredients that are not harmful to life

- An **alternative** to conventional cosmetic products
- Ingredients of plant, mineral and animal origin obtained through defined chemical, physical, microbiological and enzymatic methods, or
- Composed of nature-identical ingredients (synthetic)
- **Selection of ingredients is limited**

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Standards / certificates

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Natural cosmetics – the only assurance that a cosmetic product meets the standards of a certification institution

GENERAL SIMILARITIES

- Ethoxylated ingredients
- Petrochemicals
- Synthetic colourants
- Synthetic perfuming ingredients
- Genetically modified organisms
- Preservatives
- Animal testing ban



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What do we want from cosmetics?

- Natural
- Pleasant feeling on the skin
- Active
- Environmentally friendly
- Physiologically acceptable



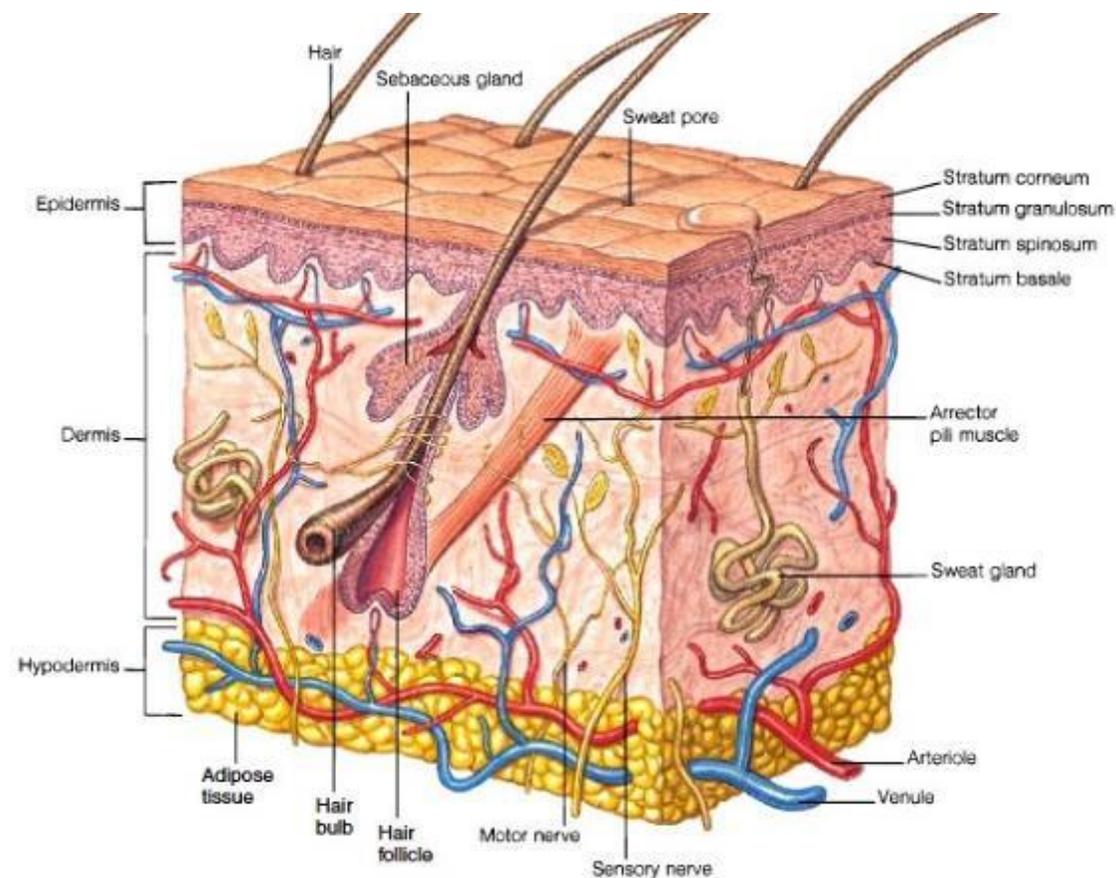
Physiology of the skin

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SKIN FUNCTIONS

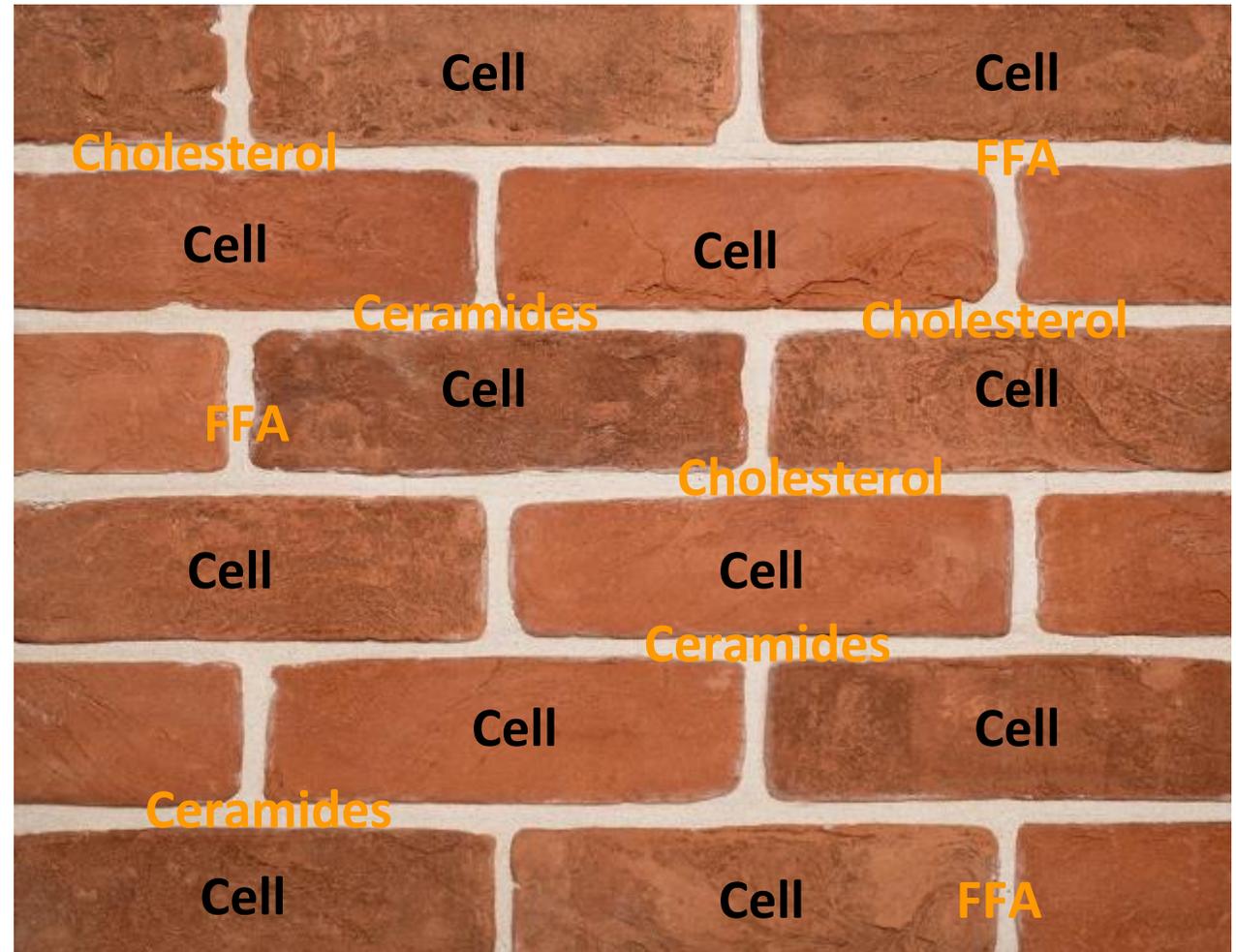
- A barrier
- Limits transepidermal water loss
- Protects from mechanical, chemical and microbial agents and UV radiation
- Regulates body temperature
- Immune function



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Physiology of the skin

- Epidermis structure is like a brick wall
- Corneocytes or 'bricks'
- Intercellular lipids or 'mortar'
- pH 4.7 to 5.5



Cosmetic ingredients of natural origin

Not all ingredients that come from nature are the best choice for our skin or hair.

SODA

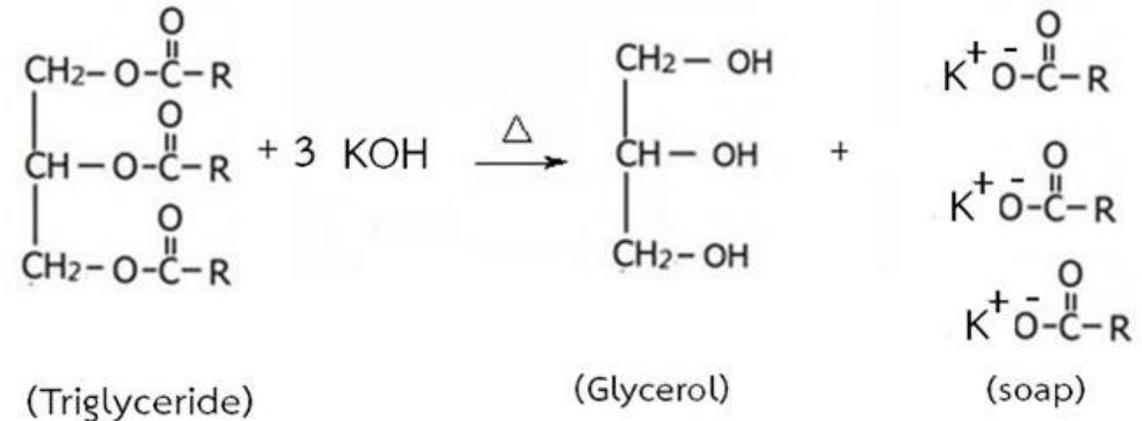
- Sodium bicarbonate, sodium hydrogen carbonate = NaHCO_3
- Industrial production: Solvay process
- pH (saturated solution): 9

Cosmetic ingredients of natural origin

Not all ingredients that come from nature are the best choice for our skin or hair.

COLD-PROCESSED SOAP

- Saponification: triglycerides (oils) + a strong base (NaOH) = free fatty acid salts
- pH (saturated solution): 8 to 10



Cosmetic ingredients of natural origin

Proven and beneficial cosmetic effects

- Emollients: vegetable butters and oils, ceramides, squalene, waxes, etc.
- Thickeners: xanthan, guar gum, carrageenan, etc.
- Moisturisers: hyaluronic acid, glycerol, ectoin, etc.
- Antioxidants: flavonoids, carotenoids, vitamin E, etc.
- Exfoliants: glycolic acid, salicylic acid, etc.
- Cosmetically active ingredients with tonic, antimicrobial, anti-inflammatory activity, etc.

It is our responsibility to use them safely and in the most beneficial way possible.



Cosmetic ingredients of natural origin

CERAMIDES

- Intercellular lipids of the stratum corneum, crucial for the proper organization of lipid lamellar phases
- Emollients for skin with an impaired barrier function
- At least 0.2%
- Cosmetic products with ceramides available on the market contain as little as 0.00000001% of ceramide III

References:

Huang HC, Chang TM. Ceramide 1 and ceramide 3 act synergistically on skin hydration and the transepidermal water loss of sodium lauryl sulfate-irritated skin. *Int J Dermatol* 2008; 47(8):812-819.

Cosmetic Ingredient Review Expert Panel. Safety Assessment of Ceramides as Used in Cosmetics. *Cosmetic Ingredient Review*, 2015.



Cosmetic ingredients of natural origin

TECHNOLOGICAL CHALLENGES

- Variability of raw materials
- Quality of raw materials
- Sensory and technological characteristics of a formulation

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Cosmetic ingredients of natural origin

COMPOSITIONAL VARIATION OF ESSENTIAL OILS

- Plant species, subspecies, variety
- Plant part
- Geographical origin, weather conditions
- Time of harvest
- Condition of plant material
- Method of production
- Storage conditions



Cosmetic ingredients of natural origin

COMPOSITIONAL VARIATION OF PLANT EXTRACTS

- No quality standards/criteria on composition
- Different forms: dry extracts, liquid extracts, etc.
- Poor analytical specifications



Cosmetic ingredients of natural origin

COMPOSITIONAL VARIATION OF PLANT EXTRACTS

- DER: drug to extract ratio

DER 10 : 1



1 kg extract

DER 1 : 1



Cosmetic ingredients of natural origin

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GREEN TEA (*Camellia sinensis*)



0.008% of the extract in
a final product

5. Conclusions

The green tea used in this study consisted of a variety of phenolic acids. EGCG, EGC, and ECG, were shown to be the three major phenolics in this extract. The noncytotoxic concentration of green tea, 0.5 % or 0.0875 mg/mL, exhibited the anti-skin aging activities, including the significant suppression of melanin production by inhibition of tyrosinase and TRP-2 activities, the potent antioxidant, and the significant MMP-2 inhibitory activity. These results have revealed that green tea is a functional processed plant for utilisation as an anti-skin aging agent in the natural healthcare products, including food, health, and cosmetic products.



European Journal of Integrative Medicine

Available online 23 September 2020, 101212

In Press, Journal Pre-proof



Anti-skin aging activities of green tea (*Camellia sinensis* (L) Kuntze) in B16F10 melanoma cells and human skin fibroblasts

Puxvadee Chaikul^{a, b}, Tawanun Sripisut^{a, b}, Setinee Chanpirom^{a, b}, Naphatsorn Ditthawutthikul^{a, b}

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<https://doi.org/10.1016/j.eujim.2020.101212>

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Abstract

Introduction

Skin aging is a multifactorial process caused by chronological changes and environmental factors. Green tea, a processed tea plant (*Camellia sinensis* (L) Kuntze), possesses health benefits and has been used in traditional medicines and natural products. However, the anti-skin aging effect of green tea in clinical trials has been a controversial issue. To clarify this without the interference of systemic involvement, the objectives of study were to investigate the activities of green tea against skin aging in B16F10 melanoma cells and human skin fibroblasts.

Cosmetic ingredients of natural origin

GREEN TEA (*Camellia sinensis*)

Green tea extract 1

Green tea extract is intended for use in both hair and skincare systems, including hair serums and treatments, skin lotions and creams, anti-aging products and skin clarifiers. **Green tea extract** is intended to act as a powerful antioxidant to protect hair and skin from environmental free radical damage, while also protecting hair and skin from UV radiation. **Green tea extract** may minimize the appearance of skin damage by helping to tone the epidermis and improve elasticity to decrease the appearance of sagging skin and fine lines."

| | |
|-------------------------|---|
| INCI Nomenclature: | Water & Camellia Sinensis Leaf Extract |
| Suggested Use Levels: | 1.0-10.0% |
| Suggested Applications: | Antioxidant & Toner |
| Appearance: | Clear to Slightly light Pink to Amber Hazy Liquid |
| Solubility In Water: | Soluble |

? of the extract in the final product

Cosmetic ingredients of natural origin

GREEN TEA (*Camellia sinensis*)

Green tea extract 2

Description: Green tea extract made from evergreen leaves of a small Asian tree that is cultivated in different regions. Undeveloped leaves are harvested manually, steamed to prevent fermentation, and then pressed and dried. **Contains 5% of extract** dissolved in water & glycerin (50/50). Pale brown liquid, faint herbal odour. Water-soluble.

INCI Name: Glycerin, water, Camellia Sinensis (green tea) leaf extract

Benefits:

Potent antioxidant agent due to polyphenols & methylxanthines

Often used in anti-aging formulas to reinforce anti-aging effects of other ingredients

Useful against irritated skin.

Use: Use as is, usual final concentrations **0.1-2%**. Stable for 36 months when kept in a closed container at 10-25 °C. For external use only.



| | | |
|------------------|-------------|------|
| pH Level | 4.0-5.0 | 4.6 |
| Caffeine | 0.10-0.25% | 0.2 |
| Catechins | 0.20-0.80% | 0.6 |
| Tannins | 0.50-2.0% | 1.25 |
| Aerobic Bacteria | 100 Maximum | Pass |

0.005 to 0.1% of the extract in a final product

Cosmetic ingredients of natural origin

CO₂ extracts – highly potent ingredients or just a good marketing gimmick?

Marigold (*Calendula officinalis*)

Flowers vs. seed extract



Cosmetic ingredients of natural origin

FORMULATION EXAMPLE

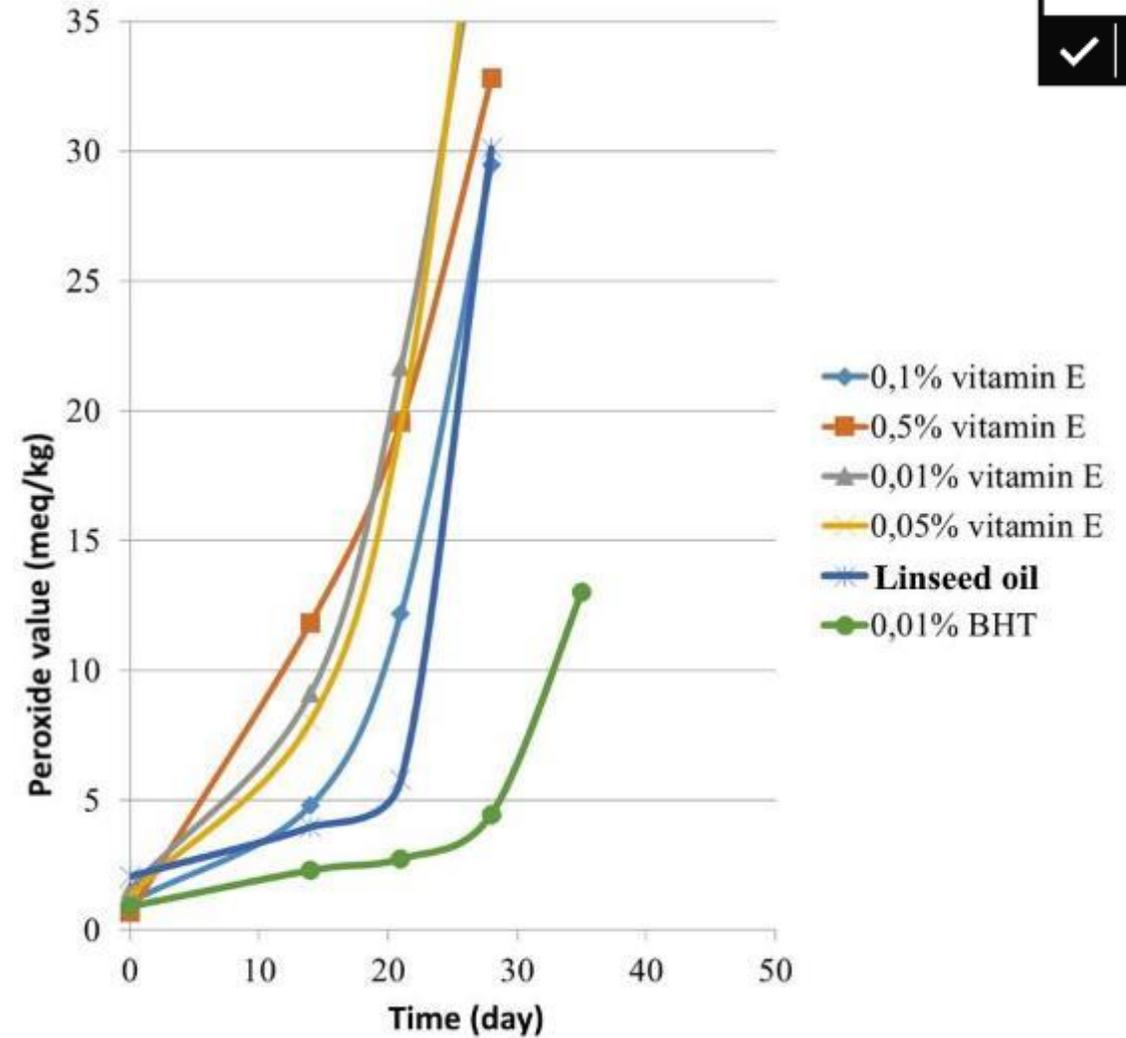
| Facial oil serum - antioxidative | |
|----------------------------------|-------|
| Linseed oil | 50% |
| Wheat germ oil | 25% |
| Chia oil | 13.5% |
| Vitamin E | 10% |
| Resveratrol | 0.5% |
| Coenzyme Q10 | 1% |

Prooxidative action

EXAMPLE: Vitamin E

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KEY PRINCIPLES

- Nature above all when selecting ingredients
- Use of ingredients in cosmetically active concentrations
- Rational use of ingredients (the “less is more” principle)
- High quality of raw materials

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CosmEthically ACTIVE is the first certificate that pursues an integral approach to the evaluation of cosmetics.



RENDEZ-VOUS
NATURE

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Webinar questions

What is the recommended concentration of vitamin E in a formulation?

It is not possible to give a general answer, as formulations have unique properties, depending on the type of the formulation and (chemical) characteristics of incorporated ingredients. Concentrations in the range of 0.05% to 0.5% are typically used.

Based on scientific research, it is reasonable to advise against excessively high concentrations of vitamin E, as it acts as a prooxidant (see references below).

References:

Isnardy B, Wagner KH, Elmadfa I. Effects of alpha-, gamma-, and delta-tocopherols on the autoxidation of purified rapeseed oil triacylglycerols in a system containing low oxygen. J Agric Food Chem 2003; 51(26):7775-7780.

Wagner KH, Elmadfa I. Effects of tocopherols and their mixtures on the oxidative stability of olive oil and linseed oil under heating. Eur J Lipid Sci Technol 2000; 102:624-629.

Webinar questions

If I have a formulation containing four essential oils, would the CosmEthically ACTIVE certification body require the inclusion of each of them in a concentration of 0.5% or higher to achieve the active concentration in a product?

The scientific team of evaluators at CosmEthically ACTIVE takes into account the synergy of ingredients, the exposure of the skin or hair to the total range of ingredients in a product, as well as the desired cosmetic activity and the intended use of a product. In case of essential oils, typically, the final concentration is lower, not a sum of individual concentrations. For example, a suitable total concentration of essential oils in a facial cream should not typically exceed 0.5%.

Webinar questions

What are nature identical ingredients?

Nature identical ingredients are substances of synthetic origin that are structurally identical to substances naturally present in nature.

For example, vitamin C (INCI: *Ascorbic Acid*) is a naturally occurring substance found in, for example, oranges. As a cosmetic ingredient, it is typically used as an antioxidant and buffering ingredient, and is of synthetic origin. The cosmetic activities of synthetic vitamin C and isolated natural vitamin C are the same.

Webinar questions

What is your opinion about solid cosmetics or cosmetics without water for skin hydration?

Lipid-based cosmetic products that contain, for example, vegetable butters and oils, waxes, synthetic triglycerides, etc. effectively express emollient action and thus indirectly improve skin hydration. As a result, transepidermal water loss is decreased. For more information, see review articles below.

However, in addition to hydrating action we have to keep in mind specific skin types for which such products are intended, as not every skin responds the same. 'Heavier' formulations, with a larger content of, for example, waxes, are typically excellent for very dry skin, but may give the unpleasant, heavy feeling of a mask on oily skin.

References:

Patzelt A, Lademann J, Richter H, Darvin ME, Schanzer S, Thiede G, Sterry W, Vergou T, Hauser M. In vivo investigations on the penetration of various oils and their influence on the skin barrier. *Skin Res Technol* 2012; 18(3):364-369.

Poljsak N, Kreft S, Kocevar Glavac N. Vegetable butters and oils in skin wound healing: Scientific evidence for new opportunities in dermatology. *Phytother Res* 2020; 34(2):254-269.

Webinar questions

What are the best natural preservatives and at what percentages?

It is not possible to present a general answer, as preservation efficacy is highly dependent on:

- the type of a formulation (i.e. water- or lipid-based),
- the type of packaging,
- the total composition of a formulation, including the presence of ingredients with an antimicrobial action that are primarily used as 1) functional technological constituents of a cosmetic product and/or 2) for their positive effects on the skin or hair, which contribute significantly to the total preservative function, etc.

Preservatives that are allowed according to criteria of the CosmEthically ACTIVE certificate are found in the 'Technical Document' at:

https://cosmethicallyactive.com/wp-content/uploads/2020/12/Technical-Document_1.0_2020.pdf.

Webinar questions

Is the preservative Cosgard considered acceptable in natural cosmetics?

Cosgard consists of two compounds, benzyl alcohol and dehydroacetic acid, which are both permitted in natural cosmetics.

Webinar questions

Is the CosmEthically ACTIVE Certificate valid in the USA?

Yes, the CosmEthically ACTIVE certificate is valid in the USA. More information about certification criteria and process is available in the 'Technical Document' at:

https://cosmethicallyactive.com/wp-content/uploads/2020/12/Technical-Document_1.0_2020.pdf.

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