Natural, or „natural” cosmetic products?

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Please, cited as: CHEMIK 2010, 64, 11, 641-648

During the last several years, the market of cosmetic products, defined as natural ones, has been increasing by several percent a year and it is covering more and more serious segment of selling cosmetics, toiletries and a wide range of household chemistry products. According to various data sources, the worldwide sale of products classified to this group increased from 7 to 10 billion USD in years 2007-2009. They are approximated and often disputable figures due to the problems with terminology that is discussed further in this paper. Nevertheless, this tendency is not dubious. The world “natural” is declined in every possible form by all related words such as “nature forces”, “nature products” and “plants energy” etc in advertising and promotional materials of the cosmetic industry. Despite numerous doubts from medicine and cosmetology circles, this trend is developing and there is no evidence of any changes in the nearest future. The biggest consortiums from cosmetic and household chemistry industry, which development was based on research and synthesis of new cosmetic raw materials and biologically active substances, have focused more and more interest towards products originating from folk traditions or ancient literature that is full of recipes of natural active substances introduced into cosmetics are ineffective or of no value. In many cases, also not related to the cosmetics, the durability of cosmetic products is the most difficult element of the discipline known at the present time as “natural cosmetology”. Also, the mere definition of “natural cosmetic product” is troublesome. So far, this term has not been defined by any legal system. Consequently, its common usage is not restricted at all. There are quite serious and credible institutions granting “natural” and/or “organic” and/or “ecological” certificates for cosmetic products. However, each of them applies different criteria. So, none of the cosmetic products fulfilling these criteria is as natural as the cosmetics from Cleopatra’s or Poppaea’s dressing table.

Marketing in 21st century

The other important element of natural cosmetic products is their real effect and effectiveness of active substances originating from natural resources present in these products. Active substances of plant, animal and mineral origin are known and used in pharmacy, herbal medicine, homeopathy and cosmetology for many years. They are described in pharmacopoeias. Long-term clinical examinations of many of these products have proved the effective action of, e.g. care cosmetics on the skin. The additive of bee’s milk, lanoline, essential oils or oil from vitellus in the cosmetic formula raise no doubts. But none of these raw materials is the base for effective marketing of the new product. For this purpose, there should be an element that captures the imagination of potential users and encourages them to buy just this product. Thus, the new natural products contain extremely exotic and intriguing names of mainly plants (less often animal products) from the heart of jungle, or mysterious formulas of African shamans, Chinese medics, or previously mentioned Hindu Ayurveda. The majority of these products have not been verified by reliable clinical tests on their effectiveness in the scope presented in the advertisement. However, their safe use is carefully examined. This is the clear method of protecting the company against the claims from the users. Advertising and marketing experts are to prepare the texts of advertisements, leaflets and etiquettes containing more or less real, more or less wonderful properties of a product to avoid the law infringement (Cosmetics Directive 76/768/EC in Europe, Act of 31 March 2001 on Cosmetic Products as amended in Poland) and the definitions which could classify such a product into the group of healing agents requiring registration and long-term clinical tests. Consequently, such products contain information on “outstanding rejuvenation of the skin with the extract from … (as exotic or difficult Latin name of the plant as possible) used for hundreds of years by women from (an exotic country)” or epidermis regeneration, reconstruction of deep layers of the skin, wrinkles smoothing, firming neck skin etc. All these promises and declarations, particularly the ones about “results visible” at, e.g. from 78 to 96% of women, do not require any tests because the attempts to remonstrate with the specific product and its declared properties fail as any of such features cannot be proved unambiguously.

It does not mean that the extending scope of a few thousands of natural active substances introduced into cosmetics are ineffective and of no value. In many cases, also not related to the cosmetics, the...
contemporary state of art and the action of plant-derived products are based on tradition and experience. They are not always verified by clinical tests (e.g. herbal medicine). The similar situation refers to active substances used in the cosmetics. They have been known and used for many years. They are periodically tested to verify their properties, and they are not controversial. However, the dermatological tests cause the limitation of their application due to irritating or allergic properties for the skin.

Such limitations do not exist for new substances with properly prepared description of their properties. If the declared action of the product is not covered by the healing treatment and its description is sufficient to avoid documenting, such a substance can be introduced into the cosmetic products without any problems.

**Terminology**

The problem of “natural cosmetic products” (organic, ecological ones) exists considering the terminology and law settlements. A mask from smashed strawberries, a compress from cucumber slices or donkey milk famous in ancient times are, without any doubt, natural in 100%. But each product being manufactured on a mass scale which has to complete the route from a manufacturer, wholesale stage, retail stage to the customer must have the formula which allows for enduring this process without any loss for declared properties. If the products, mainly based on synthetic ingredients resistant to external factors, with the additive of preservatives, antioxidants and other protecting components, contain natural elements, they are resistant to the storage process. The products containing exclusively natural elements do not have such resistance.

There are some attempts to launch cosmetic products only with natural raw materials, e.g. produced for a specified customer in beauty salons or in specialized shops where the product is made according to a selected formula. These products are usually produced in small quantities, and their shelf life is limited to days, or at maximum to weeks.

The modern knowledge of cosmetology does not allow for manufacturing the cosmetic products solely from natural raw materials, which could be launched for retail sale. The application of synthetic substances protecting the product against decaying and possible danger for the user is required. Thus, the problem with natural cosmetic products manufactured on a mass scale and awarding “certificates” is related to the definitions of such terms as “natural”, “organic”, “ecological” and so forth. It is vital to assume some compromises regarding the permissible content of synthetic substances, particularly preservatives and antioxidants.

Some basic ideas are repeated in all definitions of natural substances. But in specific cases, the particular criteria of certifying bodies can differ. Generally, the assumptions accepted in Germany are followed [3]:

- **Raw materials of plant origin, including essential oils and their fractions, natural dyes, are from controlled cultivations or controlled “wild harvests”**
- **Raw materials of animal origin are permitted only if they are obtained from living animals (e.g. lanoline from sheep wool, milk and its derivatives, bee products), possibly from ecological breeding. Chitosan, carmine and silk are the exceptions**
- **The use of inorganic salts and mineral materials is permitted only in specified exceptional cases**
- **Such raw materials as emulsions and active surfactants obtained from natural fats, oils, waxes, lecithin, lanoline, saccharides, proteins and lipoproteins through physical or biotechnological methods can be used, but with some limitations**
- **None synthetic dyes, synthetic fragrance substances, silicone, paraffin and none products from crude oil can be used**
- **Natural preservative systems guarantee the microbiological purity of the products. The preservative substances identical to natural ones are permitted. They have to be mentioned in the ingredients list placed on the container**
- **The sterilization of raw materials and products with radioactive irradiation is not permitted.**

Clearly defined methods of production which are in harmony with natural laws, intended rise in customers’ awareness, complete resignation from conducting experiments on animals and ecological criteria for raw materials, end products, packaging and methods of production and turnover are the fundamental goals of valid guidelines.

Many institutions are involved in the certification of natural cosmetic products. Generally, they are private research units or sector organisations. French EKOCERT is the most popular. Its certificates are approved in more than 80 countries. There is also German BIDH (Federal Association of German Industry and Trade Companies), British SOIL ASSOCIATION, Italian AIAB (Italian Association of Biological Agriculture), Belgian BIOFORUM and some American organizations. In Poland, some actions are undertaken by Polish Centre for Testing and Certification. Also, the bodies of European Union deal with the issue of natural cosmetic products. In 2000, The Expert Committee on Cosmetic Products at the European Council Committee on Public Health, elaborated guidelines for natural cosmetic products. But they do not constitute the applicable law. Organisations from this sector are taking interesting initiatives to form the uniform system of criteria and evaluation. In 2002, some of previously mentioned organisations established a working group during BIOFACH trades. It was to work out the uniform rules for certifying natural cosmetic products. In this way, COSMOS (Cosmetic Organic Standards) were developed. They are still only the advice and do not constitute the applicable law [4]. During the next conference in Paris in 2007, it was decided to introduce two levels of standards – for organic and natural cosmetic products. The list of methods for processing natural raw materials resulting in producing components regarded as natural ones is still a disputable problem. The same issue refers to synthetic preservatives that are essential for the production of many cosmetics with the durability required by trade rules. During the same conference in Paris, the unit called NaTrue was established. It is to represent the manufacturers of natural cosmetic products during the formation processes of European law in Brussel [5].

There are different criteria and procedures for awarding the certificates. The aware consumers can assess the reliability of manufacturer declarations presented in leaflets and advertisement materials. And at the mass market, the terms “natural”, “ecological”, “organic” and so forth are overused with impunity and refer to cosmetic products which seriously differ from specified general criteria.

The similar situation is for cosmeceutical products – cosmetics with healing properties (e.g. antiacne or antidandruff products), including also natural cosmetic products. The borders between the caring effect (characteristic for cosmetic products in accordance with the act definition) and healing effect (requiring other procedure for launching) are not clear, and many products are functioning at the border of this law. Paraffin oil, commonly used in cosmetic products and verified as the safe product a long time ago, is a good example. It is obtained through distillation process, being a chemical one, from crude oil that is as natural product as t alcum powder or sea water. The elimination of any products of petrochemical origin can be justified, but it is also controversial. The similar controversial situation refers to the admittance of limited additive of synthetic preservatives commonly postulated by manufacturers (nowadays, they are accepted by the majority of certification systems). This issue is open and the elaboration of unambiguous regulations for discussed issues at the international level seems to be a long-term task.

**Traditional natural plant oils and essential oils**

Any doubts or unclear issues referring to the terminology and regulations do not diminish the important role of natural raw materials in the production of cosmetic products. It should be enough to mention the application of plant and animal oils for cosmetic purposes
since the ancient times (e.g. olive oil [1, 6] used for anointing by the Olympic Games competitors or holy oils protecting Jewish priests against infections described in the Bible). Now, plant oils (less often animal fat even though lanoline is still commonly used) are used in nearly each cosmetic product as carriers, emulsion components or even active substances within an extremely wide range of products. This common application results from the presence of EFA (vitamin F), vitamins E and A, provitamins, phospholipids, phytosteroles and other substances favourable for the skin and protecting it against water loss, preventing ageing and supporting collagen synthesis (soybean oil Glycine clandestina, avocado Persea gratissima, cocoa butter Theobroma cacao [7]. The wide scope of tests on the content and possible applications of plant fats is conducted due to the present of these active substances in plant oils. This results in the increasing number of exotic names such as shea butter (karité) – oil from shea tree Vitellaria paradoxa, (Butyrospermum parkii) or Basabas butterfly Orbignya oleifera are used as carriers, particularly in tanning products, for dry, mature skin, body massage and hair caring. Their emollient and moisturizing effects result from decreased TEWL (Transepidermal Water Loss) [7].

Also, argan oil (Argania spinosa) known as the Berbers’ almond containing crucial omega-3 and omega-6 acids and E and F vitamins, oil from stones of peaches Prunus persica, or more popular oils from sweet almonds Prunus dulcis, grapes Vitis vinifier seeds, wheat Triticum vulgare germs, nuts Macadamia ternifolia, carrot Daucus carota seeds, starflower Borago officinalis, seabuckthorn Hippophae rhamnoides (strong antioxidant) and many others with properties similar to the previous butter and containing extra valuable components – essential unsaturated fatty acids, vitamins, carotenoids, phospholipids etc have such an effect.

The essential oils of plant origin (volatile mixture of fragrance substances) used for hundreds of years are not only found in the perfumery as fragrance substances, but due to their numerous properties they have become the fundamental active substance in cosmetic products and the base for very popular area of natural medicine – aromatherapy [1, 2, 8]. The manufacturers of cosmetic products, and even household chemistry products, quite often refer to this discipline, however not always in harmony with its ideas. Essential oils from rosewood Aniba roseodora, aka tea tree Melaleuca alternifolia, geranium oil from Pelargonium graveolens, lavender oil from Lavandula officinalis, neroli oil from Citrus aurantium (orange flowers), rose oil from Rosa damascena and ylang-ylang oil from Cananga odorata are the most appreciated oils in the cosmetics. They are characterized with a wide range of caring, protective and healing properties as antibacterial, antivirus, fungicide, protective, painkilling and anti-inflammatory agents. They can stimulate blood circulation and prevent hair loss and skin ageing. These properties are combined with unlimited number of more and more exotic plant extracts, minerals, products of flora and fauna.

A tendency towards using newer and newer raw materials from natural resources is highly supported by consumers’ opinions. The analyses of European, American and Asian markets show that according to consumers, products based on natural substances are better and safer. However, this is not always consistent with the results of clinical tests. These views are fuelled by media actions of ecologists, which are supported with easy access to information, interest in historical and exotic cultures and traditions containing a lot of information on the methods of improving health and beauty with the help of “nature gifts”.

Selected and interesting raw materials of natural origin

The reviews of natural raw materials for cosmetic products are comprised in voluminous volumes already containing thousands of items. As it has already been mentioned, the profit on the cosmetics market can be made by offering something new and unknown. The next examples of raw materials of natural origin that are proposed in the cosmetic products are just the illustration, very limited out of necessity, of tendencies on the market.

The tea products are trendy and widely advertised. It should be noticed that using the term “tea oil” instead of “tea tree oil” is a very common error made in publications. The false term refers to the essential oil from Melaleuca alternifolia, and as thus it has nothing in common with tea (Camelia sinensis), from which the essential oil cannot be obtained. And tea is the source of valuable extracts that can be obtained from its every kind (green, black and white tea). The latter one is particularly appreciated as the raw material for producing an extract with active polyphenols inhibiting oxidation processes induced by free radicals. The extracts from a special type of this tea – Pai Mu Tan (white peony) from Fujian province, are used in products preventing skin ageing, melanosis, improving protective functions of skin, preventing infections having astringent effect. The similar functions, with particular focus on antiseptic effect, are possessed by red “tea” Rooibos Aspalathus linearis. Its extract is used in anti-inflammatory, antiseptic, antiallergic, antiance and anti-eczema products. It contains, inter alia, vitamin C, magnesium, calcium, copper and zinc [9].

Many raw materials of natural origin have properties that successfully replace required chemical substances protecting the cosmetic products against ageing and impurities. Indian gooseberry Emblica officinalis is an interesting example, mentioned in Ayurveda books [10]. Its extract has strong antioxidation properties and contains 10% β-glucogallin stronger than ascorbic acid. The oil from turmeric root [11] has the same effect. And its presence in the cosmetic products improves skin glow and vitality. Japanese company Shiseido offers many other natural antioxidants [12].

The combination of oils from curry leaf tree Murraya koenigii and cinnamon Cinnamomum zeylanicum forms a strong agent affecting gram-positive and gram-negative bacteria, fungi, mould and yeast. It can be used in the cosmetic products as the preservative [10]. Other essential oils and plant extracts also have the preserving effects [1, 2, 8].

Plants that are known and popular as food products have many features useful in the cosmetic products.

For example, punicic acid – the derivative of linolenic acid, present in the oil from pomegranate fruit seeds (nearly 60%) is a strong anti-inflammatory agent. Similarly, ellagic acid (the derivative of gallic acid) is an antioxidant with anticancer effects [11, 13]. Extracts from organically cultivated figs, strawberries, cherries, mango, blackcurrant, sweet cherries, bilberries, Acai berries (Euterpe Oleracea – Braziila palm berry) or Chinese Myrica rubra have antioxidant, anti-inflammatory and energetic properties due to the presence of vitamin C and polyphenols [10]. Mangosteen Garcinia mangostana from Thailand, which is not of popular in Poland, contains natural xanthans – plant phenols with strong antioxidation, anti-inflammatory, antiseptic and immunomodulatory effect [11, 14].

Products from myrrh, Boswellia, styxras, benzoze resins and many others from Middle East, Africa and Southeast Asia, used as medicines in ancient times, have valuable properties. Boswellia resin (Olibanum - Boswellia sacra) is used to disinfect rooms by incensing. It contains acetyl-keto-beta-boswellic acid with strong anti-inflammatory properties. Moreover, it prevents collagen destruction and epidermis cornification [11, 14].

Many plants and their extracts contain plant hormones of particular importance for skin. For example, Angelica chinensis contains flavonoids and phytohormones which effect is similar to estrogens and progesterone. Also, Pueraria mirifica from Thailand contains phytoestrogens, miroestrol and dioxyimiroestrol with the strongest estrogens effect among plant hormones. It regulates fat level in subcutaneous tissue and provides perfect results in cellulite, obesity and breast firming therapy [14].

Moss and lichen are a very interesting area of studies. Their countless species are present all over the world. They cover oak and pine mosses, which extracts are used in perfumery, known for centuries and the newest products that have not been thoroughly tested, with particularly interesting properties and healing and caring substances [15, 16].

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Seas and oceans are the rich source of natural raw materials. Fats and oils from fish and other sea creatures, algae and coral – the whole range of rich fauna and flora, have been used for centuries, and are still used in the modern cosmetics. Oils from fish, especially from sea fish, are very popular. For example, the oil from fish *Hoplostethus atrunicus* caught near New Zealand [12] contains fat acids that are more similar to human fat than jojoba oil (*Simmondsia chinensis*), very popular in the cosmetic products. Sea water, particularly from reservoirs with high salinity level (e.g. the Dead Sea), and from various types of clay, ooze and slime from post-volcanic areas (Volcano island at the Sicilian coast), swamps (peat products) as well as from other sources is a valuable raw material. Mineral waters are used as active substances in the cosmetic products of a traditional brand Vichy. There are several other types of water and other products based on balneotherapy and SPA.

“Diet supplements” are classified as another issue. They are intended to have positive impact on skin and its appendages (hair nails). The vast majority of such products present on the market are not verified by reliable clinical tests that could confirm declared properties. And their recipes are based on popular properties of the elements with approved positive effect on the skin, or they are added to products according to the knowledge on their general positive effect on human health. This usually positively influences skin conditions as well (e.g. vitamins, omega-3 acids etc).

**Instead of conclusions**

As it was stated in the introductory part, the market of natural cosmetic products, however this phrase is defined, is developing very extensively. And this tendency seems to be held for many years. Obviously, this development will be conducive to search new, effective and safe raw materials to substitute for synthetic substances. Also, legislation [5] will evolve. Maybe such definitions of cosmetic products as “natural”, “ecological” or “organic” will be unambiguously specified and commonly accepted in the nearest future.

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**Bibliography**


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**Sprostowanie**

W CHEMIK 7-8/2010 na str. 514 i 520 w artykule Panów Andrezej Daniela i Krzysztofa Daniela pt. Synteza niektórych azotowych układów heterocyclicznych oraz ich zastosowanie w komórkach elektroluminescentnych (Synthes- is of some heterocyclic compounds and application thereof inelectroluminescent cells) został zamieniony rysunek 8. Poprawny rysunek 8 jest następujący:

![Rys. 8. Struktury spiro-PQ i spiro-BPP](image)

Za blad serdecznie przepraszamy Autorów i Czytelników.

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