

Feature: Cosmetic Oils

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The one thing that is certain when forecasting trends in cosmetics is what goes around comes around. Galen's famous cold cream formula contained natural olive oil; products of fifty years ago were mostly mineral oil based; twenty-five years ago natural oils came back into fashion; then oil-free cosmetics were offered and now web sites condemn natural oils for supposedly causing acne and extol the virtues of paraffinum liquidum, previously known as mineral oil.

When discussing cosmetic applications of oils the first hurdle to overcome is their definition. A flexible definition is a substance, liquid at room temperature, which is immiscible with water. To be accurate, oils are triglycerides; that is they are a tri-ester of glycerin with three equivalents of organic acid, with a setting point (titre) below 40.5°C. Fats have a titre above 40.5°C and butters have a titre between 20C and 40.5°C [Ref 1].

Oily substances are an essential part of all cosmetic emulsions that are used to prepare skin care creams and lotions and are often used in hair conditioning products.. They are added to improve the skin feel of the product; to provide emolliency; to provide a protective film; to act as vehicles for oil-soluble active substances such as UV filters; to replenish lost oils from the skin, and to provide good copy for the marketing department.

Triglycerides are differentiated by their carbon chain length and degree of unsaturation. The shorter the carbon chain the lighter the oil and less greasy it feels. The presence of double bonds lowers the setting point and makes the oil more mobile but they also increase the risk of rancidity. Iodine values are a measure of unsaturation; the higher the value the more unsaturated the oil and the more likely it is to become rancid unless suitably protected by an anti-oxidant. An exception is *Limnathes alba* (meadowfoam) seed oil), which does not have conjugated double bonds and which has a natural antioxidant content.

Many plants contain large amounts of lipids suitable for edible as well as cosmetic and pharmaceutical purposes. Vegetable lipids are produced within living plant cells and are stored within the seed as a source of energy; they are naturally biodegradable, renewable and pose no threat to the environment. The oil may be obtained by cold expression to yield virgin or crude oil, or the seeds may be crushed and the oil removed by solvent extraction. Although crude oil is demanded by some users it is more commonly winterised, that is it is cold filtered to remove waxy components; it may be filtered through clay or silica to reduce colour and have steam passed through it to reduce odour. However the oils that are commonly used in cosmetic products are complex mixtures of different triglycerides and also contain various other components that are useful. The winterising of oils results in a loss of the higher molecular weight fractions. Frequently it is these fractions that provide the unique skin feel or conditioning to the product and the different processes used in the preparation of particular oils may be critical to their functionality [Ref 2]. However many oils retain colour and odour that preclude their use in the majority of cosmetics and toiletries. Croda Oleochemicals has developed a purification process designed so that oils retain all the desirable properties of the starting material but are essentially colourless and odourless. They are available as Cropure high purity triglyceride oils.

The formulator questions why is the oil being included and which one(s) will fulfil the function required? With almost two hundred to choose from in the INCI dictionary, it is a daunting choice. There are a number that may be termed traditional; readily available and reasonably priced. [Table] The table includes oils with iodine values between 80 and 150 and most other oils fall between these limits. There are a great variety of different carbon chain lengths and there are probably sufficient

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qualities between them to provide any skin feel desired and sufficient emolliency for the majority of cosmetic applications. Although esters are better solvents for non-polar materials such as oil-soluble actives and silicone compounds provide more effective barrier properties, most vegetable oils are also good solvents and careful formulation will ensure a homogenous protective film is left on the skin when required.

However none of the oils in Table 1 are new to cosmetics and only *Borago officinalis* and *Oenothera biennis* oils have a significant content of γ -linolenic acid. Other sources include *Ribes nigrum* (black currant) and *Cannabis sativa* (hemp) seed oil. The presence of unsaturated fatty acids and γ -linolenic acid in particular, are thought to be the main reason that folk medicine has found various oils useful in the treatment of skin problems. The majority of these oils have proven uses as dietary supplements although whether they retain their effectiveness when topically applied is open to discussion. Certainly linoleic and γ -linolenic acids reduce transepidermal water-loss and far more extravagant claims abound.

Exotic oils from far-away places make good label copy and those from Africa, the Amazon Rain Forest and the Indian sub-continent are especially popular in this regard. African oils available from A&E Connock include *Adansonia digitata* (Baobab), *Sclerocarya birrea* (Marula) and that from the Ngali nut, each of which is used by the indigenous population to treat dry skin, eczema and to improve skin bloom and suppleness. The same company offers Moringa seed oil from *Moringa oleifera*, a short deciduous tree found on the lower slopes of the Himalayas, and *Astrocaryum murumuru* butter from a palm found in Brazil. A&E Connock displays an extensive list of natural oils and their properties accompanied by published articles on its web site, [www](http://www.connock.co.uk).

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From the Amazon S.Black suggests Copaiba balsam, Andiroba oil (*Carapa guaianensis*) and buriti oil, the orange-red oil from *Mauritia flexuosa*. This latter oil is rich in carotenoids and is particularly recommended for sun care products. Butters are triglycerides with higher setting points; they are less penetrating to the skin and are useful for their barrier properties and skin conditioning. Still from the Amazon, S. Black offers *Virola sebifera* nut oil also known as Ucuúba butter. In the native language this means ucu (greasy) and uba (tree). It is a dark brown butter and may be used for preparing black soap base! More details of these and other oils are on the web site, <http://www.sblack.com>.

Using the general title Crodamazon, Croda Oleochemicals has recently introduced new oils and butters from the Amazon including Crodamazon Capuacu [NOTE: the middle c should have a squiggle under it] from *Theobroma grandiflorum*. It is a soft butter with 45% C18:1 oleic acid content, making it slow to penetrate the skin. Crodamazon pequi (*Caryocar Brasiliense* fruit oil) is 36.2 % palmitic with 55.8% oleic acid, a soft butter rich in vitamin A., and Crodamazon Maracuja or passion fruit seed oil. The people of the Amazon have used Maracuja oil for skin disorders, inflammation, haemorrhoids, and burns as it has an anti-inflammatory and pain-relieving effect. The suppliers of each of these oils confirm that they are obtained by ecologically sound methods that do not harm the source and its environment.

Although oils from distant lands have romantic connotations, it is not necessary to travel the world to find cosmetically useful oils. Kings of Colchester (www.kings.co.uk) supply borage, black currant, evening primrose, *Camelia sativa* and hempseed oil plus *Echium plantagineum* oil that is rich in stearidonic acid with its anti-inflammatory and wrinkle reduction properties. Other oils are available and each may be traced back to crop from which it was extracted.

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Kings distributes its oils through Paroxite, which is also the distributor for *Limnanthes alba* (meadowfoam) oil and its many derivatives from the Fanning Corporation. Meadowfoam oil is a very light yellow coloured and essentially odourless triglyceride that is exceptionally rich in long chain fatty acids. Approximately 97% of the fatty acids are C₂₀ and C₂₂, which make it of particular interest for hair conditioning, and the high oxidative stability of *Limnanthes alba* oil provides an ingredient whose physical and chemical attributes remain relatively constant over long periods of time.

The author considers *Limnanthes alba* oil one of the truly useful new oil introductions of the last thirty years; a position shared, in his opinion, with *Simmondsia chinensis* (jojoba) seed oil, *Oenothera biennis* (evening primrose) oil and squalane. These oils provided properties that were not available from other oils popular at the time of their introduction.

Simmondsia chinensis (jojoba) seed oil remains one of the most interesting and useful cosmetic oils. It is not a true oil but a mixture of C₄₀ and C₄₄ polyunsaturated esters making it a unique liquid wax. It is resistant to oxidation and the formation of free radicals and is stable to 300°C. It is an excellent emollient and appears to have a water vapour porosity sufficient to permit the homeostatic mechanisms of the sweat glands to function optimally and is very effective in controlling skin flaking and dryness. Because of this it has proved useful in the treatment of eczema and psoriasis and is said to restore the normal function of the hair follicle, making it useful in hair conditioners to control excessive greasiness. A sure sign of an ingredient's usefulness is the number of derivatives that are produced from it. Like lanolin and *Limnanthes alba*, it has been hydrogenated, ethoxylated, isomerised, ozonised, transesterified, saponified and fractionated. The alcohols, esters and acids are available as separate fractions and each has been further treated by ethoxylation or reaction with polypropylene glycol to produce further derivatives.

Squalene is an unsaturated hydrocarbon oil previously obtained from shark livers but now obtainable from vegetable sources. It has six double bonds, making it very prone to oxidation and polymerisation. It is hydrogenated to produce pentahydrosqualane, commonly called squalane, a light emollient oil of excellent stability and with a nice skin feel. Today squalane is obtained from olive oil (*Olea europaea*). It has pigment-dispersing properties, it may be employed as a perfume fixative and it is particularly suitable for emulsions that are to be used in cold conditions. It increases skin respiration and prevents moisture loss; it is emollient and softens skin but does not leave an oily after-feel.

So, do we need more natural oils? The formulator may be satisfied with what is already available but the copywriter is always looking for the new and exotic. *Rubus idaeus* (raspberry) seed oil was prominent on several stands at In-Cosmetics 2003; A&E Connock is offering *Orbignya cohune* seed oil from a conservation project that uses natural sustainable resources to support the native population of the Maya Biosphere Reserve and *Artemisia* seed oil obtained from a plant growing wild in the Chinese desert.

1. Primary Ingredients, AJ O'Lenick, D.C. Steinberg. www.zenitech.com
2. Triglycerides - Important Cosmetic Raw Materials; Anthony J. O'Lenick, Jr., Siltech LLC, www.nyscc.org/news/archive/tech0802.htm