Organogels for cosmetic and dermo-cosmetic applications

Classification, preparation and characterization of organogel formulations - PART 2*

* Corresponding author

---

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULATION

ORGANOGEL FORMULA
technique might be of great advantages, especially in industrial scale when reduction in the preparation time and low energy consumption are always appreciated (38).

CHARACTERIZATION OF ORGANOGELS

Evaluation and physicochemical characterization are very important steps after organogel formation. Organogels show particular physico-chemical properties listed as follow and which permit their characterization (Table 1) (6-9, 30).

Various characterization parameters are used to confirm the purity and the stability of prepared organogels. In Table 2 are reported various characterization parameters and different techniques which are used for their evaluation (6, 20, 30, 36).

ORGANOGE Formulations used for cosmetic and dermo-cosmetic applications

Organogel nanoparticle dispersions as immobilization systems for a sunscreen agents are frequently used in cosmetology for their desirable physical organization properties within the oil phase and their capacity to jellify the organic solvents in small quantities. Novel particles obtained from a LMOG and an organic liquid present many advantages: they show a better encapsulation rate of lipophilic or amphiphilic molecules, with a homogeneous repartition into the particles (21, 22). The active ingredient, as a liquid, can be directly jellified and be the main constituent of the formulation; the consistency can easily be controlled depending on the organogelator wt%. The surface of nanoparticles can be functionalized by a stabilizing agent (polymer or surfactant) for a better vectorization (Figure 5).

Based on gelled nanoparticle concept, sunscreen semi-solid dispersions have been prepared and their physico-chemical properties studied. Gelled particle dispersions of sunscreen organic mixture – butyl-methoxydibenzoyl-methane (Avobenzone®, UVA solar filter, powder) dissolved in 2-ethylhexyl-2,3,3-diphenylacrylate (Octocrylene®, UVB solar filter, viscous liquid) and HSA were obtained by hot emulsification (T > Tgel), with a polymer (PVA 80) as a stabilizing agent, and cooling at room temperature (T < Tgel). The dispersion observation by TEM showed spherical particles with a mean diameter of 600 nm, a size in accordance with DLS measurements (Figure 6).

These results confirmed that the sunscreen particle size was in agreement with the necessity to keep the particles on the skin surface, avoiding their penetration through the epidermis.
The UV spectroscopy observations showed more important absorption of the gelled particles comparing to that of corresponding emulsion droplets. A rheological investigation allowed to determine the Tgel, thus confirming their gelled state. This last point was also proved by zeta potential measurements. A comparative aging study of the emulsion and corresponding dispersion showed greatly enhanced stability after gelation (36, 37).

The preparation and physico-chemical evaluation of a stable dispersion in water of organogel nanoparticles containing a sunscreen molecule (EHMAB) (39, 40) was also realized. Particles were obtained by hot emulsification in the presence of a stabilizing agent (PVA 80). HSA has been chosen as organogelator and almond oil as the oily phase. Nanoparticle diameter is found to be between 100 and 5000 nm (Figure 7). According to the HSA gelation test results, EHMAB was mixed with almond to favor the gelation phenomenon and thus lower the minimum gelation concentration (MGC) of HSA. The Tgel and Tmelt determination by rheology permeated to predict the gel phase transition according to the gelator concentration. Concerning the gelled particles, stable dispersions were obtained by ultrasound emulsification method. An investigation of the influence of different dispersion ingredients (oil, gelator and stabilizer) showed the importance of the HSA and the stabilizing agent(s) for the size, polydispersity index (PI) and zeta-potential values of nanoparticles and the stability of their dispersions. Thanks to the preliminary formulation tests, stable EHMAB

### Table 1. Physico-chemical properties and specific characteristics of organogels.

<table>
<thead>
<tr>
<th>Physicochemical properties</th>
<th>Specific characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscocelasticty</td>
<td>Organogels present both viscous and elastic properties and seem to follow Maxwell model of viscoelasticity. They behave solid-like formulations at lower shear rates and hence show an elastic property. At high shear stress, the physical interacting points between the fiber structures start getting weakened and when the shear stress is high enough to disrupt the interactions amongst the fiber structures, the organogels start to flow. This behavior may be best explained with the viscoelastic flow behavior.</td>
</tr>
<tr>
<td>Non-birefringence</td>
<td>When viewed under polarized light, organogels appear as a dark matrix. This property, of not allowing the polarized light to pass through its matrix, is regarded as non-birefringent.</td>
</tr>
<tr>
<td>Thermoreversibility</td>
<td>As the organogels are heated up above their characteristic Tgel, they lose their solid-like structure and start to flow. This has been attributed to the disruption in the physical interactions between the gelator molecules due to the increase in the thermal energy within the organogel. But as the heated organogels systems are subsequently cooled down, the physical interactions between organogelators prevail and organogels revert back to their initial solid-like consistency.</td>
</tr>
<tr>
<td>Thermostability</td>
<td>Organogels are inherently thermostable. As the gelators undergo self-assembly, the gelation occurs above a certain threshold temperature which is defined as the gel point (Tgel).</td>
</tr>
<tr>
<td>Optical clarity</td>
<td>Depending on their composition, organogels may be transparent or opaque. As examples, linseed organogels are transparent in nature while the sorbitan monostearate organogels are opaque. The optical clarity depends also on the organogelator concentration. Generally, ~ 5 wt % is a threshold organogelator concentration from which organogels present a more pronounced opacity.</td>
</tr>
<tr>
<td>Biocompatibility</td>
<td>Initially, organogels were developed using various non-biocompatible organogelators which rendered them unsuitable for therapeutic applications. Researches using various biocompatible organogelators has opened up new dimensions for their use in various biomedical applications.</td>
</tr>
<tr>
<td>Chirality effect</td>
<td>The presence of chiral centers within the organogelators plays an important role in the formation of a compact molecular packing, which provides a thermodynamic and kinetic stability to the organogel system. However, its effect in fluid network is rare.</td>
</tr>
</tbody>
</table>

### Table 2. Characterization parameters and evaluation techniques of organogels.

<table>
<thead>
<tr>
<th>Characterization parameters</th>
<th>Evaluation techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicochemical properties</td>
<td>- Spectroscopy techniques: nuclear magnetic resonance (NMR) and Fourier transform infrared (FTIR) spectroscopy; - OSM and TEOS; - Dynamic and static light-scattering (DLS, SLS); - Small angle neutron-scattering (SANS).</td>
</tr>
<tr>
<td>Rheological behavior</td>
<td>- Viscosity; - Rheology; - FTIR spectroscopy</td>
</tr>
<tr>
<td>Phase transition temperature</td>
<td>- Hot stage microscopy; - High sensitivity differential scanning calorimetry (DSC)</td>
</tr>
<tr>
<td>Gelation kinetics</td>
<td>- Rheology; - DSC; - Inverse method (IM); - Turbidity method (TM)</td>
</tr>
<tr>
<td>In vivo drug release</td>
<td>- Franz diffusion cell</td>
</tr>
<tr>
<td>Safety and skin compatibility studies</td>
<td>- Human skin irritation study; - Histopathological studies</td>
</tr>
<tr>
<td>Structural features</td>
<td>- Spectroscopy techniques: NMR and FTIR spectroscopy; - Determination emission type - oil-in-water or water-in-oil (o/w or w/o)</td>
</tr>
<tr>
<td>Final product</td>
<td>- High-performance liquid chromatography (HPLC); - Ultraviolet (UV) spectrophotometry; - Homogeneity; - Optimization with ternary phase diagram (TPD); - Stability studies</td>
</tr>
</tbody>
</table>

| Table 1. Physico-chemical properties and specific characteristics of organogels. |

| Table 2. Characterization parameters and evaluation techniques of organogels. |
formulations with HSA, cosmetic oil, antiperspirant actives, and sometimes a copolymer (42). Even when used at relatively low concentration, HSA tends to give rise to rigid gels that have limited capacity to retain fluids. It has been found that HSA organogels modified by incorporating selected copolymers produce a more stable crystalline structure, which improves the oil retention, and thus a better fracture resistance. Better rheological properties also assess a facilitated spreadability over the skin (28, 29, 39). Moreover, modified HSA organogels allow to overcome the use of higher hydrophilic lipophilic balance [HLB] surfactants, in particular anionic, many of which are potentially harsher on skin than the more lipophilic lower HLB surfactants.

Organogels in make-up products
In care and make up products, it is common to find a structured, namely gelled or rigidified, liquid fatty phase. This is particularly the case in solid compositions such as balms and lipsticks, eye shadows, concealers and foundation. This structuring is generally obtained with the aid of waxes or fillers. Unfortunately, these adjuvants tend to mattify the composition which is not always wanted for some products. It is necessary to structure the fatty phase, meaning the oil phase, to limit its exudation from solid compositions and its migration after application. It has been found that the use of organogelators combined with particular polymers, allowed to structure oil-based phases (41, 43). Gels obtained are more or less solid, and have a good mechanical strength, an acceptable rheology and an enhanced heat stability (44).

Perez et al. presented a fluid cosmetic composition for care or make-up of the lips associate a polyester, a non-volatile silicone oil, and an organogelator (45). It is shown that the use of a polyester with a silicone oil, associated with an organogelator leads to a creamy texture, with a long-lasting brilliance and pleasant (not sticky) when applied on skin or lips. The organogelator was chosen among dialkyl-N-acylglycerolamide, polyamides and their mixtures. The optimum concentration of organogelator in this composition is between 0.1 and 5 wt%. The final composition is anhydrous.

Propolis organogel for treating wounds
Propolis is a hard resinous material derived by bees from plant juices. It contains pollen, waxes, resins and a large amount of flavonoids (46). It exhibits significant antibacterial, antifungal and sometimes antiviral properties, depending on the chemical composition and the geographic location. It has been widely use in traditional medicine for treatment of wounds and burns. Pluronic lecithin organogels (PLO) containing 4 wt% of propolis extract were developed, evaluated and designed for treating wounds (47). Various formulations have been realized, depending on the concentration of lecithin and pluronic; the

nanoparticles, with mean size of 450 nm and zeta-potential value above - 30 mV, were obtained. A comparative aging study of the nanoparticle dispersion showed a greatly enhanced stability after gelation. Finally, the gelation process is thus a functional technique to improve both the photoprotective ability and photostability of UVB filter and to reduce the particle release upon immersion (39, 40).

All these results demonstrate the interest of gelled nanoparticles and their aqueous dispersion for the preparation of new formulations for cosmetic applications and dermo-cosmetic applications.

PLO organogels as vehicles for anti-cellulite ingredients
Cellulite leads to vascular, structural and hypertrophic alterations in adipose tissue. This is due to changes in the conjunctive dermic and subcutaneous tissue. Studies have been conducted to evaluate the properties of a delivery system made from a pluronic lecithin organogel formulation and two physiotherapeutic ingredients, Aloe Vera and Hydrocotyle asiatica [41]. PLO have been the interest of many studies, and proved to be effective as a dermic, and transdermal vehicle of medication. PLO were formed with Pluronic F127™ (Poloxamer 407), isopropyl palmitate, soy lecithin and water.

The advantage of the organogel over hydrogels with the same ingredients is that it facilitates the transdermal penetration to a greater degree. It is important in the treatment of cellulite as the ingredients must be able to reach the deepest layer of the skin to act upon the cells where fat is accumulated in the adipose tissue (41).

Organogels in antiperspirant gel formulation
A gelator of particular interest for many applications is HSA. Many patents have been filed describing formulations with HSA, cosmetic oil, antiperspirant actives, and sometimes a copolymer (42). Even when used at relatively low concentration, HSA tends to give rise to rigid gels that have limited capacity to retain fluids. It has been found that HSA organogels modified by incorporating selected copolymers produce a more stable crystalline structure, which improves the oil retention, and thus a better fracture resistance. Better rheological properties also assess a facilitated spreadability over the skin (28, 29, 39). Moreover, modified HSA organogels allow to overcome the use of higher hydrophilic lipophilic balance [HLB] surfactants, in particular anionic, many of which are potentially harsher on skin than the more lipophilic lower HLB surfactants.

Organogels in make-up products
In care and make up products, it is common to find a structured, namely gelled or rigidified, liquid fatty phase. This is particularly the case in solid compositions such as balms and lipsticks, eye shadows, concealers and foundation. This structuring is generally obtained with the aid of waxes or fillers. Unfortunately, these adjuvants tend to mattify the composition which is not always wanted for some products. It is necessary to structure the fatty phase, meaning the oil phase, to limit its exudation from solid compositions and its migration after application. It has been found that the use of organogelators combined with particular polymers, allowed to structure oil-based phases (41, 43). Gels obtained are more or less solid, and have a good mechanical strength, an acceptable rheology and an enhanced heat stability (44).

Perez et al. presented a fluid cosmetic composition for care or make-up of the lips associate a polyester, a non-volatile silicone oil, and an organogelator (45). It is shown that the use of a polyester with a silicone oil, associated with an organogelator leads to a creamy texture, with a long-lasting brilliance and pleasant (not sticky) when applied on skin or lips. The organogelator was chosen among dialkyl-N-acylglycerolamide, polyamides and their mixtures. The optimum concentration of organogelator in this composition is between 0.1 and 5 wt%. The final composition is anhydrous.

Propolis organogel for treating wounds
Propolis is a hard resinous material derived by bees from plant juices. It contains pollen, waxes, resins and a large amount of flavonoids (46). It exhibits significant antibacterial, antifungal and sometimes antiviral properties, depending on the chemical composition and the geographic location. It has been widely use in traditional medicine for treatment of wounds and burns. Pluronic lecithin organogels (PLO) containing 4 wt% of propolis extract were developed, evaluated and designed for treating wounds (47). Various formulations have been realized, depending on the concentration of lecithin and pluronic; the

PLO organogels as vehicles for anti-cellulite ingredients
Cellulite leads to vascular, structural and hypertrophic alterations in adipose tissue. This is due to changes in the conjunctive dermic and subcutaneous tissue. Studies have been conducted to evaluate the properties of a delivery system made from a pluronic lecithin organogel formulation and two physiotherapeutic ingredients, Aloe Vera and Hydrocotyle asiatica [41]. PLO have been the interest of many studies, and proved to be effective as a dermic, and transdermal vehicle of medication. PLO were formed with Pluronic F127™ (Poloxamer 407), isopropyl palmitate, soy lecithin and water.

The advantage of the organogel over hydrogels with the same ingredients is that it facilitates the transdermal penetration to a greater degree. It is important in the treatment of cellulite as the ingredients must be able to reach the deepest layer of the skin to act upon the cells where fat is accumulated in the adipose tissue (41).

Organogels in antiperspirant gel formulation
A gelator of particular interest for many applications is HSA. Many patents have been filed describing formulations with HSA, cosmetic oil, antiperspirant actives, and sometimes a copolymer (42). Even when used at relatively low concentration, HSA tends to give rise to rigid gels that have limited capacity to retain fluids. It has been found that HSA organogels modified by incorporating selected copolymers produce a more stable crystalline structure, which improves the oil retention, and thus a better fracture resistance. Better rheological properties also assess a facilitated spreadability over the skin (28, 29, 39). Moreover, modified HSA organogels allow to overcome the use of higher hydrophilic lipophilic balance [HLB] surfactants, in particular anionic, many of which are potentially harsher on skin than the more lipophilic lower HLB surfactants.

Organogels in make-up products
In care and make up products, it is common to find a structured, namely gelled or rigidified, liquid fatty phase. This is particularly the case in solid compositions such as balms and lipsticks, eye shadows, concealers and foundation. This structuring is generally obtained with the aid of waxes or fillers. Unfortunately, these adjuvants tend to mattify the composition which is not always wanted for some products. It is necessary to structure the fatty phase, meaning the oil phase, to limit its exudation from solid compositions and its migration after application. It has been found that the use of organogelators combined with particular polymers, allowed to structure oil-based phases (41, 43). Gels obtained are more or less solid, and have a good mechanical strength, an acceptable rheology and an enhanced heat stability (44).

Perez et al. presented a fluid cosmetic composition for care or make-up of the lips associate a polyester, a non-volatile silicone oil, and an organogelator (45). It is shown that the use of a polyester with a silicone oil, associated with an organogelator leads to a creamy texture, with a long-lasting brilliance and pleasant (not sticky) when applied on skin or lips. The organogelator was chosen among dialkyl-N-acylglycerolamide, polyamides and their mixtures. The optimum concentration of organogelator in this composition is between 0.1 and 5 wt%. The final composition is anhydrous.

Propolis organogel for treating wounds
Propolis is a hard resinous material derived by bees from plant juices. It contains pollen, waxes, resins and a large amount of flavonoids (46). It exhibits significant antibacterial, antifungal and sometimes antiviral properties, depending on the chemical composition and the geographic location. It has been widely use in traditional medicine for treatment of wounds and burns. Pluronic lecithin organogels (PLO) containing 4 wt% of propolis extract were developed, evaluated and designed for treating wounds (47). Various formulations have been realized, depending on the concentration of lecithin and pluronic; the
Organogel-based cosmetic tablets and capsules

There is a need in the field of cosmetics to have alternative types of containers, for example regarding travel situation, where there are more and more restrictions concerning liquids containing in carry-on baggage and bag weight. Tablets and capsules of cosmetic products as shower gel, soap, perfumes or creams, seems to be a good alternative to classical containers. Hurwitz et al. presented the development of cosmetic tablets or capsules soluble in water and able to deliver the active ingredient, which is in an inner cavity protected by an outer shell. The outer shell can be an effervescent ingredient (mixture of citric acid and sodium bicarbonate), a gelatin composition to encapsulate the ingredients, a coating agent or an organogel (50). It is described as noncrystalline non glossy thermoreversible solid materials composed of an organic liquid such as an organic solvent, a mineral or a vegetable oil.

CONCLUSION

In this paper, we have reviewed (i) different categories of organogels based on the nature of: organic solvent, organogelator and its intermolecular interactions in the medium, (ii) conventional and novel methods of preparation, (iii) essential parameters for characterization of organogels and (iv) recent applications in the cosmetic and dermo-cosmetic field.

Organogels present interesting advantages to transdermal delivery systems, especially for cosmetic agents, thanks to their inherent stability, non-irritation, excellent skin moisturization, spreadability and ease of preparation and administration. Over the last decade, the interest has been increased in development of organogels for various cosmetic applications including make-up, care of skin, nails, hair, lips, antiperspirant, anti-cellulite, etc. Novel systems such as organogel nanospheres, orgalogelator fusiform particles and organogel-based tablet and capsule have been designed for delivering cosmetic agents and the results obtained are very impressive. Important progress is also observed in the field of organogelators with the arrivals of new generation of LMOGs like pseudopeptidic LMOGs or supramolecular self-assembling POGs, which are potential ingredients for cosmetic and dermo-cosmetic applications.

REFERENCES AND NOTES


45. Perez Nowak, V., “Fluid Cosmetic Composition, Useful for Making Up and/or Caring the Skin and/or Lips, Comprises Polyester, Non-Volatile Silicone Oil, Organogelling Agent Comprising N-acylglutamides e.g. N-lauroylglutamic Acid Dibutylamide, and Wax”, Fr. Patent, FR2975296A1, 2012.

---

Personal Care

What you see is what you get 100% clarity!

Lipex SheaClear™

- 100% clear liquid shea
- high unsaponifiable content
- softens and moisturises the skin
- improves shine and softness in hair

Lipex SheaClear™ is a unique clear liquid shea oil that enables you to create not only translucent, but also fully transparent body hair, face and baby oils.

Find out more at aakpersonarcare.com
AarhusKarshamn Sweden
lipid@aak.com

enhancing the power of nature
## Colorant - Naturel

### Functional Cosmetics Ingredients from Indian Medicinal Herbs

<table>
<thead>
<tr>
<th>Water-Soluble Liquids</th>
<th>Lipo &amp; Oil Soluble Liquids</th>
<th>Oil Soluble Powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Red</td>
<td>Brown</td>
<td>Brown</td>
</tr>
<tr>
<td>Brown</td>
<td>Red</td>
<td>Yellow</td>
</tr>
<tr>
<td>Violet (Blue-reddish)</td>
<td>Natural Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Red Deep</td>
<td>Red Light</td>
<td>Green</td>
</tr>
<tr>
<td>Ultra Sky Blue</td>
<td>Red Light / Scarlet Red</td>
<td>Red Light / Scarlet Red</td>
</tr>
<tr>
<td>White Pearlescent</td>
<td>Ultra Sky Blue</td>
<td>Dark Black</td>
</tr>
<tr>
<td>Red Light</td>
<td>Dark Ultra Brilliant Yellow</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>Yellow Light</td>
<td></td>
</tr>
<tr>
<td>Yellow Light</td>
<td>Yellow Light</td>
<td></td>
</tr>
<tr>
<td>Dark Black</td>
<td>Dark Black</td>
<td></td>
</tr>
<tr>
<td>Dark Black</td>
<td>Dark Black</td>
<td></td>
</tr>
<tr>
<td>Dark Black</td>
<td>Dark Black</td>
<td></td>
</tr>
</tbody>
</table>

 CAMPO RESEARCH USA INC, 5 Pine Plaza, 19th Floor, New York, NY 10001, Tel: 1-877-329-8449, Fax: 1-877-343-4845  
 International Marketing & Sales HQ: CAMPO RESEARCH PTE LTD, Level 30, Sixth Battery Road, Singapore 049909, Tel: +65 63833203 Fax: +65 63834034 | CAMPO CHINA | Toll Free Tel: 1-800-450-0270 Toll Free Fax: 1-800-450-0271  
 Website: www.campo-research.com Email: sales@campo-research.com  
 Distributor in USA (East & West): BIC-ORGANIC CONCEPTS, Tel: +1 562 2385730 Fax: +1 562 2385736 Email: info@bioorp.com | Distributor in South America: SARFAN COMERCIAL IMPORTADORA LTDA, Tel: +55 11 21140400 Fax: +55 11 21140400 Email: sarfan@sarfani.com.br | Distributor in Europe: BREGAGLI O srl, Italy | Tel: +39 039 4530596 Fax: +39 039 2497377 Email: claudio.pomin@bregagli.eu | website: www.bregagli.eu