OLIVEM®900

INCI:SORBITAN OLIVATE

OLIVEM 900 is a total natural emulsifying system for W/O cosmetic formulations, very well compatible with O/W as well as multiple emulsion systems (W/O/W). Due to its very particular molecular structure, this new compound can also be very successfully used as functional lipidic system for lipsticks, make up applications and siliconic systems.

Chemically OLIVEM 900 belongs to the category of non ionic lipophilic emulsifiers, and particularly it is a sorbitan ester of fatty acid groups contained in olive oil. It is interesting to remark its complete natural origin (lipidic part from olive, and hydrophilic part from sugar), according to the continuous requests of today's cosmetic market. In fact it does not contain any PEG, and the hydrophilic part derives from sorbitan. By the way, many properties of the product derive from its starting raw material: olive oil.

OLIVE OIL, among all natural lipids, is the one showing the highest compatibility with our skin, and the most similar distribution of fatty acids to the skin lipids system. From this evidence (olive oil was the first cosmetic employed by mankind), B&T has had the idea of employing this extraordinary characteristics to build up cosmetic functionalities.

Besides being an effective rheological modifier of emulsions, OLIVEM 900 gives the cream some peculiar properties, such as a very light and silky touch, even if the amount of oil and fatty substances in general is very high. Products formulated with OLIVEM 900 are easily absorbed, and although they are rich in oily natural substances they do not appear greasy, sticky or heavy. OLIVEM 900 is also able to stabilise high polar lipids incorporated in the emulsion for the reticular structure formed in the emulsion, lowering the product oxidability also.

EMULSIFYING PROCEDURE

W/O emulsions generally require a higher mechanical stirring, compared to the one needed by O/W emulsions, and the homogenisation is important in order to obtain an appreciable final result. The consistency and the homogeneity of the lipidic phase, such as the dispersion of the aqueous phase, depend on homogenisation.

The correct procedure in order to obtain stable emulsion follows:

- **melt lipidic phase to 70°C (or higher if it contains high melting waxes)**
- **mix watery phase and heat it up to 70°C**
- **under homogeneization, slowly add the watery phase to the lipidic one portion by portion, and after every small addition of water homogeneization should go on until all the water is completely included into the emulsion.**
- **when all the water has been added, homogenize for one or two minutes.**
- **cool down the emulsion under stirring.**

In our internal laboratory of application, using a Silverson SL2 as homomixer, a volume of 300 grams of emulsion needs a total homogeneization of 10 minutes at 7-8 speed.

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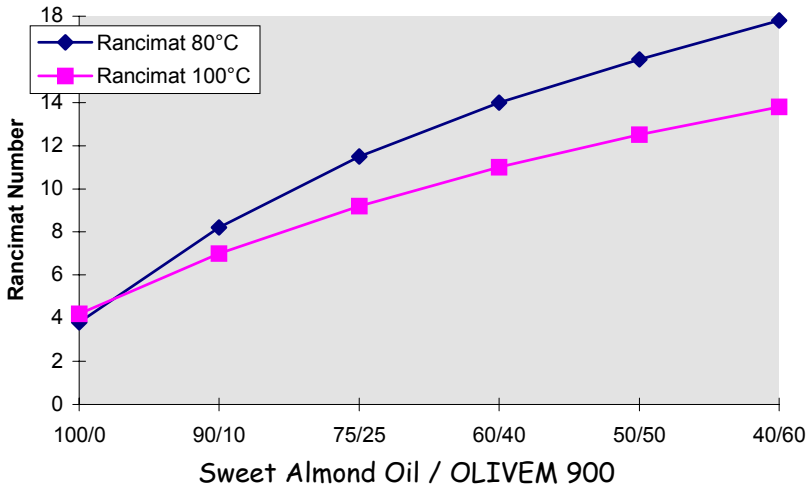
PROTECTION TO OXIDATION

OLIVEM 900 reveals the capacity of protecting lipids from undergoing oxidation accelerated by heat. In order to prove this characteristic, the Rancimat time has been measured on different blends of Sweet Almond Oil with OLIVEM 900. As remarked, the Rancimat time increases over four times compared to initial value of Sweet Almond Oil, in a blend 1:1 with OLIVEM 900.



OLIVEM 900 is therefore able to assure both a physical and biological stability to natural oils. This characteristic is due to the particular reticular structure coming from this olive oil wax derivatives.

W/O FORMULATION

In cosmetic emulsion, the lipidic phase is often composed by many substances which are very different from each other both in their chemical properties and polarity. Oils with high polarity values reveal great solubilizing capacity, they are much more similar to the skin lipids than paraffin derivatives, and they reveal great functional capacities. But since they do not behave in a completely lipophilic way, they are difficult to enclose in a stable emulsion. In fact, emulsions whose lipidic phase is only composed by polar oils are very difficult to obtain.

It is easy to formulate W/O emulsions containing lipids with medium or low polarity, such as hydrocarbons, esters or ethers, and to obtain stable emulsions. But if the lipidic phase is completely composed by lipids with low polarity, the after use feeling of the emulsions are often not so nice and light.

OLIVEM 900 is able to solve this problem making it possible to the formulator also to incorporate high polar oils in W/O emulsions. Final result are stable systems with oil in the external phase absolutely not greasy nor tacky.

In order to understand how the polarity of the lipids involved might affect the stability of emulsions, we have investigated different possibilities.

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First of all, we have tried to enclose a small amount of lipids of natural origin such as esters or triglycerides, while keeping in the lipidic phase the largest amount of a non polar lipid, such as phitosqualane. The following chances have given good results: the emulsions are homogeneous, shiny and can be easily smeared .

		Lipidic phase 40%		Lipidicphas 35%
OLIVEM 900		5	7.5	7.5
Hydrocarbon (Phitosqualane)	low polarity lipid	27.5	25	20
Natural lipid (ester or triglycerides)		7.5	7.5	7.5

We have also tried to increase the percentage of natural lipids by replacing 10% of low polar lipid (Hydrocarbon) with 10% of high polar oils (Unsaponifiables). Results are still good and the emulsions pass the stability test. The previous formulas therefore become:

		Lipidic phase 40%		Lipidic phase35%
OLIVEM 900		5	7.5	7.5
Hydrocarbon (Phitosqualane)	low polarity lipid	17.5	15	10
Unsaponifiable	high polarity lipid	10	10	10
Natural lipid (ester or triglycerides)		7.5	7.5	7.5

It is generally suggested to enclose one lipid with medium polarity also: in fact medium polarity oils in the final lipidic phase are always well recommended. It is also suggested, in order to increase the viscosity and stability of W/O emulsions, **to add a mixture (1:1) composed by magnesium and aluminium stearate, or to add magnesium sulphate eptahydrate.** In the above formulations we have added 0.7% of magnesium sulphate eptahydrate.

Starting from such general formulas, many different creams can be formulated with OLIVEM 900, used at a level between 5 - 7.5% as the only emulsifer present in the system. High dosage of OLIVEM 900 are recommended if the percentage of polar lipid in the system are high.

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All these creams reveal a light touch, although they contain a high amount of lipids, and appear shiny, agreeable and with a pleasant, silky touch, and these characteristics do not depend on the kind of the lipids involved, for they are incapsulated in the liquid crystal network. It is also remarkable that the total lipidic phase can be also very limited, with general cost benefit.
In order to obtain a stable emulsion, it is very important to consider the balance between the hydrophilic and lipophilic part of the emulsifier . In fact it is the liquid crystal phase which is formed at the interfacies and around the drop that makes the emulsion stable.
The formation of stratified lamellar structures has the peculiarity to keep the aqueous phase of the emulsion inside the layers, and this gives to the emulsion a very high hydrating power.

The lamellar phases swell with the water that is present at the interfacies and form therefore a layer which places itself between the two lipidic layers; this represent some kind of barrier that significantly reduces the water loss through the skin. That is why emulsions with OLIVEM 900 appear very shiny and light even if they contain high percentages of lipids, and they have a fresh, original and silky touch.

OLIVEM 900 AS A SENSORIAL MODIFIER
Besides the emulsifying properties of OLIVEM 900, due to its double chemical nature, it may also be employed successfully as a functional lipid. In fact its extremely high skin compliance coming from olive is very interesting in O/W emulsions also. An amount of 1-3% OLIVEM 900, in a O/W emulsion, will make the emulsion more pleasant and easily absorbed, without affecting the behaviour of the emulsifying system.
OLIVEM 900, in fact, contains fatty acids from olive, which are reported to be the most similar natural lipid to our skin, from a chemical point of view. Obviously this will give the emulsion a very special touch due to the chemical similarity of olive with our skin. This is a very interesting peculiarity allowing OLIVEM 900 to be employed in O/W emulsions as a functional lipid, able to improve the skin compatibility of traditional O/W emulsions despite of the emulsifying system contained.
Also the claim of the product is very important, for it does not contain any PEG, and is completely of natural origin.

MULTIPLE EMULSIONS W/O/W
What is the advantage of a multiple emulsion W/O/W? Mainly, the appearance of this kind of structure is very soft and smooth, it has very strong relipidification capacity, for it contains quite a high amount of fats, and it also may contain incompatible active principles that are placed in the two different watery phases.

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OLIVEM 900 has shown the property to be able to form multiple emulsion if coupled with a hydrophilic emulsifiers, always building up a liquid crystal structure. Testing trials are still going on, but we have the evidence that 5% of OLIVEM 900+5% of hydrophilic liquid crystal emulsifier are able to set up a multiple emulsion structure W/O/W. The structure has been verified by optical microscope. (See the final session on formulations for details).

SILICONIC APPLICATIONS*

The modern trend of cosmetic is also following a lot of siliconic formulations. These kind of formulations, in fact, present several advantages for the final user: they are very shiny, not sticky, have a nice spreadability, a silky touch. The problem of these kind of products is that they are absolutely not natural, while today's request from the market is also requiring natural origin. **The complete compatibility of OLIVEM 900** with silicons in general, and with siliconic emulsifiers, **allows to formulate siliconic systems containing all the natural virtues of olive oil fatty compounds**. The inclusion of a substance of natural origin in siliconic applications, in fact, might be on one side a strong marketing trend and on the other side it may match the properties of silicons with the unique properties of olive oil.

MAKE UP APPLICATIONS*

In make up applications, OLIVEM 900 has shown a complete and very interesting multifunctionality. In fact it may be included in several color cosmetics improving the performances of the final product. It acts effectively as a powder dispersant towards any kind of
powder, from fillers like talc and kaolin to colored powders like pearls or iron oxides. Furthermore,
it improves the color brilliance of iron oxides, and improves the mechanical resistance of lipsticks

* further details of this applications may be found in the specific brochure available on request
if it replaced part of the waxes in the formulation, without affecting the pay off capacity of the stick itself.

SAFETY AND NO TOXICITY

OLIVEM 900, such as all B&T products, has not been tested on animals. It has been tested on human skin (for primary potential irritation: PATCH TEST) and in vitro (Red Blood Cell test). Considering the chemical similarity of OLIVEM 900 with some compounds that have been largely tested in the past, the existing data for chemical analogues allow to define **OLIVEM 900 as NOT IRRITANT and NOT TOXIC.**

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- **PATCH TEST: OLIVEM 900**

The primary irritation test has been made using OLIVEM 900 as it is, pure product. The test requires the application of an occlusive patch on the skin of back 20 adult healthy volunteers, and it is left there 48 hours.
At the end of this period, the patch is removed and the conditions of the skin are evaluated after 15 minutes and after 24 hours from removing.
Irritation Index was 0.2 after 15 minutes, and 0.05 after 24 hours.
OLIVEM 900 can be considered NOT IRRITANT if used at the usual percentages.

- **RED BLOOD CELL TEST**

The Red Blood Cell Test can quantify the effects of cosmetic products on the cytoplasmic membranes (hemolysis) in combination with the damage of liberated cellular protein (denaturation). Various concentrations of the test sample are incubated with a defined quantity of RBC suspension for 10 minutes. At the end of the incubation period, the resulting supernatant is monitored to evaluate the ability of test sample to induce hemolysis or denaturation. The relation between hemolysis and denaturation, known as Lysis/Denaturation ratio, is then calculated and may be compared with acute eye irritancy data.
LEGENDA

In Vivo eye irritation	in vitro L/D	In Vivo eye irritation	in vitro L/D
Not irritant Slightly irritant Moderately irritant	>100 >10 >1	Irritant Very irritant	> 0.1 < 0.1

Comparison of test parameters from RBC assay with eye irritancy of tensides.

TENSIDES	L/D	IN VIVO IRRITATION
OLIVEM 900	∞	NOT IRRITANT
Laureth Solfosuccinate	3.73	moderately irritant
Na-Soap	3.70	moderately irritant
TEA Lauryl Sulfate	0.38	irritant
MEA Lauryl Sulfate	0.33	irritant
NH4 Lauryl Sulfate	0.31	irritant
Cetyltrimethylammonia - Cl	0.10	very irritant

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CONCLUSIONS

Emulsions formulated with OLIVEM 900 appear creamy and shiny, they are easily absorbed and have a light, agreeable and original touch, even if they contain a high amount of lipids.

The suggested percentages of OLIVEM 900 are between 5 and 8%, and the viscosity of the final emulsions does not significantly change, using 5% or 8% of OLIVEM 900. The very best results have been obtained using lipids with medium polarity: the emulsions are stable and appreciable, and although they have lipids in the external phase, they are much lighter and softer compared to standard W/O emulsions.

OLIVEM 900 shows the valid chance to formulate W/O emulsions that appear shiny, agreeable, light and smooth, easy to make and with interesting functional characteristics. The formulator has therefore at his disposal an original emulsifying system that derives from olive oil and allows to produce safe cosmetics with a natural image.

New applications of OLIVEM 900 have been tested in long-lasting lipsticks at a percentage of 5%: the dryness caused by silicon oils is greatly decreased by the emolliency quality of OLIVEM 900.

Apart from the standard applications of OLIVEM 900 as W/O emulsifiers, different applications are turning out in our cosmetic sistematic studies.

OLIVEM 900 may be employed as a functional lipid also in make up, where powders and colors take advantage from an improved powder dispersion. Also the spreadability of the product is improved by the presence of OLIVEM 900 in make up products. Studies have been leaded on different structures. In a lipstick, OLIVEM 900 acts as a brilliance enhancer of the colors, and also improves the mechanical resistance of the stick to breaking. This might also be obtained with other waxes, but with their high melting point this would affect the pay off capacity of releasing color, while in the presence of OLIVEM 900 the pay off capacity is not affected.

OLIVEM 900 has also remarkable filming properties that have been observed in a waterproof mascara formulation. (See specific brochure for details on make up applications).

Since the world of make up is also turning to siliconic products, we also checked the compatibility of OLIVEM 900 in siliconic emulsions in order to include a natural structure in emulsions based on silicons. Several comparisons have also shown how a small amount of OLIVEM 900 in a siliconic emulsion may improve the skin feel of the whole product. (See specific brochures for details on siliconic applications).

Finally, an interesting performance of OLIVEM 900 is also to be able to create multiple emulsions (W/O/W), if coupled with an hydrophilic emulsifier. The great advantage of these kind of product, besides the appreciable light touch, is also that is does not need to be manufactured in two steps, but the one step process gives a multiple emulsion as well.

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BIODEGRADABILITY

The determination of biodegradability has been made according to the CEE regulation N. 82/242. OLIVEM 900 is biodegradable over 90 % (OECD method).

FORMULATIONS

The following formulations are here indicated in order to give general directions for the employment of OLIVEM 900. Although they have been realised according to the best information we owe, this does not exonerate the user from verifying their validity. B&T Technical Assistance is at the user's disposal in order to contribute to the development of new formulations, and to give the needful information for a correct use of our products.

	Night Cream	
A.1	**OLIVEM 900**	7.5%
2	Phytosqualane	12.5%
3	Unsaponifiables	10.0%
B.1	Demineralized Water	up to 100
2	$MgSO_4$	0.5%
3	Glycerin	4.0%
4	Preservatives	as needed
C.1	Perfume	as needed

	Baby Paste	
A.1	**OLIVEM 900**	7.5%
2	Phytosqualane	15.0%
3	Refined jojoba Oil	7.5%
4	Zinc Oxide	12%
B.1	Demineralized Water	up to 100
2	$MgSO_4$	0.5%
3	Glycerin	4.0%
4	Preservatives	as needed
C.1	Perfume	as needed

	W/O/W Mature Skin	
A.1	**OLIVEM 900**	5.0%
2	Ceteraryl Glucoside and Cethearyl alcohol	5.0%
3	Isodecyl Neopentanoate	3.0%
4	Jojoba Oil	2.5%
5	Wheat Germ Oil	2.5%
6	Unsaponifiables form Olive Oil	2.0%
7	Dimethicone	1.3%
B.1	Glycerin	3.0%
2	Demineralized Water	up to 100
C.1	Hyaluronic Acid	0.1%
2	Demineralized Water	10.0%
3	EUROL BT	0.5%
4	Cyclomethicone	4%
5	Tocopherol Acetate	0.5%
6	Perfume and preservatives	as needed
7	Color 040-150	as needed

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	W/S Foundation Sunscreen Base	
A.1	Demineralized water	up to 100
2	Sodium Chloride	1.0%
B.1	**OLIVEM 900**	2.0%
2	Cyclomethicone and Dimethiconol	5.0%
3	Cyclopentasiloxane ar Dimethicone Copolyol	10.0%
4	Cyclomethicone	8.0%
3	TiO_2	10.0%
5	Octyl Metoxicinnamate	as required
7	Perfume	as needed

	Protective Cream with Zinc Oxide	
A.1	Demineralized water	up to 100
2	Sodium Chloride	1.0%
3	Glycerin	10.0%
B.1	**OLIVEM 900**	5.0%
2	Cyclopentasiloxane ar Dimethicone Copolyol	10.0%
3	Cyclomethicone	6.0%
4	ZnO	4.0%
3	TiO_2	10.0%
5	Dimethicone	2.0%
7	Perfume	as needed

	Tapioca Hydrating Lotion	
A.1	Cyclopentasiloxane ar Dimethicone Copolyol	12.0%
2	Cyclopentasiloxane ar Dimethiconol	10.0%
3	**OLIVEM 900**	2.0%
4	Tapioca	2.0%
5	Cyclomethicone	10.0%
B.1	Glycerin	20.0%
2	Lactic Acid	1.0%
3	Preserved Water	40.0%
C.1	Perfume	as needed
2	Color	as needed

	Barrier Cream	
A.1	Demineralized water	up to 100
2	Sodium Chloride	1.0%
B.1	**OLIVEM 900**	2.0%
2	Laurylmethicone Copo	2.0%
3	Cyclomethicone	10.0%
4	Paraffinum Liquidum	7.0%
5	Dimethicone	0.5%
6	Perfume	as needed

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TECHNICAL DATA SHEET

01. PRODUCT AND COMPANY IDENTIFICATION

Trade Name.....	:	**OLIVEM 900**
Applications.....	:	non ionic, not ethoxylated emulsifying system derived from olive oil for W/O creams and lotions
INCI Name.....	:	SORBITAN OLIVATE
CAS Number.....	:	92202-01-2
EINECS Number.....	:	2960335
Legislative Approval.....	:	world-wide
Company.....	:	B & T Srl - Via O. da Tresseno, 9 - 20127 MILAN - Italy Tel. 0039.02 26142044 - Fax 0039.02.26142060

02. SPECIFICATIONS

Form @ 20°C.....	:	flakes, waxy solid
Color.	:	ivory
Odor.....	:	slight, characteristic
Active Substance%.....	:	99.0 min
Water Content %	:	< 1.0
Acid Value.....	:	10 - 30

03. SOLUBILITY

Soluble.....	:	in ethanol and xilol.
Dispersible.....	:	in warm water

04. TYPICAL VALUES

HLB.....	:	4.7
Saponification Value.....	:	160 - 190
Melting Point.....	:	65 - 75
Additives and preservatives	:	none

05. SHELF-LIFE

5 years stored unopened into original containers at a temperature between 5 and 35° following GMP guidelines

Revision : 1.07.2002