



***Enhanced delivery of  
active ingredients  
Arlasolve™ DMI***

## A unique solvent for cosmetic applications

Active ingredients are being used more and more in skin care formulations to give efficacious products for personal care applications. The more efficient the delivery system used, the more likely it will be that the active ingredient will perform as required. Arlasolve DMI (INCI: Dimethyl Isosorbide) is a delivery enhancer which can place active ingredients where they are needed most on the skin. It is a water white liquid with excellent solvent properties. Arlasolve DMI offers formulators the option to boost the penetration of actives into the upper layers of the epidermis, enabling targeted delivery for products such as self-tanners, anti-acne actives and more.

Arlasolve DMI has undergone extensive toxicological studies for both topical and oral drug delivery and has been shown to be virtually free of irritation and is completely safe for use.

Arlasolve DMI is soluble in all proportions in water and is also soluble in a variety of other commonly used cosmetic ingredients, e.g. cosmetic esters, alcohol or polyols. It can therefore be easily formulated into a wide range of cosmetic delivery systems.

### Applications:

- Topical delivery of actives
- Self-tanning products
- AHA products
- Sunscreens based on organic actives
- Skin lightening products
- Anti-acne products
- Vitamin skin care products
- Elegant skin care for moisturization and anti-ageing

## **New ideas that stimulate the senses**

Uniqema is a global leader in the creation of ingredient technologies that deliver sensory and functional effects in personal care products. We continuously develop our expertise in the application of these ingredients.

At Uniqema, we're known for innovation and the new ideas we bring to our customers. You can call on us to stimulate your progress with ingredients...and more...

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## Features and benefits of Arlasolve™ DMI

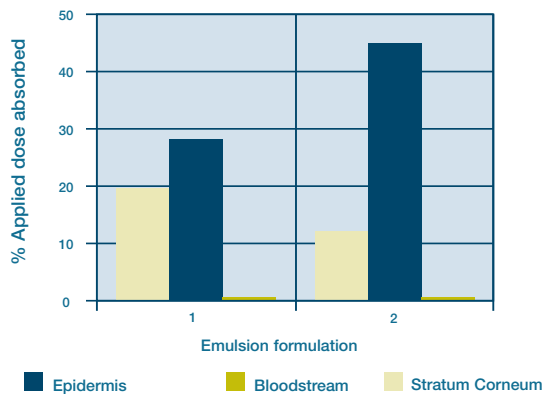
Features	Benefits
Carrier for cosmetic and pharmaceutical actives	Enables efficient delivery and enhanced skin penetration for hydrophilic actives
Wide range of applications	For both cosmetic and pharmaceutical use, enables one material to be used in a wide range of products
<p>Enhanced delivery of active ingredients in topical applications, including:</p> <ul style="list-style-type: none"> <li>• Dihydroxyacetone (DHA) for self-tanning products</li> <li>• Benzoyl peroxide in anti-acne formulations</li> <li>• Various other actives whether water soluble or sparingly soluble e.g. hydrocortisone, salicylic acid, lactic acid, acetylsalicylic acid, vitamins C, E &amp; K, hyaluronic acid, bioflavonoids, kojic acid, hydroquinone, estrogen etc</li> </ul>	<p>Enables either cost reduction due to less active, less irritancy from aggressive actives which will give the same effect with less active or a more effective product</p> <ul style="list-style-type: none"> <li>• Rapid colour development with enhanced tan longevity. Tan develops more evenly with less streaking or blotchiness =&gt; improved product</li> <li>• Enhanced penetration of actives through the epidermis enabling targeted delivery</li> <li>• Can be used in a wide range of applications to reduce the cost of formulations or improve effects</li> </ul>
Aids stability of actives	Gives improved shelf stability to formulations containing unstable actives, particularly those susceptible to hydrolysis or transesterification
Stable to hydrolysis	Miscible with all proportions of water without concerns of hydrolysis
Miscible with a wide range of ingredients including most organic solvents and nonionic surfactants	Broad formulation latitude with excellent shelf stability allowing incorporation into a wide range of product forms e.g. clear gels, foams, creams, lotions, sprays and ointments
Excellent safety profile, long history of safe use	Produces mild formulations with reduced irritancy potential
High boiling point, low volatility, low viscosity	Enables transport of water soluble actives into the skin, without recrystallization of the active. Allows production of formulations in conventional equipment without the need for flammable materials handling

# Active delivery enhancement with Arlasolve™ DMI

Arlasolve DMI (INCI: Dimethyl Isosorbide) can be used to aid penetration of actives into the epidermis where they will act more effectively. While providing excellent targeted delivery of the active to the epidermis, Arlasolve DMI does not promote penetration of the active into the blood stream.

Work has been carried out by Uniqema using a hydrophilic active (INCI: Propagermanium). The results below support the claim that Arlasolve DMI enhances delivery into the epidermis but does not promote the product into the bloodstream. The formulations used are also given below.

Topical delivery efficacy of Propergermanium



Ingredient	Formulation 1	Formulation 2
BRIJ™ 721	5%	5%
BRIJ 72	1%	1%
PRISORINE™ 2034	15%	15%
ESTOL™ 3609	3%	3%
PRICERINE™ 9091	4%	4%
ARLASOLVE DMI		10%
Keltrol	0.2%	0.2%
Nipaguard BPX	0.7%	0.7%
Water	71.1%	61.1%

### Examples of actives

- Dihydroxyacetone
- Benzoyl Peroxide
- Hydrocortisone
- Salicylic Acid
- Lactic Acid
- Acetylsalicylic Acid
- Vitamins C, E, K
- Hyaluronic Acid
- Kojic Acid
- Estrogen

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## What benefits can Arlasolve™ DMI bring to cosmetic formulations?

Cosmetic products which have efficacy claims need to deliver what they promise. With Arlasolve™ DMI (INCI: Dimethyl Isosorbide) the formulator has a number of options to enhance the delivery of active ingredients without having to add more active. Effective delivery of actives such as salicylic acid, Vitamin C, lactic acid, hydrocortisone and hyaluronic acid can even lead to a reduction in the amount of active levels required to give the effect claimed. This can lead to a reduction in cost of the final formulation.

### Other benefits from Arlasolve™ DMI:

- Enhanced penetration of actives to the upper layers of the epidermis
- A lower level of skin irritation in the formulation due to reduction in the required concentration level of aggressive actives
- Improved stability of formulations – even those susceptible to hydrolysis and transesterification
- Miscibility with most organic solvents and non-ionic surfactants
- Incorporation in many product forms, including clear gels
- A long history of safe usage
- Ability to deliver water soluble actives into the skin without recrystallization of the active in the formulation
- Does not require special equipment for manufacture – no need for the flammable handling equipment required with many solvents

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## Improved self-tanning performance with Arlasolve™ DMI

The improvement in active delivery can be seen very well in self-tanning products. Addition of Arlasolve DMI (INCI: Dimethyl Isosorbide), to your formulations gives a fast result without streaking.

A 3% loading of Arlasolve DMI in a self-tanning foam offers a deep rich uniform color when compared to the control.

At 5%, Arlasolve DMI in a self-tanning cream exhibits markedly improved color development.

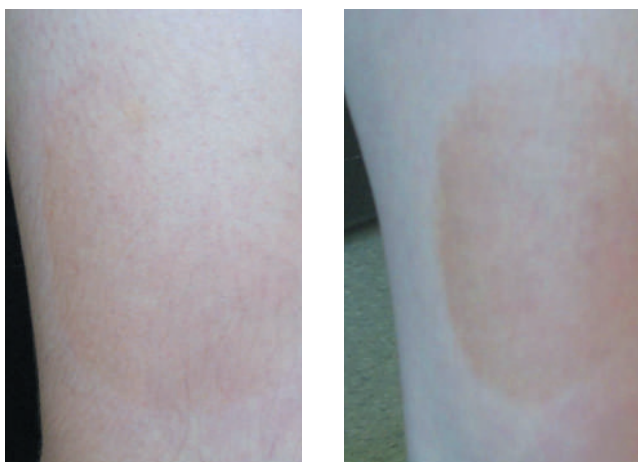
### Self-tanning foam *in-vivo* testing



Left: without Arlasolve DMI

Right: with Arlasolve DMI (3%)

### Self-tanning cream *in-vivo* testing



Without Arlasolve DMI

With Arlasolve DMI (5%)

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# Improved self-tanning performance with Arlasolve™ DMI

(cont.)

Clinical studies have also been carried out comparing a self-tanning cream with and without Arlasolve DMI. The total color difference relative to untreated skin was measured and the results over a period of time were plotted.

In all cases the cream with Arlasolve DMI showed a greater total color difference than the cream with no Arlasolve DMI. This shows that addition of Arlasolve DMI to a self-tanning cream improves the efficacy of the product in terms of color development.

Addition of Arlasolve DMI can enable you to formulate products containing less DHA with the same efficacy, thus leading to reduction of irritation potential and cost savings in the formulation.

## Self-tanning clinical study Hill Top Research results

