



## Personal Care Solutions



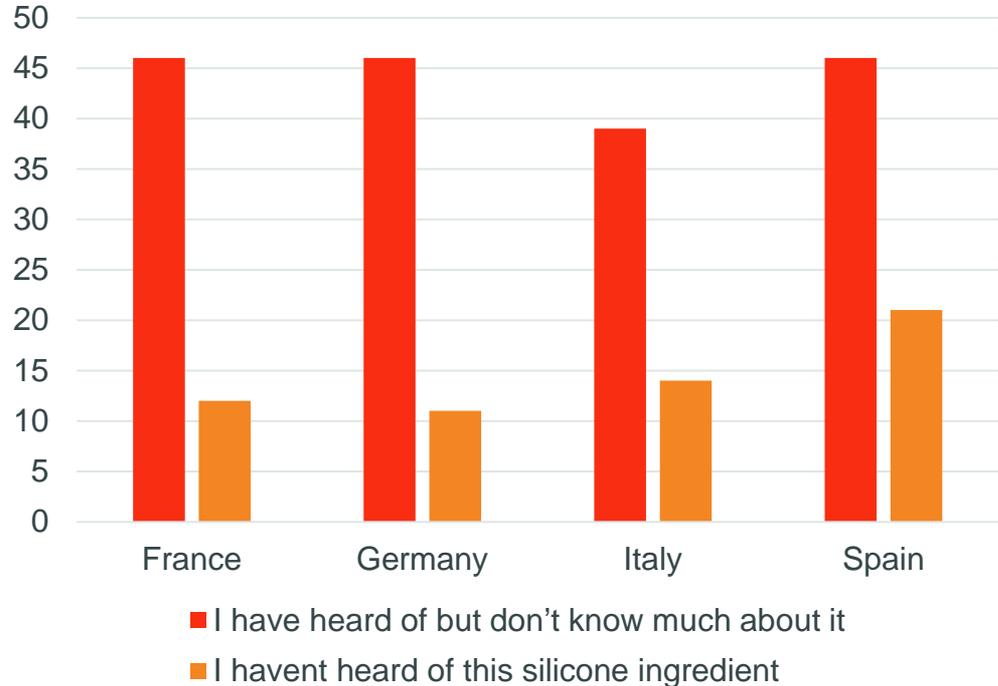
# Beauty with Silicones

Understanding Silicones in the Personal Care Market

## Market Overview

A Mintel view in 2014 on Silicones indicated that Germany, France, Italy and Spain **don't know** much about silicones and there is over **10%** that have **never** heard of the ingredient.<sup>(1)</sup>

### European Consumers Understanding of Silicone in % (2014)



# Silicones: Overview in Beauty Care

- Silicones used in personal care are stable and inert under conditions for the intended applications.
- Silicones are among the most extensively studied materials used in consumer and industrial applications today.
- More than 1,000 studies have been conducted by silicone manufacturers to assess the safety of silicones relative to workers, consumers, the environment and manufacturing processes. The results of this continued research and testing demonstrate the safety of silicones in their diverse and important applications.
- Dow assesses every product that is sold or sampled into personal care from a human health and environmental perspective.
- For further reading:
  - <http://www.silicones.eu>
  - <http://www.siliconesinfo.com>
  - <http://www.silicones.eu/sustainability-environment/silicones-in-the-environment>



# Awareness: Silicones and their Attributes

1. Silicone Chemistry Facts
2. Silicones in Cosmetic Use
3. Silicones in Skin Care
4. Silicones in Hair Care

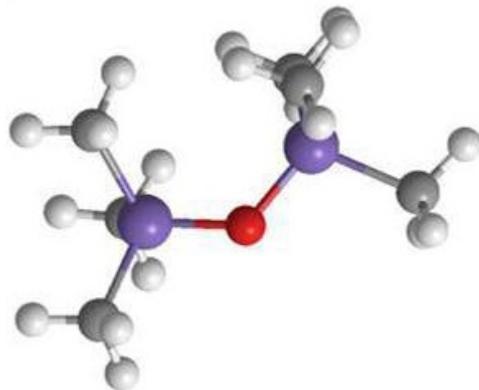




# Silicone is a Chemical

Silicones are chemicals, but everything you touch and see can be classed as a chemical ... carbon dioxide, methane, water and you!

In the case of silicones, units are made of two basic elements linked together: silicon and oxygen. Due to the enormous variety of compounds that can be developed from silicones, they are among the most used family of materials in the world.



## Chemical

Dictionary Definition\*

“Basic substrate that is used in or produced by a reaction involving changes to atoms or molecules”

\*From Cambridge Online Dictionary

# Silicone is a Family of Chemicals

Silicones are a family of chemicals known as a “class”. No ingredient on its own is named “silicone”, which means you should never see silicone in the ingredient list of a product. Chemical classes share common traits.

Common INCI names for silicones in cosmetics are:

- Dimethicone
- Trisiloxane
- Dimethiconol
- Amodimethicone
- Dimethiconecrosspolymer
- Trimethylsiloxysilicate
- Polymethylsilsesquioxane
- Polypropylsilsesquioxane

## Cosmetic Ingredient

The International Nomenclature of Cosmetic Ingredients (INCI) has over 13,000 registered names representing over 60,000 trade and technical names, 3,000 suppliers in 91 countries.<sup>(2)</sup>

## Polymer

Dictionary Definition\*

“A natural or artificial substance made from many smaller molecules (= groups of combined atoms)”

\*From Cambridge Online Dictionary

# Silicone in Cosmetic Uses

Depending on the country requirements will depend on the regulation and registration needs. The bases of the regulations is to ensure both ingredients and the end cosmetic product are safe for use.

Dow carries out appropriate testing and assessment to ensure safety and regulatory compliance for all its products marketed and supplied for cosmetic use.

Safety in use of any cosmetic ingredient is dependent on the full formulation of the cosmetic product, the desired attributes of the product, the use level of that product on the body, and the use level of the individual ingredient in question.

<http://www.silicones.eu>

<http://www.siliconesinfo.com>

## Safety Aspects

Raw material suppliers should carry out extensive testing and assessment to ensure the safety of those materials for intended uses before commercializing materials on the market.

# Silicone in Skin Care

Typically silicones do not irritate skin/scalp. There is no evidence on negative impact to the scalp.<sup>(14)</sup>

Silicones are also typically used in anti-dandruff shampoos as part of scalp care where they help to counteract the negative impact of the anti-dandruff actives on conditioning.<sup>(15)</sup>

Silicones are used in products positioned in the market for sensitive skin, where there are claims for treatments like rosacea, eczema, psoriasis, post-surgery, diaper rash and skin ulcers.<sup>(3)</sup>

## Irritation

- Dictionary Definition\*  
“The production of inflammation or other discomfort in a bodily part or organ”
- Skin irritation can be from acne, eczema to serious skin conditions.
- 24.7% of products launched globally for sensitive skin in the personal care sector featured silicone in their ingredient listing.

\*From Cambridge Online Dictionary

# Silicone are Non-Allergenic

Most silicone molecules used in beauty care are either too large to enter the skin or they are volatile and therefore evaporate. They are often used in barrier creams designed to prevent skin sensitization to allergens. <sup>(3)</sup>

When looking at other markets, such as healthcare, silicones can replace latex, a common allergen, in adhesives, gloves and a wide array of other items.

Silicone and organic/silicone combinations are also used to treat wounds, facilitate healing, reduce discomfort and do not promote bacterial growth. <sup>(5, 12)</sup>

## Allergen

- Dictionary Definition\*  
“A substance that can cause an allergy (= condition the body reacting badly to something) but is not harmful to most people”
- A Mintel Analysis of products launched in 2015 claiming allergy testing show that 32% of products contained silicone.

\*From Cambridge Online Dictionary

# The Feel of Silicones

Most silicones are invisible when they are resting on the skin, and some can absorb sebum and matify the skin, minimizing visual appearance of pores in the process.<sup>(6,7)</sup>

Any greasiness which is felt can often be attributed to the formulation design and not the silicone in itself.

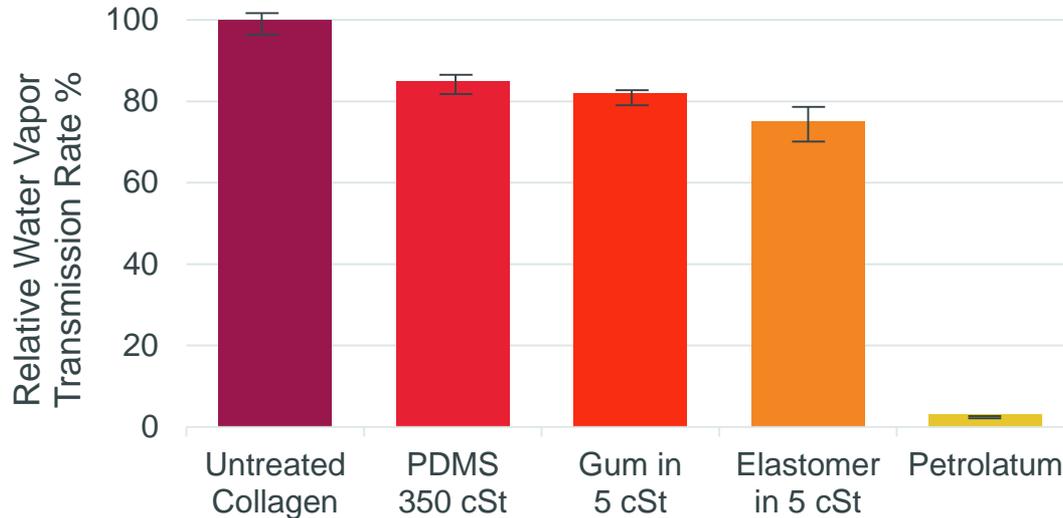
## Greasy

- Greasiness is a sensory perception of how something feels. Each person will have an individual level of acceptability.
- Certain functional ingredients which moisturize like glycerin have an inherent greasy feel which can be overcome by the use of ingredients like silicones.

# Silicones and Breathability

Silicones are typically non-occlusive or “breathable” due to their chemical structure: They allow oxygen, nitrogen and water vapor to pass through them on the way to, or out of, the skin.<sup>(8)</sup>

**Water Vapor Permeability of Common Silicones**



## Breathability

Breathability of an ingredient is defined by its occlusive or non-occlusive properties which is determined from permeability of chemicals like oxygen or water vapor.

Silicones are typically non-occlusive however have the ability to be tailored to a semi-occlusive nature depending on the final product performance requirements.

# Silicones are Non-Comedogenic/Acneogenic

Silicones are non-comedogenic and non-acneogenic and mostly non-irritating. They also do not promote bacterial or other microbial growth.<sup>(4, 9, 12, 13)</sup>

However, they can aid the penetration of other ingredients for example actives.

Each formulation needs to be tested and evaluated for its specific properties, there are a wide range of ingredients and it will depend on their type, usage level and the skin type if the product can be considered non-comedogenic/acneogenic.

## Non-Comedogenic

- Dictionary Definition\*  
“Denoting a skin-care product or cosmetic that is specially formulated so as not to cause blocked pores”
- 2015 product launches via Mintel Analysis shows that 62% of products claiming non-comedogenic contain a silicone ingredient.

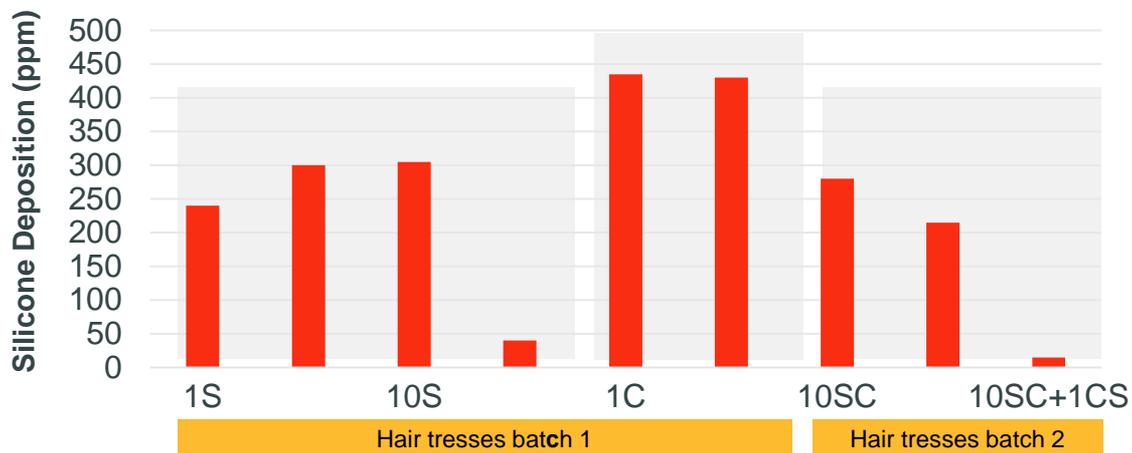
## Non-Acneogenic

- Dictionary Definition\*  
“Means that a product is formulated to be less likely to cause acne or make it worse. The label refers to products that won't clog pores and are less likely to cause pimples or acne breakouts”
- 64% of product launches claiming to be non-acneogenic contained a silicone ingredient in 2015.

\*From Cambridge Online Dictionary

# Silicones on Hair

Silicones are present and detectable on the hair and can provide benefits such as smoothness, shine and frizz control. Sebum, dirt, pollutants, and products which are not removed sufficiently can continue to accumulate overtime. It is recommended to use a clarifying/cleansing shampoo periodically to remove or prevent build-up. Graph indicates silicone deposition and removal with clarifying shampoo.



Treatment: 0.8 g or 0.4 g/1 g hair, 1% silicone active  
S=Shampoo; C=Conditioner; SC=Shampoo and Conditioner  
CS=Clarifying Shampoo (no Si)

Testing: ICP-OES

## What is a Cleansing Shampoo?

A cleansing shampoo can remove all types of products including hair oils, mousses, hairspray, dry shampoo. They can potentially lift mineral deposits from hard water and chlorine from swimming pools.

Most regular shampoo have a gentle cleaners with a low proportion of surfactants compared to moisturizing ingredients, in contrast a cleansing shampoo has a larger amount of surfactants and very little else!

# Biodegradability

Although silicones are not biodegradable, they are degradable either in the soil for non volatiles polydimethylsiloxanes or in the air for the volatiles species such as Cyclopentasiloxane.<sup>(10)</sup>

<http://www.silicones.eu/sustainability-environment/silicones-in-the-environment>

## Biodegradability

Dictionary Definition\*

“Biodegradation is the chemical dissolution of materials by bacteria, fungi, or other biological means. Although often conflated, biodegradable is distinct in meaning from compostable.”

\*From Cambridge Online Dictionary

# What do Silicones Bring to Beauty Care?

## INTRINSIC PROPERTIES<sup>(11)</sup>

- Quick Spreading
- Low Surface Friction
- Low Surface Energy
- Flexibility/Elasticity
- Permeability
- Low Conductivity
- UV Stable
- Breathability

## PERFORMANCE PROPERTIES<sup>(11)</sup>

- Smooth/Soft Feel/Sensory Enhancers
- Ease of Use/Ease to Formulate
- Efficacy at Low Use Levels
- Soft Focus
- Heat Protection
- Hair Repair
- Reduces Frizz/Helps Manageability
- Add Texture to Formulation
- Water/Sebum/Long Lasting Resistance



# Beauty Care That Does More

Dow is creating differentiating specialty silicone solutions that bring beauty to life in a way that has a lasting effect on your business and on the lives of consumers everywhere.

## How can we help you today?

When you need industry-leading innovation, Dow can help meet your needs for specialty materials, collaborative problem-solving and innovation support. Learn how we can help you bring **BEAUTY WITH IMPACT** to your products at [consumer.dow.com](https://consumer.dow.com).



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# Thank You

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