

QUALITY CARES



LANXESS high-purity isoparaffins
for wide-ranging uses in skin, hair,
and sun care.

X Purolan®

QUALITY WORKS.

LANXESS
Energizing Chemistry

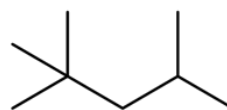
HIGH-PERFORMING ALTERNATIVES TO LIGHTWEIGHT SILICONES IN PERSONAL CARE

Purolan® IHD is great for use in skin and sun care products, leaving a silky, nourished feeling on the skin while remaining lightweight. It is dermatologically safe, non-comedogenic, and has excellent spreading ability. **Purolan® IHD** is compatible with commonly used oils and imparts luxurious textures to lotions and creams.

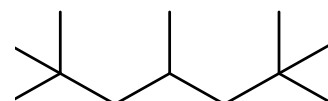
Purolan® IDD (INCI: isododecane) and **Purolan® IHD** (INCI: isohexadecane) are clear, colorless, and odorless liquids with wide-ranging uses in skin, hair, and sun care. **Purolan® IDD** is a fast-evaporating liquid which makes it suitable for use in color cosmetics like mascara, eyeliner, lip products, or any product where improved wear properties and no residue are desired. It is ideal for make-up removers – leaving no oily residue behind.

Purolan® IOC (INCI: isooctane) is a colorless liquid with low odor intensity. As a rapidly evaporating carrier, **Purolan® IOC** results in significantly lower cooling effect and irritation than similarly volatile solvents. It represents an excellent option for applications requiring quick drying times while leaving minimal residue.

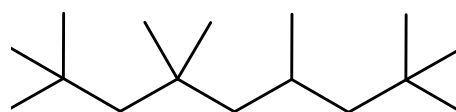
The **Purolan®** isoparaffins consist of lipophilic alkanes prepared through an oligomerization process, starting from purified isobutylene monomers. This results in extremely high purity material with a narrow distillation range, very low residual carbonyl, sulfur, and olefin content, and less than 0.0001% aromatics. The **Purolan®** isoparaffins have high solubility in natural oils, ester fluids, and silicones. While other ester replacements can have acceptable skin feel and emollience, they lack the volatility, low surface tension, and extremely high spreadability that make the **Purolan®** isoparaffins so remarkable.



Purolan® IOC
Isooctane



Purolan® IDD
Isododecane

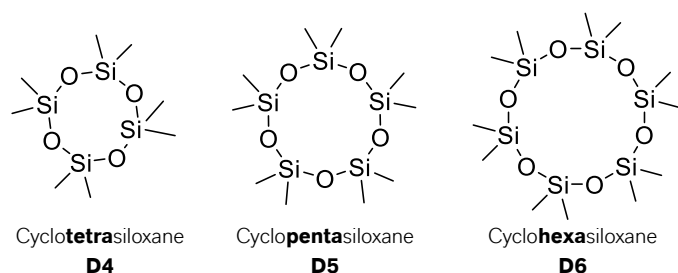


Purolan® IHD
Isohexadecane



RISE OF SILICONE-FREE CLAIMS

A change in consumer stigma against silicones in hair care is becoming increasingly apparent, as some high molecular weight silicones can build up in hair between washes. These facts, combined with increasing regulations have **many personal care product manufacturers seeking high-performing alternatives to these traditional materials.**

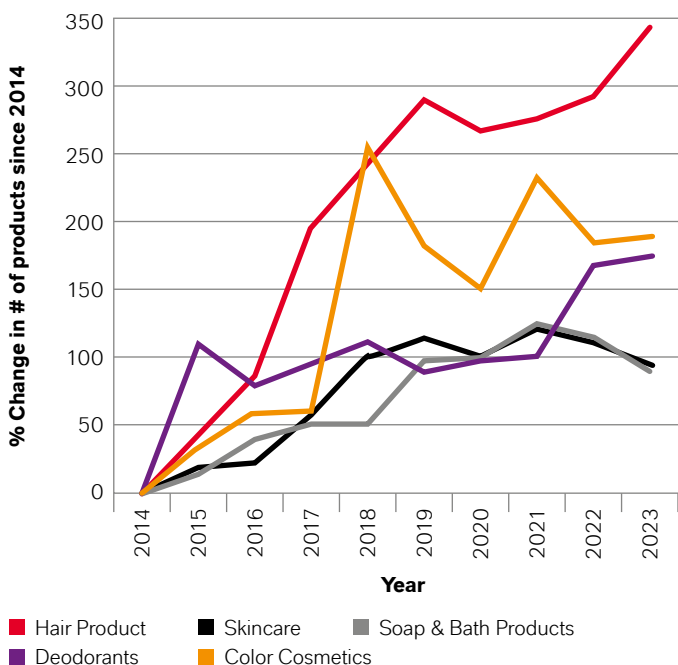


Furthermore, the two most popular cyclic silicones (known as **D4** and **D5**) are currently limited to 0.1% in rinse-off applications in the European Union and cannot be intentionally added as an ingredient. All three of the cyclic siloxanes (left) are listed as Persistent, Bioaccumulative, and Toxic (PBT) by the EU, and are on the Candidate List for Substances of Very High Concern due to their PBT status and combination of very high persistence and bioaccumulation potential.

The Purolan® isoparaffins provide excellent options to replace these silicones without compromising on performance. The highly branched structures of the Purolan® Isoparaffins mimic the overall chemical structures of cyclic siloxanes, which possess numerous methyl groups on the outer surfaces of the molecules. These structural similarities give rise to comparable physical properties, resulting in similar functionality of the Purolan® Isoparaffins in a variety of formulas.

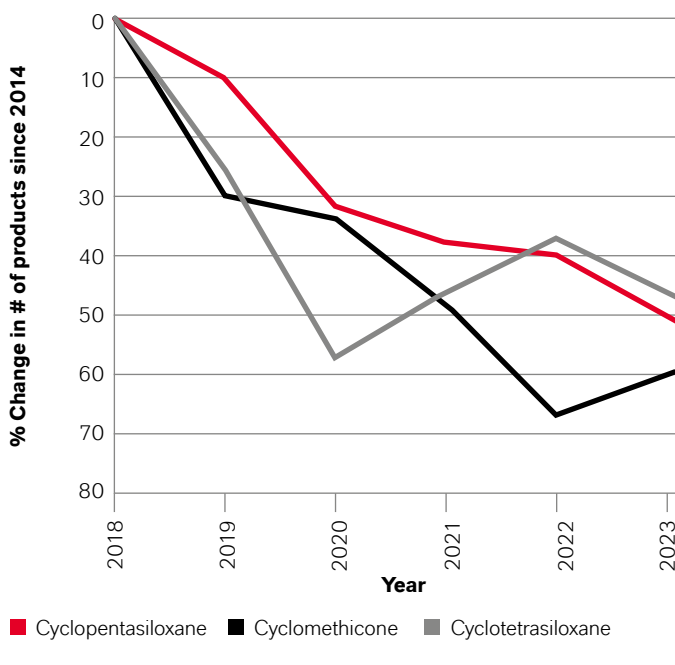
Rise in “Silicone-Free” Claims

New Product Launches, Global, Beauty & Personal Care



Change in Ingredient Penetration

New Product Launches, North America, Beauty & Personal Care

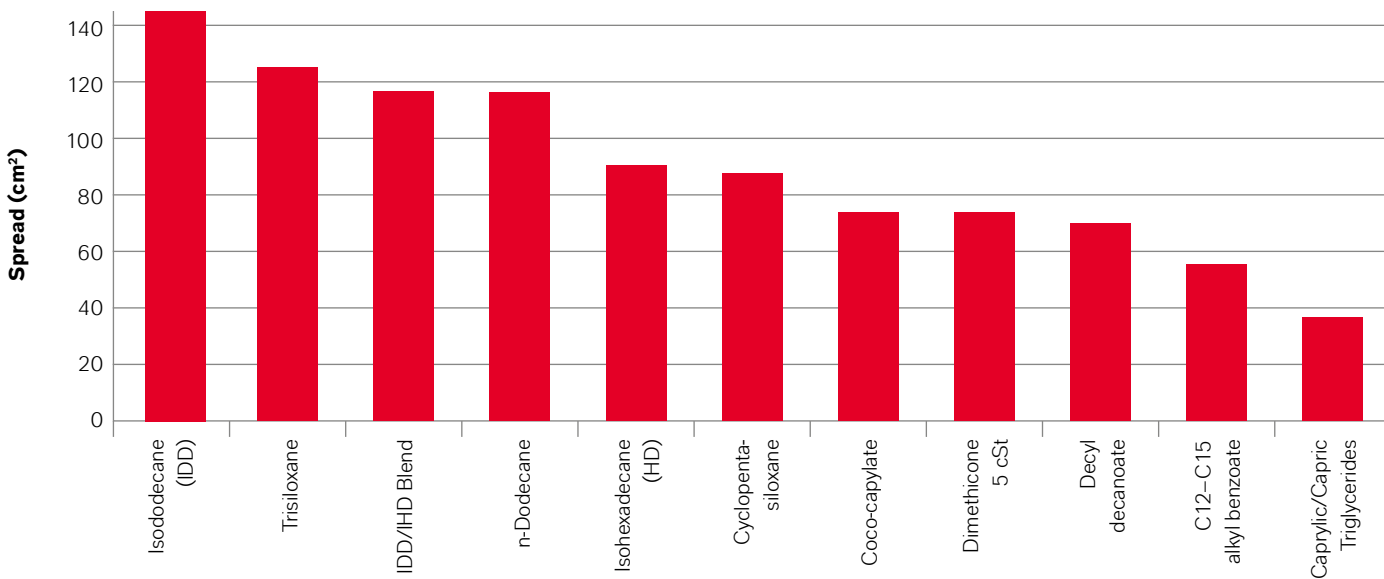


SPREADABILITY

Spreadability is a highly desirable trait for ingredients used in hair and skin care products. Liquid ingredients with low viscosity and low surface tension disperse easily throughout the hair. This allows for even distribution of other claim ingredients when blended into a carrier of **Purolan®**

IDD, resulting in a lightweight, non-greasy afterfeel. **The Purolan® isoparaffins demonstrate exceptionally high spreadability**, leading them to impart brilliant sensorial properties to a vast array of personal care and beauty products when used at moderate levels (1–5%).

Spreading Property of Common Emollients

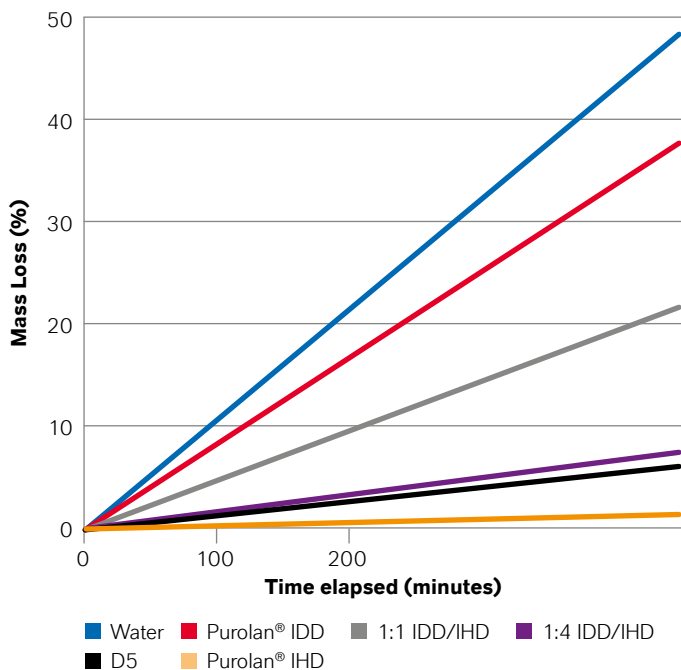


EVAPORATION RATE

While other personal care emollients can have a suitable combination of low viscosity, spreadability, and formula compatibility, few are able to offer any degree of volatility. By blending Purolan® IDD and Purolan® IHD in various ratios, a tunable rate of evaporation can be achieved, allowing for application in a variety of different product types. Purolan® IDD evaporates relatively quickly and can serve as an excellent carrier liquid for hair serums, a fast-drying fluid for lip gloss, or as a gradually drying base for deodorant. Purolan® IHD exhibits a much slower rate of evaporation, but through blending with IDD, an evaporation rate comparable to cyclopentasiloxane can be achieved.

Solvent	Evaporation rate	Cooling Effect (J/mL)
Purolan® IOC	3.68	209
Ethanol	2.06	721
Ethyl Acetate	4.19	327
Isopropanol	1.72	572
n-Butyl acetate	1.00	330

Evaporation Loss Over Time



Purolan® IOC has a fast evaporation rate comparable to other very lightweight solvents, but with a lower cooling effect.

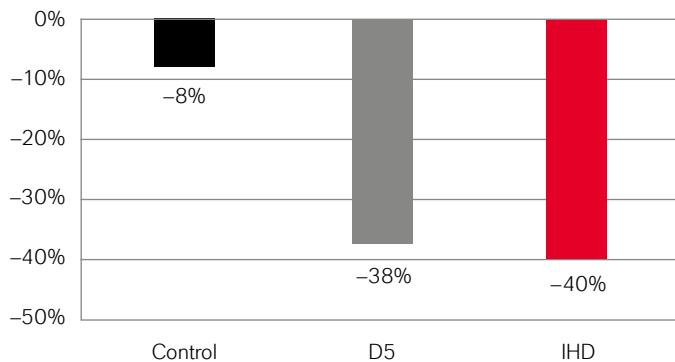


APPLICATIONS IN HAIR CARE

The **Purolan®** isoparaffins can offer a wide range of benefits in hair care:

- Broad formula compatibility
- Decreased combing forces through conditioning effects
- No greasy afterfeel
- Lightweight carrier to other natural oils
- Reduced humidity-induced frizz by maintaining moisture content of styled or straightened hair

Change in Wet Comb Force



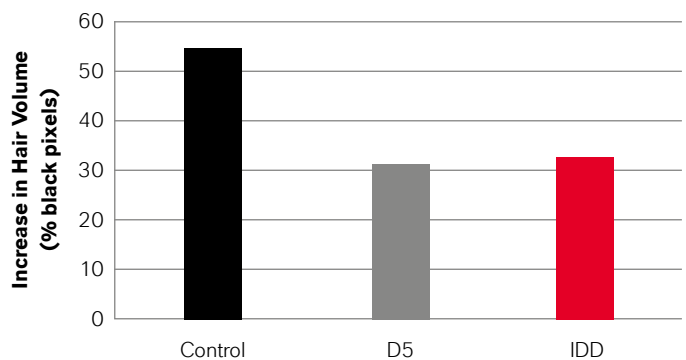
Method details: A hair combing rig attached to an Instron with a 2 kg load cell. Thoroughly cleaned hair treated with conditioner (D5 or IHD blended at 3%) thoroughly rinsed, average of 6 replicates.

Purolan® IHD shows equal performance to cyclopentasiloxane (D5) at reducing combing forces of wet hair



When **Purolan® IDD** is applied to dry hair prior to high temperature straightening, it **reduces the frizz effect as much as cyclopentasiloxane (D5)**. The **Purolan®** isoparaffins are excellent additions to conditioners, serums, and leave-in hair treatments, where they can maintain moisture content inside the hair and smoothen rough cuticles to leave hair feeling soft, supple, and silky.

Increase in Observed Frizz



Method details: Thoroughly cleaned and dried tresses treated with equal amount of IDD or D5, before high temp (210°C/410°F, 10x) straightening, were photographed before and after being placed in a high humidity (95%, 3 h) environment. Frizz volume was measured as a share of black pixels, after consistent image thresholding

Detangler

Ingredient	w/w %
Phase A	
Water	80.7
Glycerin	1.0
Propylene Glycol	0.5
Lactic Acid	0.2
Tetrasodium Glutamate Diacetate	0.1
Purox® S Sodium Benzoate	0.5
Phase B	
Purolan® IDD	5.0
Purolan® IHD	4.0
Cetearyl Alcohol	3.0
Behentrimonium Methosulfate	3.0
Argan Oil	0.75
Tocopherol	0.25
Glyceryl Stearate/PEG-100 stearate	0.5
Steareth-21	0.5

HIGH PERFORMANCE IN SUN CARE

SPF products can be inherently challenging to formulate, since a large proportion of the product is composed of either chemical or mineral UV filters, which are not easily absorbed by the skin and do not contribute to an aesthetically pleasing formulation. The Purolan® isoparaffins demonstrate improved solubilization of organic UV filters compared to D5 and dimethicone 5 cSt. Improved solubilization of UV filters can **increase the stability and SPF factor** in sunscreens throughout storage.¹

Solubilized UV Filter (g/100 mL)

	Octin-oxate	Octo-crylene	Avoben-zone*	Oxyben-zone**
Purolan® IDD	100% miscible	100% miscible	6	5
Purolan® IHD	100% miscible	25	3	5
D5	37.5	4.3	1.5	3
Dimethicone	6.6	2.1	1.25	3

* with 15% C12-15 alkylbenzoate

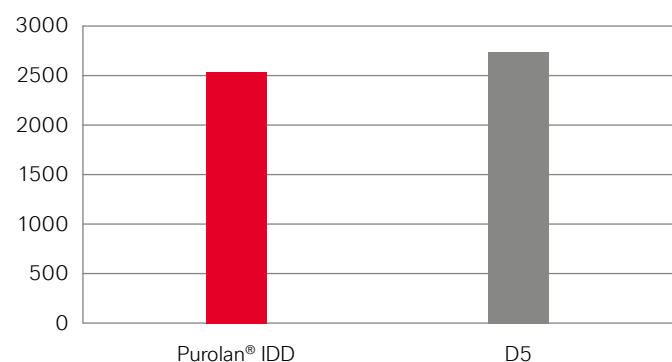
** with 20% octisalate

¹ Vallejo, Jhon; Mesa, Monica; Gallardo, Cecilia. (2011). Vitae. 18. 63-71.

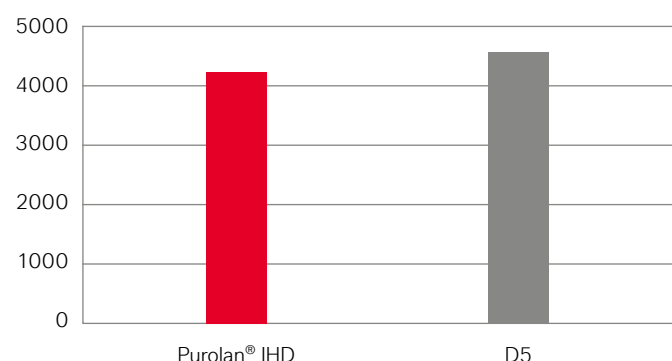


Purolan® isoparaffins enhance dispersion of inorganic mineral filters. They yield **lower viscosity dispersions** of both coated and uncoated ZnO and TiO₂, which aids in manufacturing and helps generate final formulations with more desirable sensory characteristics.

Viscosity of a Coated ZnO Dispersion



Viscosity of an Uncoated TiO₂ Dispersion



The exceptional solubilizing power and high spreadability of the Purolan® isoparaffins make these materials an excellent option for increasing the sensory qualities of sun care products, reducing stickiness and tackiness, which are common problems for high SPF products using chemical UV filters.



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