



Dry Skin Feel in Cosmetic Products

Volatile or Non-Volatile?

Editors Note: The search for a suitable replacement for D5 in personal care applications has intensified recently. The search has identified several low molecular weight hydrocarbons, and some low molecular weight silicones. Flammability, odor, biodegradation and an ability to reform D4 and/or D5 under certain conditions remain a question with some of these approaches. We suggest that the basic question that still remains is “Do candidates for replacing D5 need to be volatile to provide the prerequisite dryness? This supplement addresses this key issue. As always alternate opinions are always welcome.

The Search for a Dry Silicone

Tony O’Lenick
Siltech LLC

There are a number of applications in which a dry skin feel is important. Cyclomethicones are commonly used in cosmetic products to provide a solvent that feels dry on the skin. Key areas where it is used include antiperspirants, color cosmetics and as a base solvent to blend with fragrance oils and perfume oils. Cyclomethicone is a clear, odorless silicone. It leaves a silky-smooth feel when applied to the skin. Cyclomethicones possess a cyclical structure rather than the chain structures of dimethyl silicones. Low heat of vaporization and the ability to select a desired vapor pressure has led their use as cosmetic vehicles. In other words the feel has been associated with volatility.

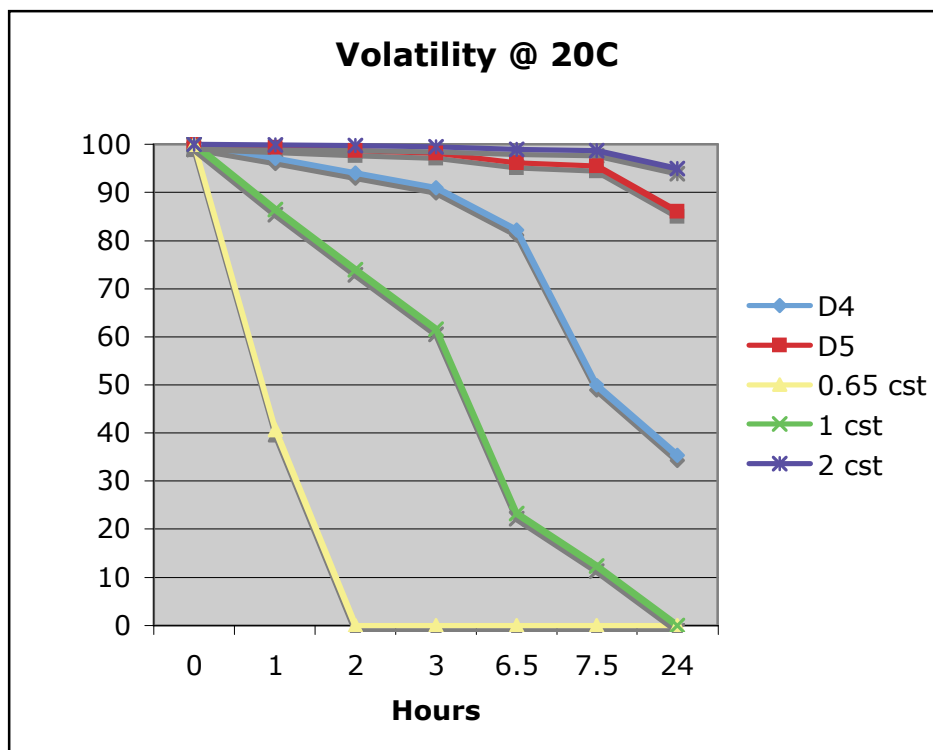
Volatility is the ability of the compound being tested to evaporate under the temperatures at which the compound is used in formulation. For cosmetic products, this temperature is ambient. It has generally accepted that cyclomethicones provided this feel because they evaporate quickly after helping to carry oils into the top layer of the epidermis.

The ability to provide product that (1) has the dry feel, (2) is cyclomethicone free, (3) is not capable of making cyclomethicone when exposed to catalyst and (4) is not flammable is a long felt need, un-satisfied need in the cosmetic industry.

Volatility a contributor to dry feel, but more importantly, spreadability and low surface tension are major contributors to dryness. The assumption that volatility is required for dry feel is due to the fact that historically D4 is both dry and volatile. D5 has replaced D4 in formulations and consequently has been found acceptable in many cosmetic formulations as a D4 replacement, BUT is it volatility that contributes dryness?

Percentage Remaining at 20°C

Hours	D5 Cyclic	D4 Cyclic	0.65 cps	1cps	2cps
0.0	100.0%	100.0%	100.0%	100.0%	100.0%
1.0	99.4%	97.1%	40.6%	86.5%	99.9%
2.0	98.7%	94.0%	0.0%	74.0%	99.7%
3.0	98.1%	91.0%	0.0%	61.6%	99.5%
6.5	96.1%	82.2%	0.0%	23.3%	98.9%
7.5	95.5%	50.1%	0.0%	12.4%	98.7%
24	86.1%	35.3%	0.0%	0.0%	94.9%



The above graphic clearly shows that

1. Silicones having a viscosity of 0.65 and 1 cst are very volatile.
2. D4 is more volatile than D5.
3. Neither D5 nor 2 cst silicone fluid are appreciably volatile.
4. Dry feel on skin at ambient temperature does not equate to volatility.



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