

THE BEHAVIOR OF WAXES

A Study of Three Different Chemistries

"Before joining the Koster Keunen team, I had many false notions regarding wax chemistry. I encountered industry colleagues who also believed these "myths". While developing my own knowledge on waxes, I learned many of my assumptions were incorrect. I am excited to promote education in our field and share my understanding of waxes with others. Our brilliant technical team uses scientific methodology to classify and understand wax functionality in personal care applications."

Belen Lemieux
R&D Manager, Koster Keunen

Koster Keunen presents a selection of natural waxes with very different chemistries. The variations in chemistry translate into distinctive behaviors when formulated into cosmetic products.

BEESWAX

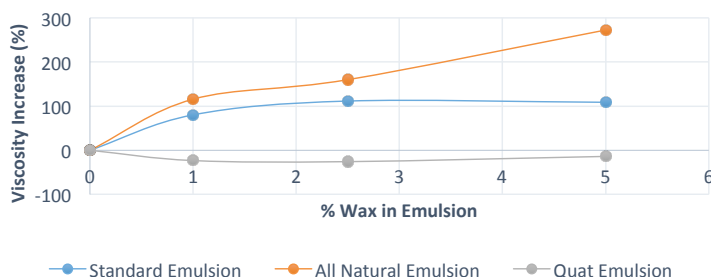
Beeswax is an incredibly complex mixture of organic compounds which is what makes it unique¹. In personal care, beeswax has oil gelling and viscosity building capabilities. It is an excellent choice for structuring balms and sticks. It is widely used in emulsions, sunscreen sticks, lipsticks, mascaras, and hair stylers (emulsions as well as anhydrous).

Function & Uses

- Create or Add Structure to Anhydrous Systems
- Gel Oils
- Build Viscosity
- Create Glossy White Emulsions
- Create Butters & Creams with Moderate-to-Heavy Skin Feel



Wax Behavior in Different Emulsion Systems:
Beeswax



Beeswax is natural, non-comedogenic, non-irritant and has been shown to reduce TEWL by up to 18%.

INNOVATION IS OUR TRADITION

KESTER WAX K-24

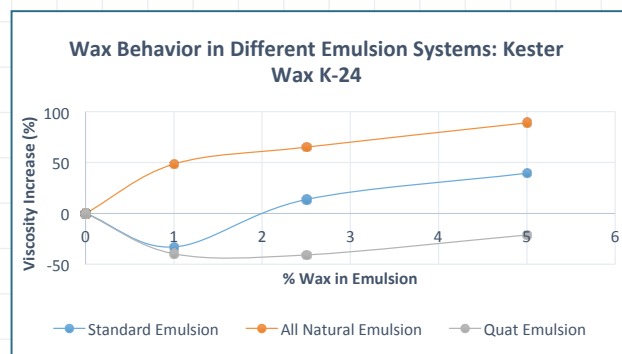
INCI NAME: *Lauryl Laurate*

Lauryl laurate is a natural mono-ester produced from renewable plant derived materials. It is a hydrophobic alkyl ester with low molecular weight, safe for use in cosmetics². The low molecular weight chemistry lends to the special characteristic of lauryl laurate; it melts on skin contact providing a unique sensory effect[†].

In personal care, lauryl laurate is an exquisite emollient that reduces greasiness and stickiness in emulsions and anhydrous systems. It is an excellent choice to add slip and glide to products without compromising structure, including pencils, lipsticks, and sunscreen sticks.

Function & Uses

- Solid at 25°C and Below[†]
- Emollient with Dry, silky After-Feel
- Reduces/Eliminates Greasiness or Stickiness
- Add Slip and Glide
- Create Light Feeling Emulsions
- Can Provide Gentle Cooling Effect in Systems



Kester Wax K-24 is natural, non-comedogenic, non-irritant, and reduces TEWL by up to 23%.

**Every Generation - Every Body
Every Skin Type Fresh Lotion**

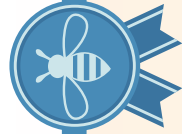
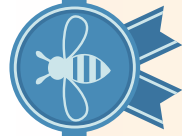


Ingredient Trade Name	INCI Name	%	%	%
Phase A		#1	#2	#3
Deionized Water	Aqua	80.90	80.90	80.90
Disodium EDTA	Disodium EDTA	0.05	0.05	0.05
Glycerin	Glycerin	4.00	4.00	4.00
Pemulen TR-2	Acrylates/C10-30 Alkyl Acrylate Crosspolymer	0.05	0.05	0.05
NaOH 10%	Sodium Hydroxide	0.50	0.50	0.50
Optiphen	Phenoxyethanol, Caprylyl Glycol	1.00	1.00	1.00
Phase B				
Kostol PGP	Beheneth-5, Polyglyceryl-3 Stearate	2.50	2.50	2.50
Cetyl Alcohol	Cetyl Alcohol	3.00	3.00	3.00
Jeechem CTG	Caprylyc/Capric Triglyceride	3.00	3.00	3.00
Kester Wax K-24*	Lauryl Laurate	5.00	-	-
Kester Wax K-60P*	Polyhydroxystearic Acid	-	5.00	-
Beeswax*	Beeswax	-	-	5.00

[†]This formula chassis was used for results of sensory panel and TEWL results. TEWL formulas consist of 1% of * material while sensory panel formula used 5%.

¹ Puleo, S.L., 1991, Beeswax Minor Components: A New Approach, Cosm. Toiletr., 106(2), p. 83-89.

² 2015, Safety Assessment of Alkyl Esters as Used in Cosmetics, Int. J. Toxicol., 34(2), p.55-69.



SCIENCE

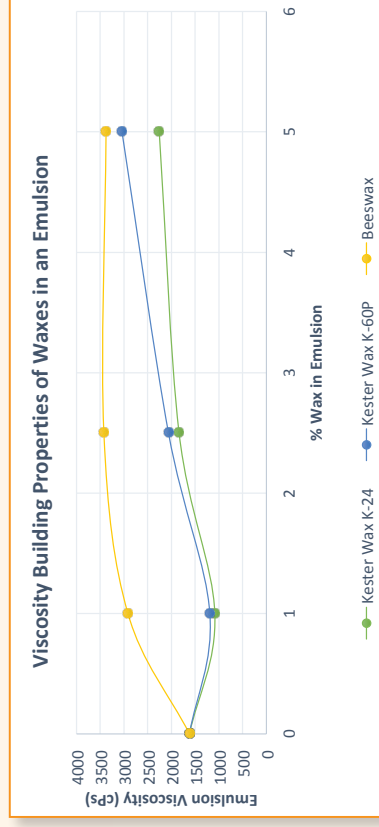
vs.

WAX MYTHS

Koster Keunen Proves the Top 7 Wax Myths **FALSE!**

Myth #1 – All Waxes Function the Same

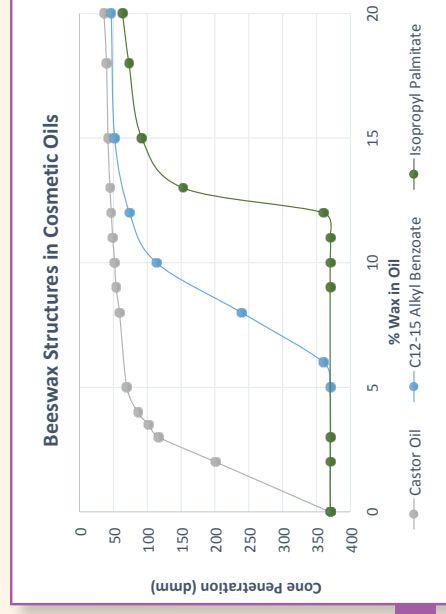
FALSE. Waxes are a diverse class of organic compounds. They generally build viscosity in o/w emulsions as part of the oil phase. However, the rate at which they build viscosity can vary considerably and is dependent on at least two factors: wax chemistry and emulsion properties.



Myth #2 – Waxes Behave the Same in All Systems

FALSE. Most waxes thicken and structure oils by building stable gel networks. Scientific data shows that gel hardness is usually proportional to wax percentage. However, there are many nuances and exceptions.

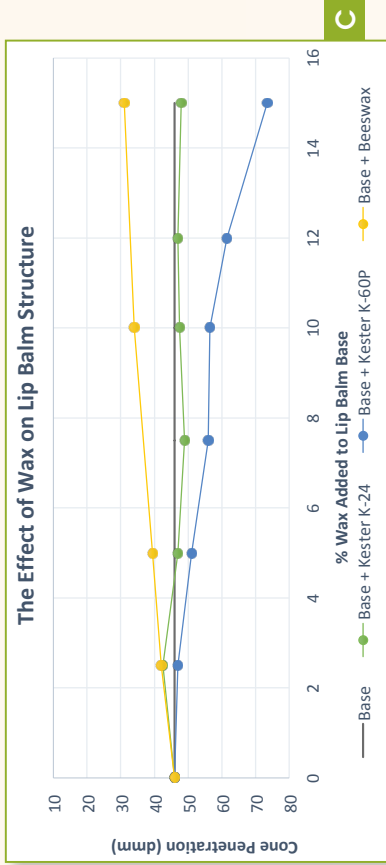
For example, the viscosity of the oil affects the rate of thickening, as seen in chart B.



B

Myth #3 – All Waxes Structure

FALSE. Many waxes are excellent structuring agents while others do not structure or thicken at all. For example in chart C, increasing Kester Wax K-24 had no effect on lip balm hardness, but changed the textural properties. Increasing Kester Wax K-60P softened the system and increased creaminess.



Myth #4 – Waxes Clog Pores

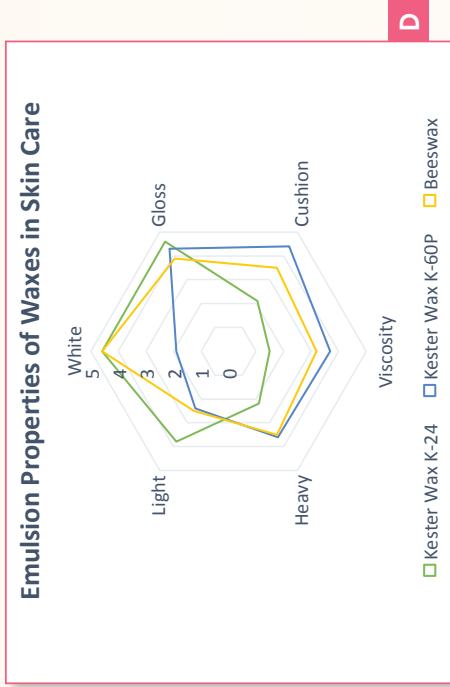
FALSE. Many waxes are known to be non-comedogenic and non-irritant. To the right is the comedogenicity and irritancy data of well-known waxes.

Wax	Comedogenic Rating*	Irritation Rating	Test Method
Beeswax	0-2	0	Standard 1989
Kester Wax K-24	0	0	Follicular Biopsy (3rd party)
Kester Wax K-60P	0.5	0	Follicular Biopsy (3rd party)
Candelilla Wax	1	0	Standard 1989
Carnauba Wax	1	0	Standard 1989
Ceresin Wax	0	0	Standard 1989
Cetyl Esters	1	1	Standard 1989
Kester Wax K-48	0	0	Standard 1989

*A comedogenic rating of 0-1 signifies no increase in keratosis.

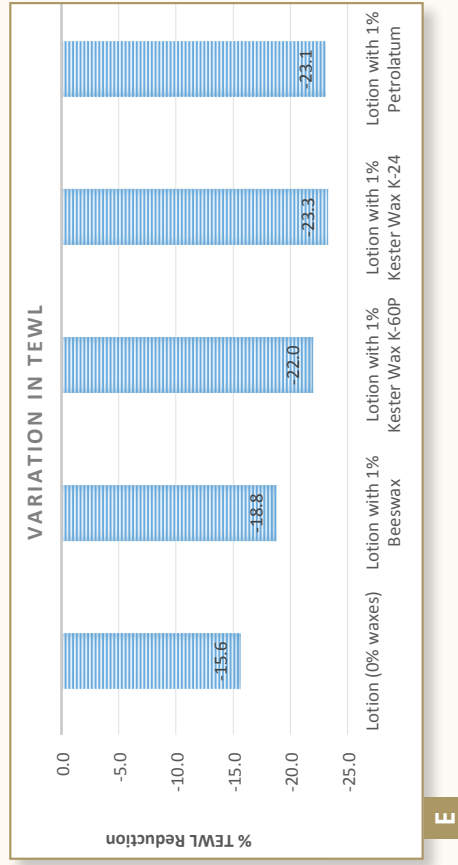
Myth #5 – Waxes Make Sticky Emulsions

FALSE. Waxes are perfectly suited for skin care applications, as they contribute to formula functionality and sensoriality, offering a wide variety of textures when formulated into an emulsion and applied to the skin.



Myth #6 – Waxes Have No Skin Benefits

FALSE. From a functional standpoint, waxes are film formers that contribute to water retention by the stratum corneum, which is why they are widely used in cosmetic and OTC drug applications.



Myth #7 – Waxes Are on “NO” Lists

FALSE. Numerous waxes are natural in origin and go through minimal processing. Waxes are accepted as natural by most certifying bodies and “clean beauty” standards. Waxes can also be sustainable and ethically sourced, like Beeswax, Carnauba and Candelilla.

Wax	INCI Name	Attributes	NPA	USDA Organic	ISO 16128	Whole Foods	Credo	Vegetarian	Kosher	Halal	Vegan	Leaping Bunny	EWG	Sephora
Beeswax	Beeswax	Natural multifunctional wax that increases strength, promotes stability, and offers many texture options in anhydrous formulas. Makes emulsions glossy, rich and with excellent pickup.	X	X	X	X	X	X	X	X		X	X	X
Kester Wax K-24	Lauryl Laurate	Natural low melt point ester with a sensory profile more consistent with that of a liquid oil. It is an emollient with a dry, silky afterfeel, adding excellent slip to anhydrous formulas.	X		X	X	X	X	X	X	X	X	X	X
Kester Wax K-60P	Poly-hydroxystearic Acid	Natural polyester wax, excellent plasticizer and film former. Makes cosmetic sticks more creamy and prevents issues like sweating, brittleness, and grain formation. In emulsions, it leaves a rich heavy feeling on the skin and can be a vegan alternative to beeswax.	X		X	X	X	X	X	X	X	X	X	X

KESTER WAX K-60P

INCI NAME: *Polyhydroxystearic Acid*

Polyhydroxystearic acid is a natural poly-ester wax produced from renewable plant materials. This saturated polyester is an excellent plasticizer, which imparts flexibility and softness to systems.

In personal care, polyhydroxystearic acid is an absolute choice in cosmetic sticks, as its plasticizing properties add a creamy feeling and prevent issues like sweating, brittleness, and grain formation. In emulsions Kester Wax K-60P builds formula viscosity and leaves a non-tacky, rich, substantial feeling on the skin. It can also be a vegan alternative to beeswax.

Function & Uses

- Plasticizer
- Film-Forming
- Viscosity Modifier
- Reduces/Eliminates Sweating, Brittleness, Graininess
- Add Flexibility
- Add Stability

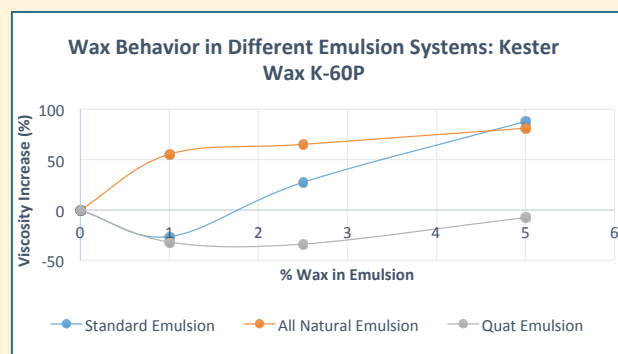
ELIMINATE THE ISSUES!

By building a plasticizer into the formulation, chemists can reduce or eliminate a multitude of issues before they start.

Kester Wax K-60P is natural, non-comedogenic, non-irritant and reduces TEWL by up to 22%.

Viscosity Building Properties of Waxes in Emulsions:

In a series of experiments conducted at Koster Keunen, Inc. We determined that waxes generally build viscosity in o/w emulsions as part of the oil phase. However, the rate at which they build viscosity can vary a great deal, and is dependent on at least two factors: wax chemistry and additional emulsion chemistry.



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