

# BIOESTOLIDES™

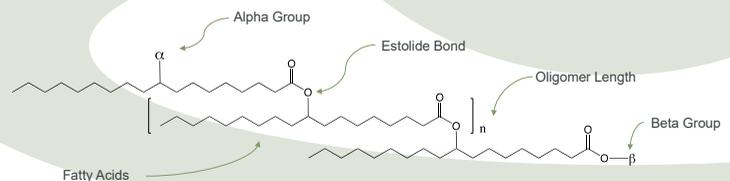
*Delivering Innovations for a Sustainable Future.*

**BioEstolides™ are a stable bio-derived, sustainable emollient with unique performance features. BioEstolides™ are REACH registered and Kosher, Vegan and Halal certified and provide exceptional moisturization characteristics as well as a light, satiny feel. In addition, BioEstolide™ are multi-functional and not only enhance the feel and performance of other cosmetic ingredients, but they come with some powerful benefits of their own.**

**Biosynthetic Technologies is a specialty ingredient supplier to the Beauty and Personal Care industry. We are dedicated to meeting evolving consumer needs, and are committed to sustainability and social responsibility.**

## BIOESTOLIDE TECHNOLOGY

Biosynthetic Technologies' flexible chemistry allows for the products to be specifically designed to meet a wide range of formulation requirements. To the left you can see the chemical structure for our patented Estolide technology, which forms the foundation of the BioEstolides. The oligomeric structure contains fatty acid repeat units, with secondary ester linkages on the alkyl backbone. This is a fully saturated molecule which is contributing to the excellent oxidative stability of the BioEstolides. BioEstolides solve inherent problems that traditional biobased materials or natural oils have because of they have a secondary ester bond. Our BioEstolides are derived from castor oil - a NON GMO source. This unique estolide structure provides the product unique protection from oxidation so it does not easily go rancid or break down over time.



PRODUCT NAME	BIOESTOLIDE 30	BIOESTOLIDE 250	BIOESTOLIDE 1300
INCI NAME	Ethylhexyl Acetoxystearate	Acetyl Ethylhexyl Polyhydroxystearate	Acetyl Ethylhexyl Polyhydroxystearate
CAS NUMBER	61800-40-6	23610055-93-6	2361055-93-6
CAS NAME	Octadecanoic Acid 12-hydroxy-, 2-ethylhexyl ester acetate	Octadecanoic Acid 12-hydroxy-, homopolymer, 2-ethylhexyl ester acetate	Octadecanoic Acid 12-hydroxy-, homopolymer, 2-ethylhexyl ester acetate
BIO-CONTENT	69%	86%	95%

## BIOESTOLIDE APPLICATIONS

Baby Care	Hair Conditioner	Skin Creams and Lotions	Hair Conditioning	Make-up Remover
Bath & Shower	Hair Setting Aid	Depilatories	Hair Styling	Pharmaceutical
Body Care	Hair Relaxer	Ethnic Hair Care	Hair Treatment	Skin Care
Color Cosmetics	Hair Dye	Food & Pharma	Household Cleaning	Skin Cleansing
Hair Shampoo	Decorative Cosmetics	Hair Cleansing	Lubrication	Tanners etc.

## PRODUCT FEATURES AND BENEFITS

- Extremely Stable** - BioEstolides have excellent oxidative stability enhancing the shelf life of the product over other naturally derived oils.
- Excellent Sensory Profile / Gentle Feel** - BioEstolides have a luxurious soft feel. Can be used as a silicone replacement in hair and skin care.
- Enhances Moisturization** - BioEstolides hydrate, soften and smooth the skin surface without leaving an oily residue on the skin.
- Environmentally Friendly** - BioEstolides are non-toxic, biodegradable with a high bio-content.
- Silicone Replacement** - Serves as a biobased silicone replacement
- UV Protection** - BioEstolides have inherent UV blocking properties.
- Water Resistance** - BioEstolide 1300 has water resistance benefits.
- Thermal Protection** - Helps protect hair from being damaged when exposed to heat.
- Healthy Shine** - Healthy look
- Lubricating Benefits** - Reduces friction
- Suspension Benefits** - Holds pigment or UV filters.

## ENVIRONMENTAL BENEFITS

- Negative Carbon Footprint**
- Biodegradable**  
BioEstolides are biodegradable per OECD 301
- Non-Bioaccumulative**  
BioEstolides will not bioaccumulate per OECD 107
- Non-Toxic**
- Bio-Based**  
BioEstolides are made using natural Castor Oil with renewable carbon levels ranging from 69% to 95% per ASTM D6866 and ISO 16128
- Natural Origin Index**

BioEstolide 30	0.69
BioEstolide 250	0.86
BioEstolide 1300	0.95

### ZINC OXIDE IN BIOESTOLIDE 1300



0% 5% 10% 15% 20%  
Pigment wt%

### TITANIUM DIOXIDE IN BIOESTOLIDE 1300



0% 5% 10% 15% 20%  
Pigment wt%

### PIGMENT DISPERSION

BioEstolides provides excellent pigment dispersion. BioEstolide 1300 suspends pigments the most effectively manner and forms stable suspensions with zinc oxide (micronized), titanium dioxide (micronized), and iron oxide. BioEstolides outperform natural or vegetable base oils in terms of pigment dispersion.



BIOESTOLIDE™ PRODUCT TYPICALS	BIOESTOLIDE™ 30	BIOESTOLIDE™ 250	BIOESTOLIDE™ 1300
KINEMATIC VISCOSITY, 100°C, CST	4.7	22.0	75.9
KINEMATIC VISCOSITY, 40°C, CST	20.7	153.0	668.4
VISCOSITY INDEX	153	170	195
DYNAMIC VISCOSITY, 25°C, CP	34	259	1300
SPECIFIC GRAVITY, 15°C	0.9065	0.9174	0.9190
FLASH POINT (OPEN), °C	242	268	288
FLASH POINT (CLOSED), °C	216	221	251
POUR POINT, °C	-21	-23	-21
CLOUD POINT, °C	-16	-21	n/a
ASTM COLOR	1	1	1
IODINE VALUE, G I2/100G	1.0	2.0	2.0
ACID VALUE, MG KOH/G	0.1	0.3	0.3
REFRACTIVE INDEX, 20°C	1.45	1.46	1.47
WATER CONTENT, WT%	0.1 max	0.1 max	0.1 max
MOLECULAR WEIGHT, G/MOL	455	1426	2680
ODOR	Low	Low	Low
APPEARANCE	Light Yellow	Light Yellow	Light Yellow
SENSORY AFTER FEEL	Light, Satiny	Light, Satiny	Light, Satiny
RENEWABLE CARBON, %	69%	86%	95%

\* Typical product values. While BT holds itself to strict quality control standards, actual product properties may vary slightly

## HAIR CARE

We compared BioEstolides to a typical silicone used in hair for conditioning and heat protection in a blind study and found that BioEstolide products showed improved shine over the market leading silicone products. In addition, BioEstolides offer the following features and benefits in hair care formulations:

- **Thermal Protection - BioEstolides offer heat protection up to 450 °F**

BioEstolides are one of least volatile oils on the market and very thermally stable

- **Healthy Shine** - BioEstolides outperformed a quality silicone-based product in shine when tested by a third-party lab

- **Friction Reduction** - BioEstolides have strong lubricating properties

- **Bio-Based Silicone Replacement** - Used as a silicone replacement due to its unique properties and benefits



## SILICONE REPLACEMENT

Silicones are being phased out in many parts of the world and are now one of the most rejected ingredients in cosmetic products. Bioestolides function as a natural silicone replacement in a variety of applications including hair care. BioEstolides offer thermal protection and help keep hair looking healthy and are gentle on the skin and offer a soft satiny feel.



## UV Blocking Properties

BioEstolides hydrate, soften and smooth the skin surface without leaving an oily residue on the skin. BioEstolides have some inherent UV blocking properties when used in personal care formulations. They can boost the use of chemical and/or physical filters while they are not an active ingredient. The BioEstolide 1300 also has some water-resistance properties. This is especially useful in reef safe sunscreen formulations where environmental concerns are key. In addition, BioEstolides are Biodegradable, and non-bioaccumulative, Non-toxic and Biobased.

*BioEstolides have a soft gentle feel and spread easily with ample playtime. In addition, BioEstolides provide a sensation of both slipperiness and cushion which results in a soft satiny feel and gives the skin a healthy glow.*



## REGISTRATION AND CERTIFICATION

At Biosynthetic Technologies we hold the appropriate certifications and registrations to certify our products do not only deliver on performance and quality but are also compliant with national and international requirements. Our Quality Assurance team stays current on the ever-evolving regulations as new legislation is passed and implemented in the industry. Our continuous improvement culture drives us, building upon our solid foundation of quality principles ensuring we meet or exceed customer expectations. All our castor oil derivatives have sales approval for US (EPA, Canada (CEPA), and Europe (REACH). Currently, we proudly maintain the following certifications for all products:



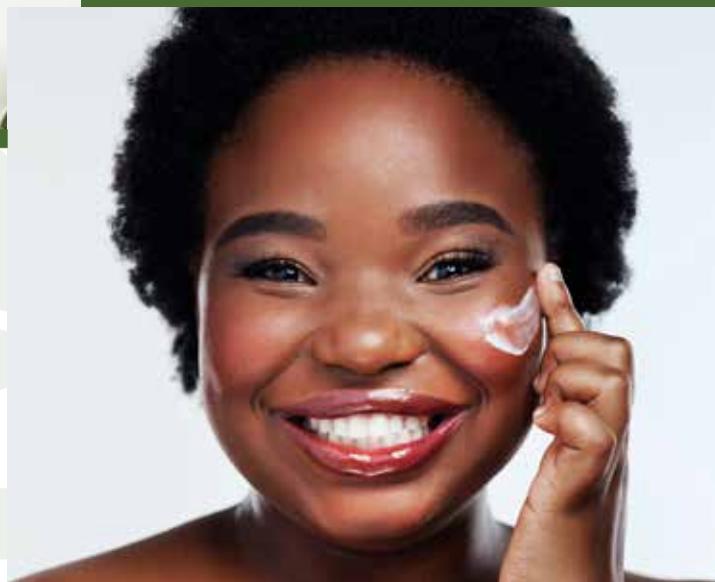
## SUSTAINABILITY AND CARBON FOOTPRINT

At Biosynthetic Technologies, we understand the importance of sustainable manufacturing practices. As such sustainability through innovation is a main driver of our company's mission. We are constantly looking for ways to minimize the negative impacts on the environment while conserving energy and natural resources. Our objective is to make sustainability a point of difference for our business, and we are confident that this strategy will generate even greater benefits for the environment in which we operate, the people that we work with and the communities we are part of. Biosynthetic Technologies is committed to sustainability and clearly focused on the responsible use of natural resources in our daily business. We understand that health, environmental awareness and traceability play just as large a role for consumers as quality and efficacy. Biosynthetic® Technologies is aware of its responsibility in this business and sustainability. As such, our manufacturing facility is operating with a NEGATIVE carbon footprint!



## FORMULATION ASSISTANCE

At Biosynthetic Technologies, we believe in the importance of offering superior technical support and customer service to our clients. We work closely with our partners to understand their needs and challenges and determine the best solutions to keep your businesses running smoothly. Our extensive R&D team and formulators is here to help in the creation of tailor-made ingredients to meet your specific formulation needs.



## ABOUT BIOSYNTHETIC TECHNOLOGIES

Biosynthetic® Technologies manufactures a revolutionary new class of biobased synthetic compounds called Estolides that are made from organic fatty acids found in various bio-derived oils. These highly functional biosynthetic oils have numerous uses in lubricant, automotive, marine, pharma and personal care applications and can be used as the primary base oil of a formulation, a component of a base oil co-blend, or even as an additive. In addition to their high-performance properties, these renewable oils are biodegradable and nontoxic. Biosynthetic Technologies strives to make their mark on the world by delivering innovations for a sustainable future. For more information about Biosynthetic Technologies, please visit [www.biosynthetic.com](http://www.biosynthetic.com) and follow us on LinkedIn or contact us at [info@biosynthetic.com](mailto:info@biosynthetic.com).

The information in this document relates only to the named product. The user is solely responsible for all determination regarding any use and any process. Typical properties depicted on this document are average values only and do not constitute a specification. Minor variations that do not affect product performance are to be expected during normal manufacture, and at different blending locations. Product data is subject to change without notification.

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