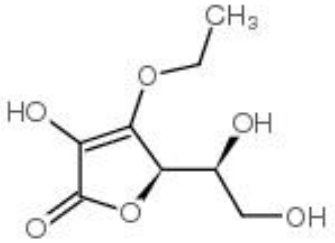
Introduction of Ethyl Ascorbic Acid

1. Ethyl Ascorbic Acid Overview

Ethyl Ascorbic Acid is a vitamin C derivative obtained by hydrocarbylation. It is stable to light, heat, acid, alkali; and it is not easily oxidized by air. It is a chemically stable vitamin C derivative. Also it is soluble in water, oil, and methanol.

Ethyl Ascorbic Acid can block melanin formation by inhibiting tyrosinase activity. It has effect of whitening skin. Additionally, Ethyl Ascorbic Acid has strong antibacterial and anti-inflammatory effect. It can resist inflammation caused by sunlight. Meanwhile, it can improve the dullness of skin and repair skin cells. It promotes collagen production, and has antioxidant and anti-aging effect. Ethyl Ascorbic Acid has been widely used in whitening and anti-aging cosmetics.

Product Name	**CAS Number**	**INCI Name**
Ethyl Ascorbic Acid	86404-04-8	3-O-ETHYL ASCORBIC ACID
Molecular Weight	**Molecular Formula**	**Molecular Structure**
204.18g/mol	$C_8H_{12}O_6$	

Product ID	Specification	Minimal Package	Minimal Order Quantity
PMB2201	99%	1KG	1KG

2. Ethyl Ascorbic Acid Source

Ethyl Ascorbic Acid is synthesized from vitamin C. The following are two common synthetic methods:

	One-step synthesis	Three-steps synthesis
Procedure	Ethyl Ascorbic Acid is obtained by directly hydrolyzing 3-hydroxyl group using vitamin C and ethyl methanesulfonate or diethyl sulfate as raw materials.	A series of reactions are carried out using vitamin C and acetone as raw materials and anhydrous copper sulfate as a catalyst to obtain Ethyl Ascorbic Acid.
Advantage	Less steps, simple operation.	Raw material is easy to get. Low cost, stable yield, high purity and easy to be industrialized.
Disadvantage	Hydroxyl group is replaced by many positions; and the product is difficult to be separated. It needs to be purified by column chromatography and is not suitable for industrial production.	–

3. Ethyl Ascorbic Acid Manufacturer Specifications

Product Name	Specification
Ethyl Ascorbic Acid	99%

Items	Specification
Appearance	White crystalline powder
Assay	≥99%

Physical Characteristics	
pH value (3% water solution)	3.5–5.5
Free of VC	≤10ppm
Loss on drying	≤0.5%
Ignition residue	≤0.2%
Heavy Metals	
Heavy Metals	≤10 ppm
As	≤2ppm

4. Ethyl Ascorbic Acid Advantage

Vitamin C has four hydroxyl groups in its structure. It cannot be directly absorbed by skin; and it is easily oxidized to cause discoloration. As a whitening agent, it is limited in use of cosmetics. Vitamin C ethyl ether is prepared by 3-hydroxyl hydrocarbylation:

(1) It is a vitamin C derivative that does not change color; and it does not affect its biological activity.

(2) In addition, Ethyl Ascorbic Acid is both oil-soluble and water-soluble. It allows it to be arbitrarily added to oil phase or aqueous phase of cosmetic formulation,. Also it can be added at high temperature or low temperature. So it is convenient to be applied in cosmetics.

(3) More importantly, its solubility makes it easier to penetrate stratum corneum into dermis to exert its biological effects.

Compared with other vitamin C derivatives, Ethyl Ascorbic Acid has advantages in solubility and pH stability, as shown in the following tables:

Comparison of vitamin C content and solubility

Name	Molecular weight	Vitamin C content(%)	Solubility
Ethyl Ascorbic Acid	204.18g/mol	86.3	Oil-soluble, water-soluble
Ascorbic Acid 2-Glucoside	338.27g/mol	52.0	Oil-soluble, water-soluble
Magnesium Ascorbyl Phosphate	303.5g/mol	49.3	Water-soluble
Sodium Ascorbyl Phosphate	358.08g/mol	46.55	Water-soluble

As can be seen from the above table, Ethyl Ascorbic Acid has the highest vitamin C content, and has the smallest molecular weight; it is both water-soluble and oil-soluble. It is more favorable to be absorbed by skin.

Comparison of pH stability

Name	pH
Ethyl Ascorbic Acid	4.0-6.0
Ascorbic Acid 2-Glucoside	6.0-7.0
Magnesium Ascorbyl Phosphate	7.0-9.0
Sodium Ascorbyl Phosphate	8.0-10.0

Ethyl Ascorbic Acid is a relatively acidic substance compared to other vitamin C derivatives. It is more suitable for human skin property.

5. Ethyl Ascorbic Acid Benefits

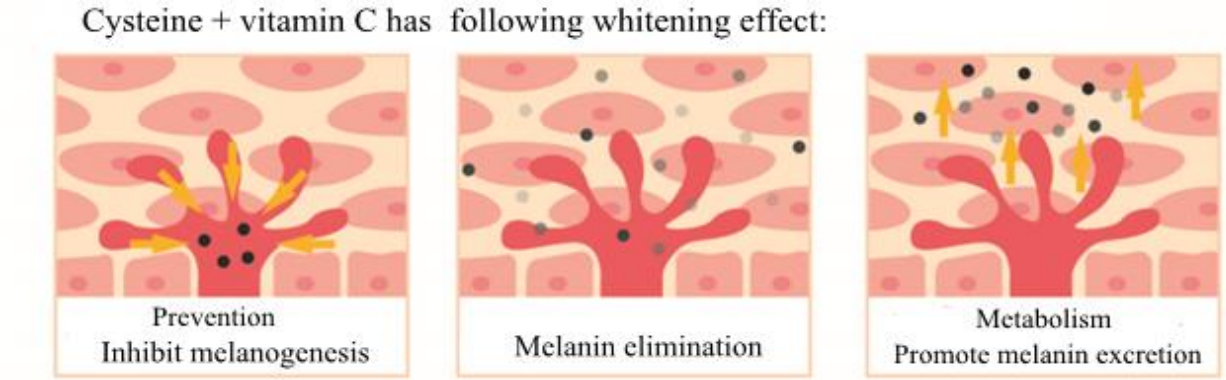
Ethyl Ascorbic Acid is easily decomposed by enzymes after being absorbed by skin. Thereby it plays the role of vitamin C in skin care:

- **Anti-aging**

Ethyl Ascorbic Acid is effective against free radicals. It can resist damage caused by UVA and UVB. Ethyl Ascorbic Acid prevents skin cells from aging and damage. It can help body to reduce the harmful free radicals produced by metabolism, and effectively fight free radicals.

- **Skin-whitening**

Ethyl Ascorbic Acid directly can reduce melanin to colorless reduced melanin. Then it exerts effect of whitening skin and lightening spots. It is also capable of reducing o-quinone by its own antioxidant activity; and it inhibits catalase activity to achieve the effect of inhibiting melanin formation.

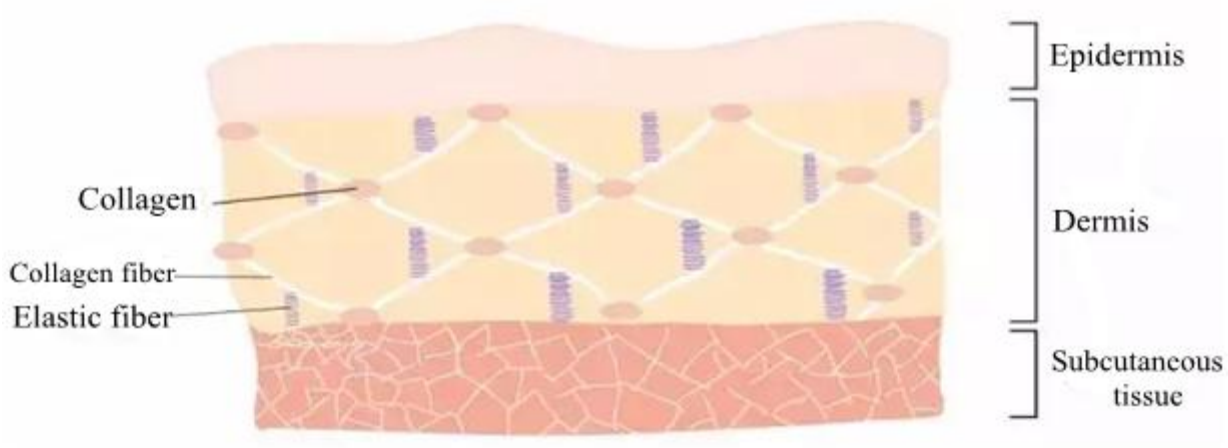


- **Anti-inflammatory**

Ethyl Ascorbic Acid promotes the synthesis and repair of collagen. It is effective against carbonation and saccharification. Thus it significantly resists inflammation on skin surface.

- **Promote collagen synthesis**

Ethyl Ascorbic Acid has the activity of repairing collagen (including repairing the composition and synthesis of collagen). It can promote formation of skin cells and synthesis of collagen according to the ratio of skin cells and collagen consumption. Therefore, it makes skin shiny and elastic.



6. Ethyl Ascorbic Acid Application and Reference Dosage

Ethyl Ascorbic Acid is widely used in whitening and anti-aging skin care products, such as lotion, cream, toner, mask, essence, etc. The recommended dosage in cosmetics is 0.5-3%.

Application	Reference Dosage
Whitening	2%

Note:

◆ When pH value of Ethyl Ascorbic Acid is 3.0-6.0, the whitening and freckling effect is the best.

Ethyl Ascorbic Acid application cases in major cosmetic brands in the world:

Country	Brand	Product
USA	KIEHL‘S	Corrective Dark Spot Solution Corrective White Clarity Activating Toner
	L'Oreal	Turn-Around Anti-Spot Essence
	GIORGIO ARMANI	Crema Nera Extrema Reviving Cream

Australia	Clorisland	Pure Bright Radiant Essence Toner
China	OSM	Pearl Brightening Lotion Pearl White Smoothing Lotion
	Genuine Namir	Snow Rose Crystal Whitening Essence
	Beauty Plus	VC Whitening Lotion
	For Beloved One	Melasleep Whitening Ethyl Ascorbic Acid Toner
Korea	SULWHASOO	Time-treasure Renovating Cream Ex
France	Garnier	Light Complete White Speed Super Essence
	BIOTHERM	White D-Tox CC Base Evenness SPF50+ PA++
	LANCOME	Absolute Precious Cells White Aura Serum Blanc Expert Beautiful Skin Tone Brightening Cream
Japan	SHISEIDO	Anessa Perfect Uv Sunscreen A+ Cr Melanoreduce Cr Shiseido White Lucent Luminizing Infuser
	FANCL	Whitening Essence Whitening Mask
	Dr.Ci.Labo	O2 Herbal Gel Oxygen Charge
	CLE DE PEAU	Beaute Brightening Serum Supreme L
Thailand	Beauty Buffet	Whitening Body Lotion Co-Enzyme Q10


7. Ethyl Ascorbic Acid Reference Formula

◆ **Whitening cream**

Phase	Ingredient	Content (%)	Ingredient	Content (%)
Oil phase	**Ethyl Ascorbic Acid**	2	Mineral oil	4.0
	Ethylhexyl Ferulate	3.5	Nicotinamide	1.5
	Polydimethylsiloxane	3.0	Lecithin	0.8
	Glyceryl Stearate	0.5	Methl Glucse Sesquistearate	0.6
	Methylparaben	0.2	Propylparaben	0.05
	Phenoxyethanol	0.5	Dimethiconol	4.0
	Caprylic Triglyceride	6.0	Cyclomethicone	4.0
Water phase	Deionized Water	Add To 100	Propylene Glycol	6.0
	Sodium Hyaluronate	0.1	Allantoin	0.2
	Fragrance	0.25	Chinese Medicine Extracts	10

Preparation method：

1. Add water phase ingredients to the water phase pot; heat to 85°C; stir to dissolve, and form an aqueous phase.
2. Add oil phase ingredients to the oil phase pot, stir and heat to 85°C. After dispersing completely, then pump into the emulsification pot; then get oil phase.
3. Slowly pump ingredients in water phase pan into the emulsification pot through the filter to emulsify. After emulsifying for 25 minutes, stop homogenization; open circulating water to cool down. Keep stirring and vacuumize to defoam.
4. Cool down to 45°C; add fragrance, and stir evenly. Continue to cool down to 38°C, then discharge to obtain the cream.

◆ **Sunscreen facial mask fluid**

Ingredient	Content (%)	Ingredient	Content (%)
Ethyl Ascorbic Acid	**0.5**	Hyaluronic Acid Oligomer	0.2
Butylene Glycol	3	Synthetic Egg White Powder	2

Aloe Extract	0.8	Scutellaria Baicalensis Extract	5
Propylene Glycol	0.5	Raspberry Ketone Glucoside	0.3
Glycerin	2	Macromolecular Hyaluronic Acid	0.3
Ginseng Extract	3	Liquorice Extract	3
Kojic Acid	0.8	Nano Titanium Dioxide	1.5
Water	Add to 100		

Preparation method：

1. Mix and dissolve ginseng extract, scutellaria baicalensis extract, and liquorice extract for 10-24 hours to obtain solution A.
2. Mix propylene glycol with 1,2-butanediol to obtain solution B.
3. Add hyaluronic acid oligomer, macromolecular hyaluronic acid, synthetic egg white powder, aloe extract, ethyl ascorbic acid to solution B. Disperse and mix by homogenizer to obtain solution C; dispersion speed of homogenizer is 10000 rpm; and for three times, each time is 5 seconds.
4. Dissolve kojic acid, nano titanium dioxide, and raspberry ketone glucoside in one-third of water solution to obtain solution D.
5. Add solution A to solution C, then add solution D, then add glycerin and the rest water to stir and dissolve. Stir in a homogenizer for 3 times, and 3 seconds each time; disperse speed is 10,000rpm. Then mask liquid is obtained.

◆ **Anti-aging emulsion**

Phase	Ingredient	Content (%)	Ingredient	Content (%)
Oil phase	Tocopherol Acetate	0.2	Methyl Glucose Sesquistearate	1.5
	Kiwi Fruit Seed Oil	3	Flaxseed Oil	3
	Geraniu Essential Oil	0.2	Bay Laurel Essential Oil	0.2
	Cinnamon Essential Oil	0.2		
Water phase	Ethyl Ascorbic Acid	0.2	Troxerutin	0.2
	Butanediol	10	Carbomer	0.15
	Water	Add to 100		
	Arginine	0.15	Solomonseal Rhizome P.E	0.5
	Benincasae Semen P.E.	0.5		

Preparation method：

1. The oil phase ingredients are heated to 70-90°C; stir and dissolve, and pressurize 0.1-10 MPa.
2. The water phase ingredients are heated to 70-90°C; stir to dissolve, and pressurize 0.1-10Mpa.
3. Inject the water phase into the oil phase mixture; homogenize for 3-5 minutes, then stir for 15 to 45 minutes. Release the pressure, and cool down to 45°C, and then add arginine, solomonseal rhizome P.E, Benincasae Semen P.E., and stir evenly.

◆ **Whitening essence**

Phase	Ingredient	Content (%)	Ingredient	Content (%)
A Phase	Sodium Hyaluronate	0.03	1,3-Butanediol	4
	Propylene Glycol	3	Glycerin	3
	Deionized Water	Add to 100		
B Phase	**Ethyl Ascorbic Acid**	2		
	Fragrance	q. s.	Preservative	q. s.

Preparation method：

The phase A is heated to 85°C. Stir until completely dissolve, and cool down to below 45°C. Then add phase B. After dissolving completely, stop stirring. And then obtain the essence.

8. Ethyl Ascorbic Acid Safety

★ The CIR Expert Panel has experimentally concluded that Ethyl Ascorbic Acid is safe for use in cosmetics;

★ In 2010, the Department of Health announced that ethyl ascorbic acid is a whitening ingredient that can be added to cosmetics. The dosage limit is 1-2%.

9. Packing and Storage

Package: Packed in 25kg paper drums with two plastic bags inside.

Storage: Stored in a cool dry place and away from direct sunlight and oxidizing agents.