

Tocopherol (Vitamin E) – Extracted and Purified by Short Path Distillation of Plant Oil Deodorizer Distillates

Case Study

KEY FACTS

- Meet growing customer demand for premium and natural products
- Economical high-volume production
- Sustainable production



Application

Tocopherols (vitamin E) are a versatile and essential nutrient with widespread applications in the health, cosmetic, pharmaceutical and food industries, and are highly valued as antioxidants.

Synthetic production of stable and pure tocopherol is possible, popular and established, especially for animal feeds, low-cost mass cosmetic products but also pharmaceuticals.

With the increasing demand and consumer preference for premium and natural products, especially in the food and beverage and dietary supplement industries, there is a growing need to focus on natural tocopherol extraction.

The most common source of natural tocopherols are deodorizer distillates from soybean, sunflower, palm, canola or other vegetable oils. The use of these distillates from vegetable oil refining is cost-effective and sustainable as it uses side streams.

Molecular distillation offers the most efficient process to produce these distillates. Molecular distillation, also known as Short Path Distillation, offers low residence time and minimal thermal degradation of the feed stock.

Challenges

The production of high-quality tocopherol from vegetable oil deodorizer distillates present two major challenges:

- Tocopherol is a high boiling point compound
- The deodorizer distillates contain various compounds and require a sophisticated separation process to obtain concentrated tocopherol





Solution

Vegetable oil deodorizer distillates are a mixture of free fatty acids, mono-, di-, and triglycerides, tocopherols and sterols, and some impurities.

After optional upstream processes such as esterification, neutralization and washing, the mixture is ready for the short path distillation process to obtain concentrated tocopherol.

Short path distillation is a continuous vacuum distillation process. A wiper in the cylindrical evaporator distributes the oil to a thin film on the heated evaporator wall. Lighter boiling components will evaporate from this highly turbulent film.

Using short path distillation prevents thermal degradation of tocopherol due to low operating temperatures. Gentle operating conditions avoid formation of unwanted by-products that reduce shelf life and efficacy.

The benefits of short path distillation are:

- Continuous distillation at lowest vacuum levels down to 0.001 mbar absolute
- Short residence time
- High evaporation rates
- Low processing temperatures
- Low evaporator wall fouling
- Compact design

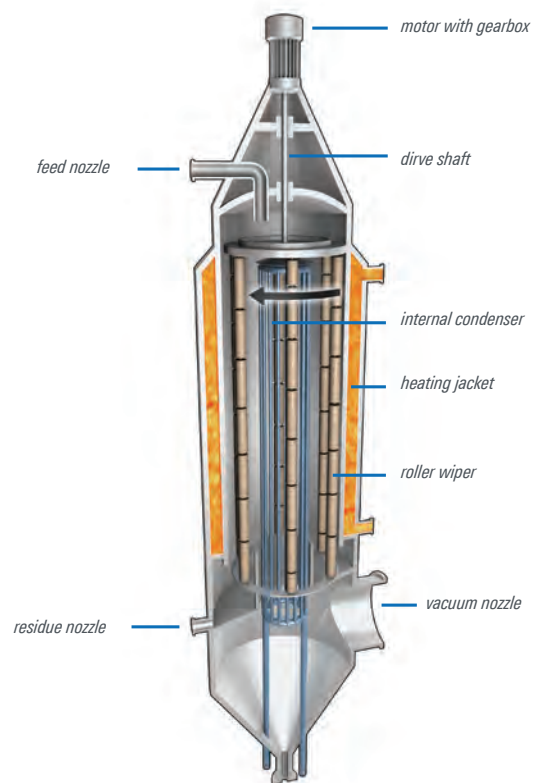
Depending on the composition of the feedstock, a multi-stage distillation process may be required.

VTA and UIC have more than 40 years of experience in designing process solutions for tocopherol concentration for various international customers. We support our customers in the design of the right purification process, from the initial trials to evaluate the perfect distillation conditions in one of our two state-of-the-art laboratories, through plant design, supply, installation and commissioning, to after-sales service.

We offer suitable plants in all sizes, from small laboratory test plants to pilot plants to industrial scale plants. One of our biggest success stories in tocopherol purification is a six-stage tocopherol purification plant delivered to a customer in China, consisting of a thin film evaporator and five downstream short path evaporators.

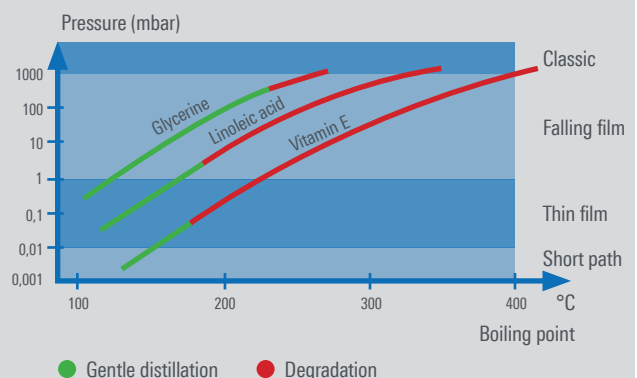
We can also perform your contract distillation for any batch size you require. Let us take on your next distillation challenge together!

Short Path Distiller



Typical working areas of various distillation processes

Vapor pressure curve



VTA and UIC are the partners for demanding process solutions of high-end thermal separation tasks. The distillation specialists offer small, standardized laboratory units up to tailor-made, skid-mounted industrial size facilities. Testing, engineering and manufacturing is performed in-house at the headquarters in Germany. VTA and UIC offer contract distillation on different toll processing plants. VTA and UIC are offering wiped and short path distillation equipment and process development for various industrial sectors with high boiling and thermal sensitive products.

Technologies

- Thin Film / Wiped Film Distillation
- Short Path Distillation
- Horizontal Thin Film Distillation
- Thin Film Drying
- Fractionation



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