

Tocopherol & Natural Vitamin E Recovery

Executive Project Presentation

High-value recovery from vegetable oil deodorizer distillate

FROM BY-PRODUCT TO HIGH VALUE

Tocopherol & Natural Vitamin E Recovery

Unlock the value in deodorizer distillate

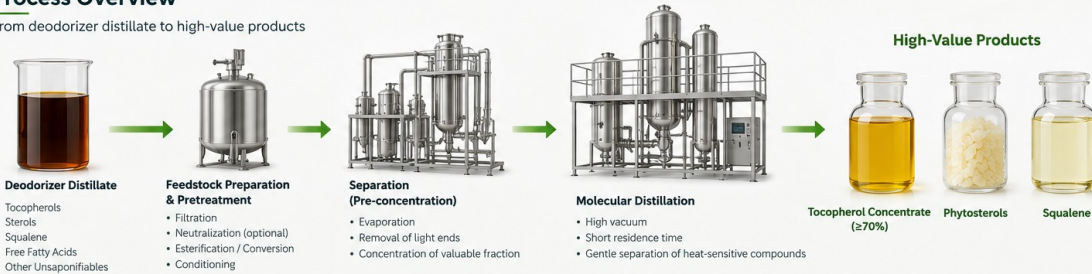
Advanced process solutions for the recovery of natural tocopherols, sterols, squalene and other valuable components from vegetable oil deodorizer distillates.

 Sustainable Value Creation  Proven Separation Technologies  Improved Refinery Economics  Natural Ingredients for a Healthier Tomorrow

More Value for a Sustainable Future

Process Overview

From deodorizer distillate to high-value products



Deodorizer Distillate
Tocopherols
Sterols
Squalene
Free Fatty Acids
Other Unsaponifiables

Feedstock Preparation & Pretreatment

- Filtration
- Neutralization (optional)
- Esterification / Conversion
- Conditioning

Separation (Pre-concentration)

- Evaporation
- Removal of light ends
- Concentration of valuable fraction

Molecular Distillation

- High vacuum
- Short residence time
- Gentle separation of heat-sensitive compounds

High-Value Products

Tocopherol Concentrate (≥70%) Phytosterols Squalene

Key Advantages

 High Product Recovery  Gentle Separation for Heat-Sensitive Compounds  Flexible for Different Oil Sources  Additional Revenue from Existing By-Product  More Sustainable Refining

Applications

 Food & Beverage  Nutraceuticals  Animal Nutrition  Cosmetics  Pharmaceuticals  Specialty Chemicals

SAVE TECH
PROCESS SOLUTIONS FOR A BETTER TOMORROW

Engineering | Technology | Sustainable Value

Executive Opportunity

Transforming an existing refinery side stream into a portfolio of higher-value products

- Vegetable oil deodorizer distillate contains valuable tocopherols, sterols, squalene and fatty-acid-rich fractions.
- Instead of selling the stream primarily as a low-value by-product, selective recovery can create additional product and revenue streams.
- Save Tech develops the project around feedstock composition, required product quality, capacity, utilities and investment strategy.
- Primary design focus: product recovery, controlled thermal exposure, process efficiency and commercially viable integration.

Feedstock

Deodorizer distillate

Conversion

Pretreatment & separation

Core Technology

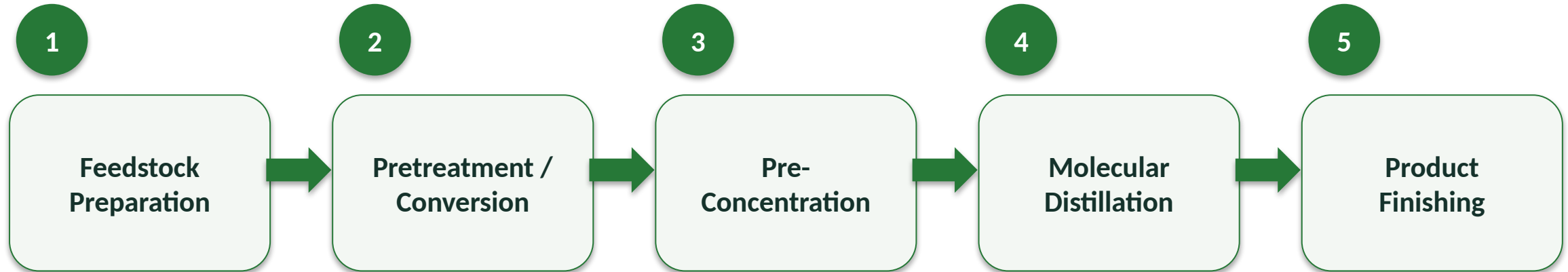
Molecular distillation

Products

Tocopherol • Sterol • Squalene

Process Concept

A modular route from deodorizer distillate to concentrated natural components



- High vacuum and short residence time reduce thermal exposure of heat-sensitive components.
- Final configuration depends on feedstock analysis and target product specifications.
- Side fractions can be evaluated for additional commercial value rather than treated only as waste.

Target Product Portfolio

Multiple value streams can be developed from a single refinery by-product

Natural Tocopherols

Vitamin E concentrates
Available grades: 30% / 50% / 70%

Phytosterols

High-value plant sterol fraction
for downstream purification

Squalene

Valuable unsaponifiable fraction
subject to feedstock composition

Fatty Acid Fraction

Potential downstream utilization
or integration with oleochemical routes

Flexible Grade Strategy: 30% | 50% | 70% Tocopherol Concentrates

Feedstocks & Markets

Designed for vegetable-oil refinery streams and diversified end-use markets

Potential Feedstocks

- Sunflower deodorizer distillate
- Soybean deodorizer distillate
- Rapeseed / canola deodorizer distillate
- Corn-oil and other tocopherol-rich distillates

Application Areas

- Food & beverage
- Nutraceuticals
- Animal nutrition
- Cosmetics
- Pharmaceuticals
- Specialty chemicals

Save Tech Project Scope

Support from feasibility and process definition through industrial implementation

Feedstock characterization & feasibility

Mass and energy balance

Process flow diagrams & equipment sizing

Technology / equipment integration

CAPEX & OPEX development support

Detailed engineering / EPC-EPCM coordination

Commissioning & performance optimization

CE / ATEX / PED-oriented project requirements

Indicative Design Basis

A representative project basis for executive evaluation

Feedstock	Sunflower deodorizer distillate
Feed condition	Approx. 230 °C / 3 mbar at deodorization source
Typical feed tocopherol	Approx. 4–5 wt% — to be confirmed by analysis
Target product	30% / 50% / 70% Tocopherol Concentrates
Design objective	Flexible 30% / 50% / 70% product grades based on feedstock and market requirements
Indicative plant scale	1,000–1,500 kg/h feed basis
Product handling	Nitrogen-blanketed storage; final packaging per product specification

Business Case Framework

Economic performance should be built from actual feedstock and product data

- Feedstock opportunity cost / current by-product selling price
- Tocopherol, sterol, squalene and fatty-acid fraction yields
- Product purity and achievable market pricing
- Utilities: steam / thermal oil, electricity, cooling water and vacuum
- Consumables, catalysts/chemicals, labor and maintenance
- CAPEX, ramp-up assumptions, working capital and product qualification
- Scenario analysis for feed composition, recovery and product price

Executive Decision Gate

1. Confirm feed analysis
2. Define product specification
3. Complete mass balance
4. Obtain market/offtake indications
5. Freeze CAPEX & financial model

Recommended Next Steps

- 1 Laboratory analysis of representative deodorizer distillate
- 2 Define target tocopherol purity and co-product strategy
- 3 Develop preliminary mass balance and technology configuration
- 4 Prepare budgetary CAPEX/OPEX and financial feasibility
- 5 Proceed to basic engineering and supplier/EPC package

Project Communication Visual

A concise visual for management discussions, website use and early-stage customer presentations

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Improved Refinery Economics



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