



KRATON

SUSTAINABLE SOLUTIONS.
ENDLESS INNOVATION.™



PRODUCT GUIDE
OLEOCHEMICAL AND ROSIN

TABLE OF CONTENTS

3
4
4
5
6
7
8
8
8
10

Back
Cover

Sustainable Solutions

Our product's low carbon footprint and high biobased content can help advance customers' sustainability goals. As part of our commitment, we have obtained biobased certifications for our products under the U.S. Department of Agriculture (USDA) BioPreferred® Program.

Over 150 of Kraton products are USDA BioPreferred certified, meaning they meet or exceed the minimum biobased requirements for one or more product categories identified by the USDA. The biobased certification provides scientific, independently verified evidence of Kraton products' biomass content, based on ASTM D6866, a widely used testing standard.

Broad Product Application

You can find SYLFAT™, SYLVAROS™, SYLVATAL™, UNIDYME™, and CENTURY™ pine chemicals in applications:

- » Alkyd Resins
- » Lubricant Additives
- » Special Industrial & Household Cleaners
- » Metalworking Fluids
- » Rust Inhibitors
- » Flotation Reagents/Collectors
- » Asphalt Emulsions
- » Anti-wear Agents
- » Plasticizers for Rubber
- » Epoxy Ester Resins
- » Friction Modifiers
- » Construction
- » Ester Solvents
- » Oilfield Chemicals
- » Coatings Surfactants
- » Fuel Additives
- » Textiles
- » Paper Sizing





LEADING GLOBAL PRODUCER OF PINE CHEMISTRY

HIGH-QUALITY, EXCELLENT CONSISTENCY

Kraton develops, manufactures and markets biobased chemicals and specialty polymers that deliver exceptional value and enhance the lives of people all over the world.

Our biobased chemistry portfolio delivers sustainable value, helping numerous industries replace non-renewable sources with environmentally-friendly alternatives offering unmatched performance. With almost a century of experience making pine-based raw materials and the largest manufacturing capacity worldwide, our specialty chemicals help improve the quality of thousands of everyday products through safer, better chemistry. Our manufacturing facility in Sandarne, Sweden was one of the pioneers in developing a process for refining tall oil into biobased chemicals. In fact, the term "tall" originated from the Swedish term for pine trees.

Kraton is the world's largest producer of pine chemicals and specialty resins based on crude tall oil (CTO), a byproduct of pine wood pulping. This feedstock and our primary bio-refinery products – SYLFAT™ tall oil fatty acids (TOFA), SYLVAROS™ tall oil rosin (TOR) and SYLVATAL™ distilled tall oil (DTO) – are biobased, natural, non-edible and have an overall lower carbon footprint compared to vegetable alternatives.

CTO is derived from pine trees, so it is not as sensitive to seasonal changes compared to other plant-derived alternatives. This, in combination with our world-class bio-refineries, enable our products to have excellent composition consistency and constant high quality.

High Supply Security

Kraton's global, well-established network of bio-refineries enables us to provide high supply security of products. In combination with our bio-derived raw material, our products deliver excellent composition consistency and constant high quality.

Advancing the Biobased Economy

We recognize a growing need for customers to integrate their processes and products into the biobased economy. Our sustainable solutions can help customers to:

- » Shift to the use of renewable raw materials
- » Lower carbon footprint*
- » Extend product life
- » Improve product performance

Sustainable Chemistry

- » Biobased
- » Produced from a by-product of Kraft pulp industry
- » Sourced from responsibly managed forests
- » Do not compete for land with food crops
- » Are not genetically modified (non-GMO)
- » Do not require land-use change

* All relevant life cycle stages of the end-product must be considered to identify the overall life cycle impact along the value chain. The actual life cycle performance improvement that is achieved can only be concluded through an ISO certified process. Product specific biogenic carbon credit depends on process, composition and local energy source.





Fatty Acids

SYLFAT™ and **CENTURY™** fatty acids are useful in a wide range of industrial applications. The utility of these product ranges can be found in the long carbon chain (C18), acid function of the carboxyl group (COOH) and unsaturation of the double bonds. Each of the SYLFAT and CENTURY fatty acids have a unique degree of unsaturation and fatty acid distribution, which is related to the region of origin.

All SYLFAT tall oil fatty acids (TOFA) have a high fatty acid content, a low content of rosin acids and unsaponifiables, SYLFAT 2 and SYLFAT 2LT are from European, particularly Scandinavian, origin and have a specific characteristic to have more double bonds (e.g. higher Iodine Value) compared to TOFA with an origin

closer to the equator, such as SYLFAT FA1 and SYLFAT FA2. SYLFAT 2 and SYLFAT FA2 provide a combination of light color, good color stability and air-drying properties. SYLFAT 2LT is a specialty grade of TOFA with excellent low temperature properties typically used as fuel additive to improve lubricity of low sulfur diesel.

CENTURY Pine-based, Branched Fatty Acids offer a unique mixture of branched and straight-chain saturated/unsaturated C18 fatty acids and differ in unsaturation level and viscosity.

CENTURY D1 and CENTURY M05 contain both saturated and unsaturation C18 fatty acids, with branched chain iso-oleic acids constituting the main portion, and with virtually no polyunsaturated fatty acids.

| Product | SYLFAT 2 | SYLFAT 2LT | SYLFAT FA1 | SYLFAT FA2 | CENTURY D1 | CENTURY M05 |
|-------------------------------------|----------|------------|------------|------------|---------------------|---------------------|
| Product Description | TOFA | TOFA | TOFA | TOFA | Branched Fatty Acid | Branched Fatty Acid |
| Region of Origin | Europe | Europe | USA | USA | USA | USA |
| Color Gardner | 4 | 4 | 4 | 3 | 2 | 3 |
| Biobased Content* (%) | 100 | 100 | 100 | 100 | 100 | 100 |
| Acid Value (mg KOH/g) | 195 | 195 | 194 | 196 | 174 | 177 |
| Viscosity (mPa.s at 20°C) | 35 | 33 | 35 | 33 | Solid | Semi-solid |
| Free Rosin Acids (%) | 1.9 | 1.9 | 2.5 | 0.9 | NA | NA |
| Unsaps (%) | 1.7 | 1.8 | 2.0 | 1.3 | 7 | 7 |
| Iodine Value (cg I ₂ /g) | 151 | 154 | 125 | 125 | 75 | 80 |
| Pour Point (°C) | -9 | -13 | 3 | 2 | - | - |
| Cloud Point (°C) | -6 | -10 | 4 | 9 | - | - |

Typical results and actual product specifications can be obtained from Product Data Sheets

*According to the USDA BioPreferred® Program. USDA Biobased product certificate available upon request..



Distilled Tall Oil

The **SYLVATAL™** products are distilled tall oils (DTO) containing 10-40 percent rosin acids. SYLVATAL products combine the advantages of fatty acids and rosin acids, and therefore, an ideal raw material for functional products like metalworking fluids, oilfield chemicals, soaps, cleaners and alkyd resins. SYLVATAL grades help to provide hardness improvement for indoor varnishes with high gloss and excellent water and alkali resistance. When used as magnesium soaps, SYLVATAL products can be efficient dispersants for fuel oils.

SYLVATAL 10S, SYLVATAL 20S, SYLVATAL 20/25S and SYLVATAL 20/30S grades are from European, particularly Scandinavian, origin and have a specific characteristic to have more double bonds (i.e. higher Iodine Value) compared to DTO with an origin closer to the equator, such as SYLVATAL D25LR, SYLVATAL D30LR and D40LR products.

| Product | SYLVATAL 10S | SYLVATAL 20S | SYLVATAL D25LR | SYLVATAL 25/30S | SYLVATAL D30LR | SYLVATAL D40LR |
|---------------------------|--------------|--------------|----------------|-----------------|----------------|----------------|
| Product Description | DTO | DTO | DTO | DTO | DTO | DTO |
| Region of Origin | Europe | Europe | USA | Europe | USA | USA |
| Color Gardner | 5 | 5 | 3 | 6 | 3 | 4 |
| Biobased Content* (%) | 100% | 100% | 100% | 100% | 100% | 100% |
| Acid Value (mg KOH/g) | 193 | 191 | 188 | 196 | 186 | 183 |
| Viscosity (mPa.s at 20°C) | 45 | 70 | 120 | 115 | 170 | 340 |
| Free Rosin Acids (%) | 10% | 20% | 26% | 27% | 30% | 37% |
| Unsaps (%) | 2% | 2% | 4% | 2% | 4% | 4% |

Typical results and actual product specifications can be obtained from Product Data Sheets

*According to the USDA BioPreferred® Program. USDA Biobased product certificate available upon request..



Polymerized Fatty Acids

UNIDYME™ products are dimerized fatty acids specially designed for the manufacture of polyamide resins, other high molecular weight intermediates and certain specialty additive applications. Based on the same feedstocks as our SYLFAT fatty acids, UNIDYME products are also characterized by a high composition consistency and constant high quality.

Tall Oil Rosins and Soaps

Tall oil rosin (TOR) is a primary bio-refinery product based on crude tall oil (CTO) and comparable to the resinous constituent found in pine tree exudates.

SYLVAROS™ NCY products are an unmodified TOR with a high content of abietic type rosin acids. It is especially suited for the manufacture of fortified rosin, paper size and ink resins. SYLVAROS Rosin and Disproportionated Rosins (DR) can be used for the manufacture of emulsifiers for the polymerization process and pigment coating. DR grades are further suitable for the formulation of solvent- based and hot-melt adhesives as well as in the manufacture of adhesive tapes and rubber

products. Other applications are lacquers, soldering fluxes, sealants, marine coatings and the production of rosin derivatives.

SYLVAROS Rosin Soaps (RS) and Disproportionated Rosin Soaps (DRS) are used as emulsifiers in the polymerization process of styrene-butadiene rubber, nitrile rubber, polychloroprene and acrylonitrile-butadiene-styrene plastics. It is also suitable for the preparation of pigments, as anchoring agent and in the adhesive industry to improve adhesive properties on basis of casein or polymer dispersions.

| Product | SYLVAROS 85 | SYLVAROS NCY | SYLVAROS DR 22 NC | SYLVAROS DRS 214 |
|----------------------------------|-------------|--------------|-------------------|------------------|
| Product Description | TOR | TOR | TOR | K-Rosin Soap |
| Region of Origin | USA | USA | USA | Europe |
| Color Gardner | 5 | 7 | 4 | 6 |
| Biobased Content* (%) | 100 | 100 | 100 | Not Yet Rated |
| Acid Value (mg KOH/g) | 175 | 165 | 166 | 11 |
| Abietic Acid % of Solids | 33 | 35 | 0.5 | 0.3 |
| Dehydroabietic Acids % of Solids | 20 | 18 | 55 | 51 |
| Unsaps (%) | 4 | 6 | 8 | 9 |
| Solid Content (%) | 100 | 100 | 100 | 80 |
| Rosin Content (%) | 88 | 85 | 87 | 76 |

| Product | UNIDYME 14 | UNIDYME 18 | UNIDYME 22 | UNIDYME 35 |
|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Product Description | Distilled Dimer Acid | Distilled Dimer Acid | Distilled Dimer Acid | Distilled Dimer Acid |
| Region of Origin | USA | USA | USA | USA |
| Color Gardner | 5 | 7 | 7 | 8 |
| Biobased Content* (%) | 100 | 100 | 100 | 100 |
| Acid Value (mg KOH/g) | 195 | 194 | 194 | 194 |
| Viscosity (mPa.s at 20°C) | 8500 | 11000 | 11250 | 10600 |
| Dimer Acids (%) | 94 | 81 | 81 | 81 |
| Monomer Acids (%) | 0.6 | 1.7 | 1.8 | 1.7 |
| Timer Acids (%) | 6 | 17 | 17 | 18 |
| Unsaps (%) | 0.2 | 0.2 | 0.1 | 0.1 |

Typical results and actual product specifications can be obtained from Product Data Sheets

*According to the USDA BioPreferred® Program. USDA Biobased product certificate available upon request..



| SYLVAROS DRS 215 | SYLVAROS DRS 40 | SYLVAROS DRS 42 | SYLVAROS RS 200 |
|------------------|-----------------|-----------------|-----------------|
| K-Rosin Soap | K-Rosin Soap | K-Rosin Soap | K-Rosin Soap |
| Europe | USA | USA | USA |
| 6 | 3 | 3 | 7 |
| No Yet Rated | Not Yet Rated | Not Yet Rated | Not Yet Rated |
| 10 | 16 | 12 | 10 |
| 0.7 | 0.4 | 0.5 | 33 |
| 50 | 53 | 53 | 20 |
| 9 | 8 | 8 | 4 |
| 84 | 80 | 80 | 55 |
| - | - | - | - |

Typical results and actual product specifications can be obtained from Product Data Sheets

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Potential Applications

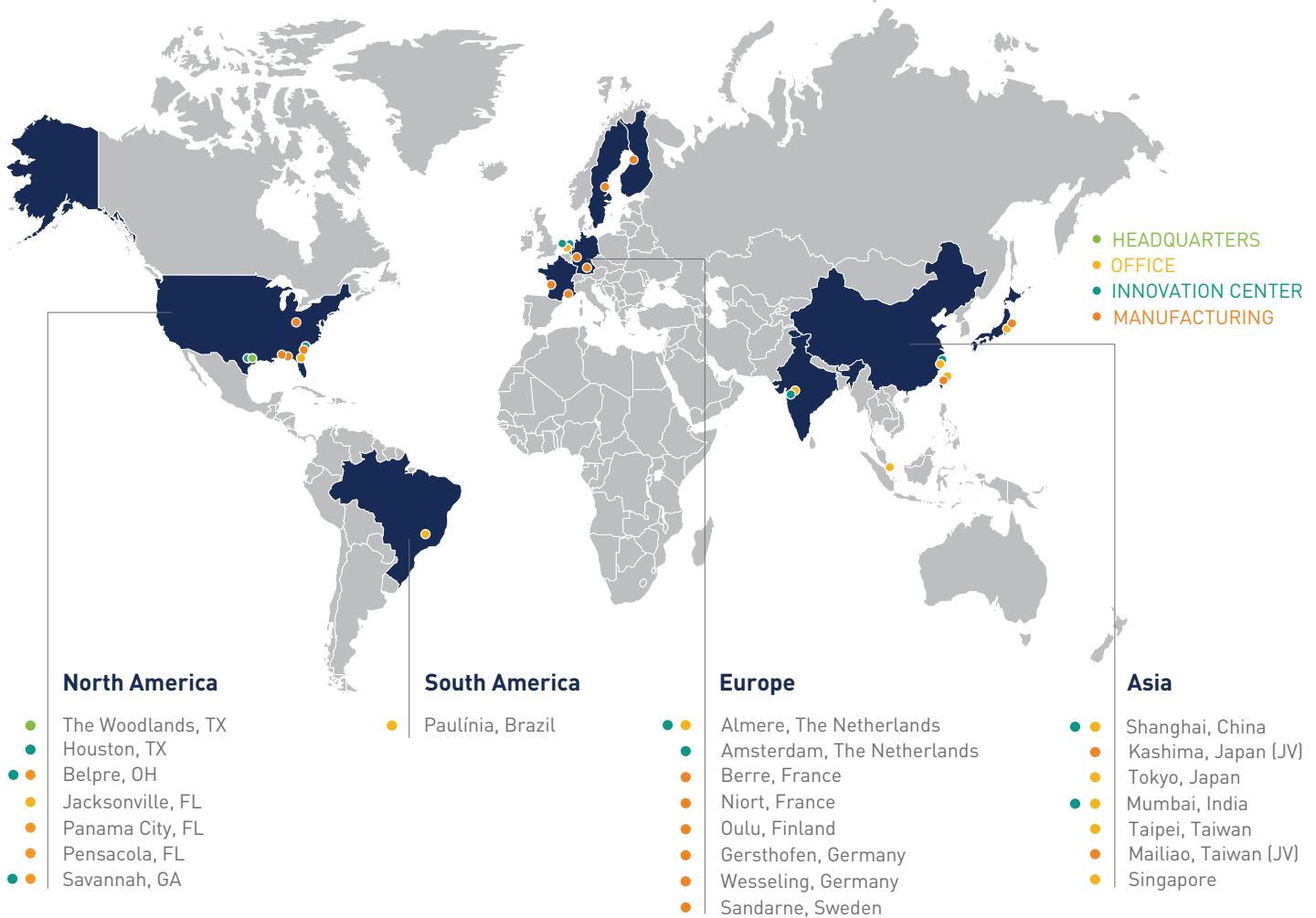
SYLFAT™, CENTURY™, SYLVATAL™, SYLVAROS™ and UNIDYME™ pine chemicals are used for their functional properties, such as chemical reactivity and surface activity in chemical synthesis or in formulated products. For instance, the functionality of the carboxylic group of the fatty acids can be used to react with amines to form new amines, amides and imidazolines. This same functional group is readily reacted with mono-, di-, and poly alcohols to form esters offering unique properties. The unsaturation sites in the carbon chain's backbone can be used in Diels-Alder reactions to make adducted products. Dimer acids can be produced from TOFA, either thermally or catalytically.

| | SYLFAT | SYLVATAL |
|---|-------------------------------------|-------------------------------------|
| | Tall Oil Fatty Acid | Distilled Tall Oil |
| <input checked="" type="checkbox"/> Recommended <input type="checkbox"/> Functional | | |
| Asphalt Emulsions | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Agrochemicals | | |
| Adjuvants | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Slow-Release Fertilizer Coatings | | <input checked="" type="checkbox"/> |
| Construction | | |
| Concrete Release Agents | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Concrete Air Entrainment | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Ester Solvents | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Fuel Additives | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Lubricants | | |
| Lubricant Esters / Base Oils | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Lubricants Additives | <input checked="" type="checkbox"/> | |
| Metalworking Fluids | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Mineral Processing- Flotation Reagents/Collectors | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Oilfield Chemicals | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Plasticizers For Rubber | <input checked="" type="checkbox"/> | |
| Resins | | |
| Alkyds, Short Oil | | <input checked="" type="checkbox"/> |
| Alkyds, Medium/Long Oil | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Antifouling Coatings | | |
| Phenolic / Resinate Ink Resins | | |
| Epoxy Esters | <input checked="" type="checkbox"/> | |
| Pigment Wetting Agents | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Polyamide Curing Agents | <input checked="" type="checkbox"/> | |
| UV Curing Resins | | |
| Special Industrial & Household Cleaners | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Textiles | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |



KRATON

GLOBAL FOOTPRINT



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