KRATON™

SUSTAINABLE SOLUTIONS.
ENDLESS INNOVATION.™

TACKIFIERS FOR ADHESIVES

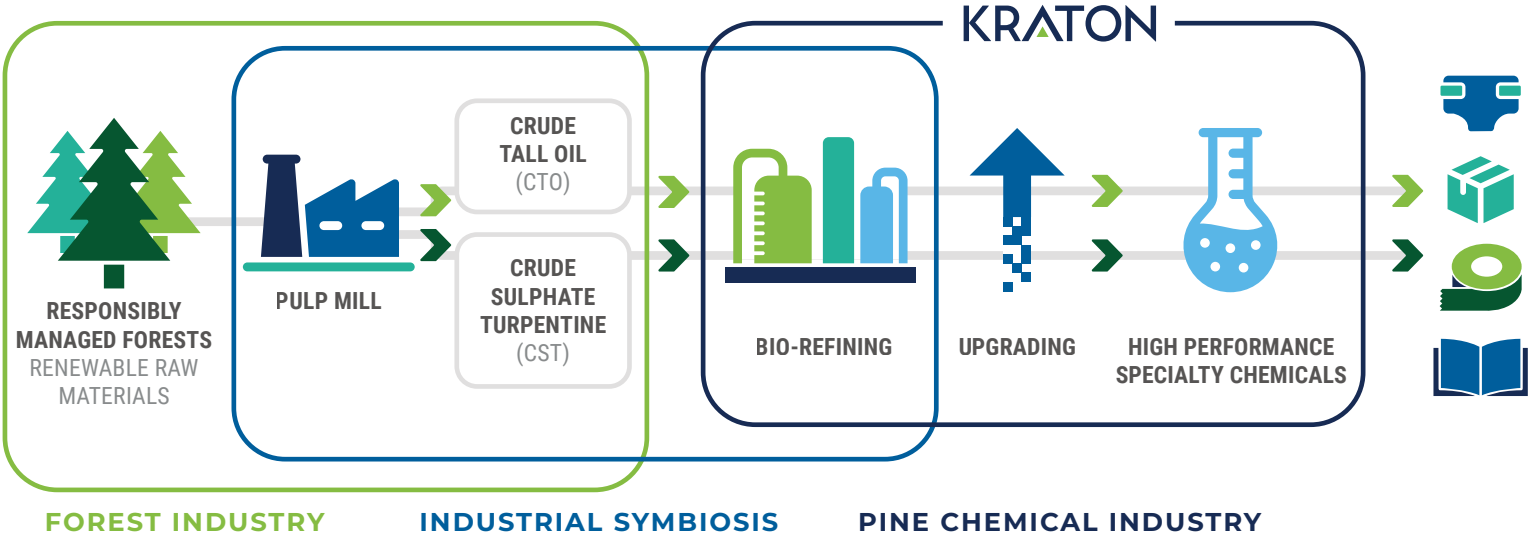
Table of Contents

Biobased Product Portfolio

Kraton is dedicated to advancing the biobased economy, offering innovative solutions to help customers reduce the usage of fossil-based materials, increase the use of renewable resources, and lower carbon emissions while enhancing product performance and extending product life.

Kraton is the frontrunner in biorefining crude tall oil (CTO) and crude sulfate turpentine (CST), renewable by-products of the paper and pulp industry sourced from responsibly managed forests. We benefit from the forest industrial symbiosis and make optimal use of renewable resources, maximizing the value of our raw materials while minimizing waste and environmental impact.

Biorefining Process



Meeting our customers' sustainability needs requires credible data that helps quantify the value of using Kraton products. Our participation in the USDA BioPreferred® program and the recent update of Kraton's Life Cycle Assessment program are a testimony of our commitment to supporting our customers in achieving those targets.

USDA BIOPREFERRED® PROGRAM

Kraton offers more than 160 United States Department of Agriculture (USDA) certified Biobased Products. Following the USDA BioPreferred® program certification scheme, the biobased content is measured using the widely accepted American Society for Testing and Materials (ASTM) D6866 standard. This offers transparency and credibility and scientific evidence of the biogenic carbon content in our products.

The USDA has recognized Kraton as a BioPreferred Program Champion to signify our long-term commitment to supporting the bioeconomy and bettering the planet.

For more information, visit:
https://www.biopreferred.gov/BioPreferred/

KRATON LIFE CYCLE ASSESSMENT PROGRAM

Our Life Cycle Assessment (LCA) program is not just about data. It's about empowering our customers to achieve their environmental goals, especially with reducing their Scope 3 greenhouse gas emissions. By providing this information, we enhance the transparency and credibility of their sustainability claims, fostering a stronger, more sustainable future for all.

As a commitment to continuously enhance our Life Cycle Assessment (LCA) capabilities and meet the demand for credible environmental impact data, Kraton is rolling out its LCA program. Our data is systematically collected per plant to ensure the reliability and traceability of the information.

The LCA program enables us to identify hotspots to improve on and foster closer engagement with suppliers, supply chain partners, and customers.

In addition to product carbon footprint, The LCAs include a Life Cycle Impact Assessment according to the most used methodologies (EPD - Environmental Product Declaration, PEF – product environmental footprint, TRACI – Tools for the Reduction and Assessment of Chemicals and other environmental Impacts). This approach provides our customers with the necessary data to make informed decisions that align with their commitment to environmental stewardship.

Please contact your account manager to discover how the Kraton Life Cycle Assessment program can benefit your business and the environment.

ISCC PLUS CERTIFICATION

The chemical industry faces various challenges in transitioning to the use of recycled or renewable raw materials.

The mass balance approach offers the opportunity to start using more sustainable raw materials, and ISCC PLUS is a globally applicable sustainability certification system that covers all sustainable feedstocks.

ISCC PLUS provides traceability along the supply chain and verifies that a company's use of certified recycled or renewable raw material matches the amount of recycled or renewable content attributed to their end products.

A number of our Pine Chemicals production facilities have obtained ISCC PLUS certification. This allows our customers to certify their own mass balance approach to produce ISCC PLUS sustainable products.

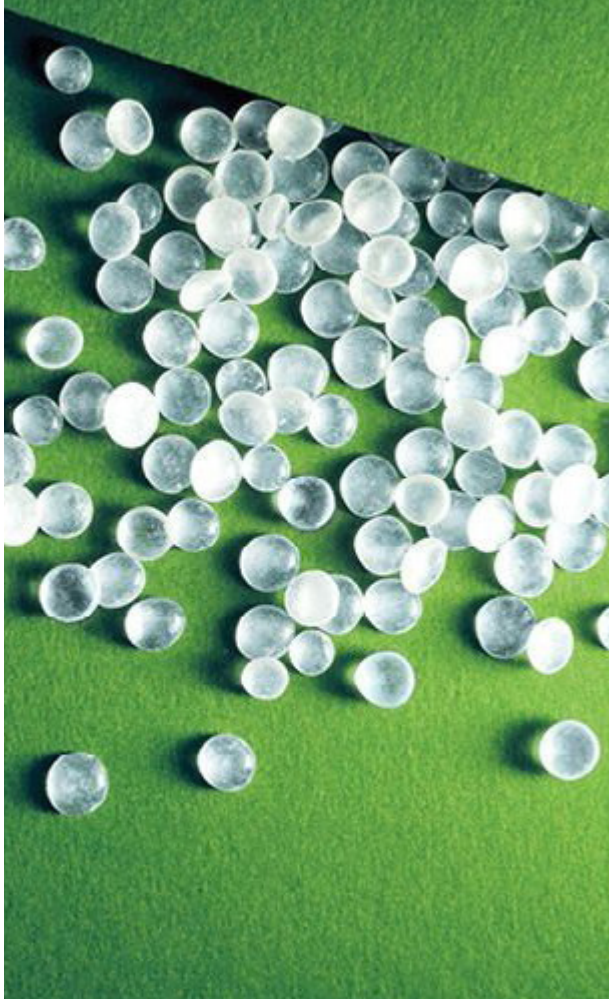
Please contact your account manager to discover how the Kraton ISCC PLUS program can benefit your business and the environment.

Tackifiers for Adhesives

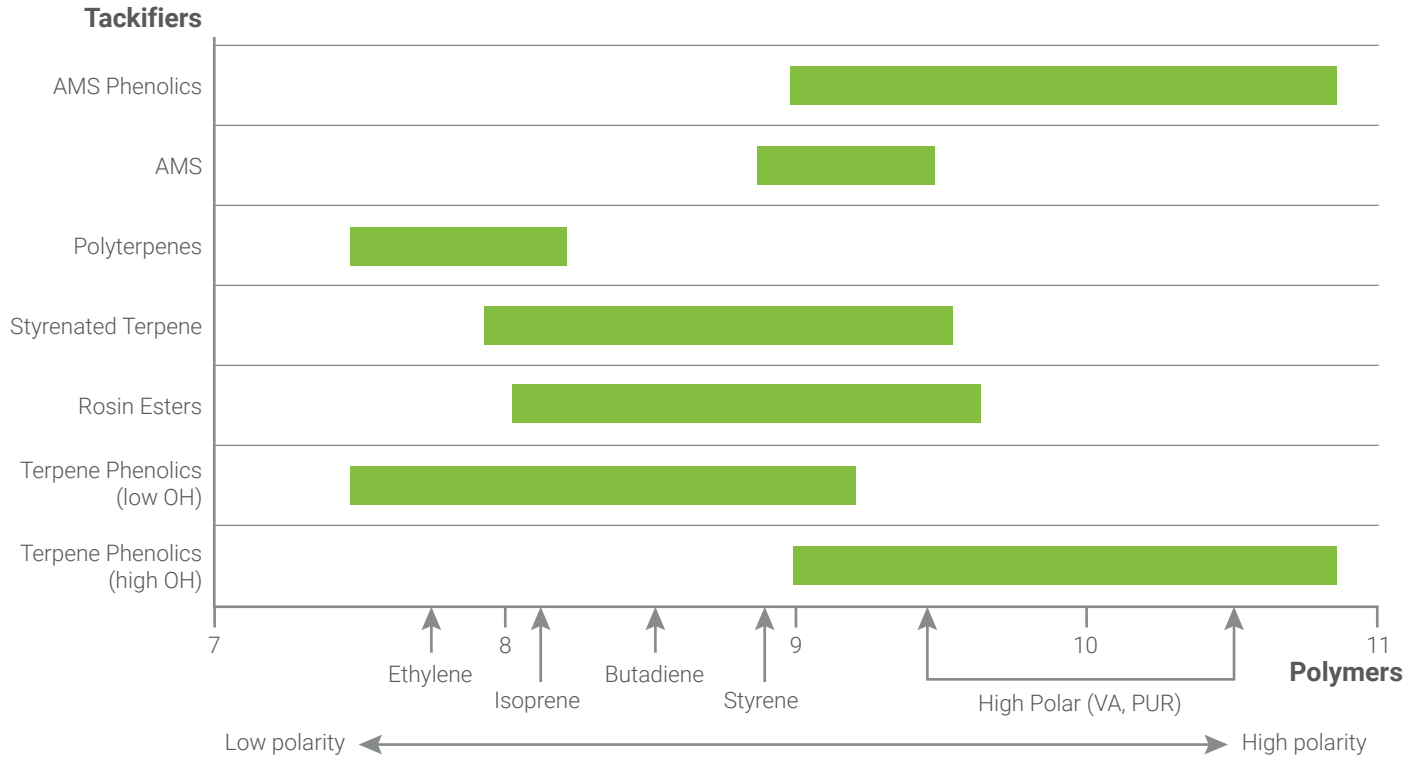
By working with a large and varied molecular asset base, Kraton's Research and Development teams can select or create products that achieve desired performance results.

POLYMER COMPATIBILITY

Compatibility between a tackifier and an adhesive polymer is a crucial factor in enhancing viscoelastic properties. In contrast, a certain amount of incompatibility can also provide desired properties. The Hildebrand solubility parameter gives an estimate of the degree of interaction between tackifier and polymer. Materials with similar values are likely to be miscible and have favorable viscoelastic properties.



Hildebrand Solubility Parameter



SYLVATAC™ and SYLVALITE™ Rosin Ester Tackifiers

Rosin esters are compatible with a broad range of polymers, including high and low vinyl acetate content EVA, acrylics, SBR, SIS and SBS. This characteristic enables formulation flexibility in various hot-melt, water-based and solvent-based adhesive applications. Solid rosin esters can be formulated into SBC- or EVA-based adhesives for packaging, PSA and woodworking applications. In addition to these end uses, liquid rosin esters can also be used in acrylic and SBR latex for construction adhesives.

At Kraton, we are continuously enhancing our product offerings, and we are excited to introduce our latest innovation: RE*volution*™ Rosin Ester Technology. This innovation enables the production of light-colored and stable rosin esters. Adhesives formulators can benefit from the superior adhesion characteristics of rosin esters, as well as their high biobased content and low carbon footprint. With the launch of SYLVALITE 2100, 2200, and 9100, empowered by RE*volution* technology, we make the sustainable option the new market standard.

Typical Property	SP	AN	Color		Tg	Biobased %**	Manufacturing Region*
Method	AQCM 003	AQCM 001	AQCM 002		AQCM 218	ASTM D6866	
Unit	°C	mgKOH/g	Gardner (neat)	Gardner (1:1 toluene)	°C	%	
SYLVATAC™ RE 5S	liquid	16	-	7	-28	95	EU
SYLVALITE™ 2010	liquid	9	3	-	-30	85	US
SYLVATAC™ RE 12	liquid	14	-	1	-24	94	EU
SYLVATAC™ RE 25	30	21	2	-	-13	93	US
SYLVALITE™ 2038	35	13	3	-	-6	94	US
SYLVALITE™ RE 80HP	78	8	3	-	30	92	US
SYLVATAC™ RE 85 (US)	81	5	3	-	30	100	US
SYLVATAC™ RE 85 (EU)	82	4	-	2	33	100	EU
SYLVALITE™ RE 85GB	85	11	3	-	35	96	US
SYLVALITE™ RE 88F	88	4	-	1	41	100	EU
SYLVATAC™ RE 95	96	9	-	5	47	97	EU
SYLVATAC™ RE 98	95	17	6	-	46	97	US
SYLVATAC™ 2098	98	8	-	4	46	97	EU
SYLVALITE™ 9100	104	7	-	88 Hazen	55	97	EU
SYLVALITE™ RE 100L	98	10	4	-	53	97	US
SYLVALITE™ RE 100F	100	4	-	2	52	97	EU
SYLVATAC™ RE 103S	103	7	-	4	52	97	EU
SYLVALITE™ RE 105XL	106	6	-	1	57	97	EU
SYLVALITE™ RE 105L	105	11	3	-	51	94	US
SYLVALITE™ RE 110L	108	8	4	-	57	94	US
SYLVALITE™ 2100	99	4	-	1	48	97	EU
SYLVALITE™ 2200	99	9	1	-	52	97	US
SYLVALITE™ 2115	115	4	-	2	65	98	EU
SYLVALITE™ 2119	120	12	4	-	68	98	US

* Please contact your Sales Manager for product availability in your region.

** USDA Biobased product certificate available upon request.

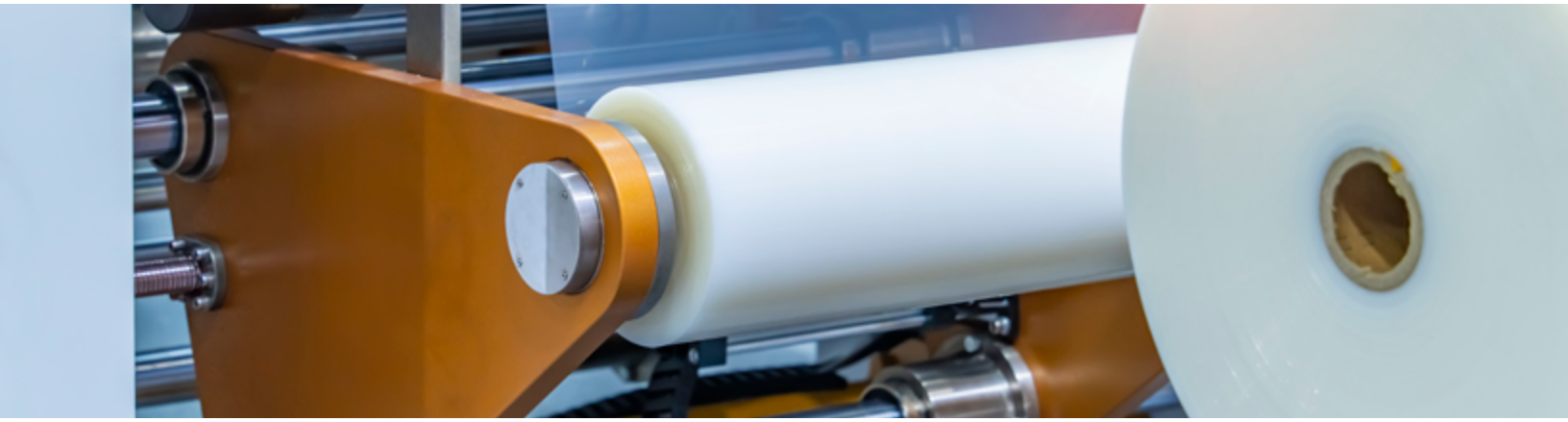
The values presented in this brochure are average values for typical resin samples and should not be construed as product specifications. Kraton test methods are available upon request.

UNI-TAC™ Modified Rosin Tackifier

UNI-TAC™ 70 tackifier imparts outstanding adhesion to difficult-to-bond substrates due to the high acid number, non-crystallinity and low molecular weight of this highly polar solid rosin.

Typical Property	SP	AN	Color	Tg	Biobased %**	Manufacturing Region*
Method	AQCM 003	AQCM 001	AQCM 002	AQCM 218	ASTM D6866	
Unit	°C	mgKOH/g	Gardner (neat)	°C	%	
UNI-TAC™ 70	80	155	11	33	98	US

* Please contact your Sales Manager for product availability in your region.
** USDA Biobased product certificate available upon request.



AQUATAC™ Dispersion Tackifiers

AQUATAC™ waterborne tackifiers have high solid content, which contributes to improving overall operational efficiency for adhesive manufacturers. These dispersed tackifiers are compatible with a broad range of water-based polymers including natural rubber, C-SBR, SBR, polychloroprene and acrylic latices. Our AQUATAC dispersion tackifiers can be formulated to achieve optimum performance properties for both pressure-sensitive and non-pressure-sensitive adhesives.

Typical Property	SP (base resin)	Solid Content	Viscosity	pH	Biobased %**	Manufacturing Region*
Method	AQCM 003	AQCM 029	AQCM 004 (Brookfield 25 °C)	AQCM 136 (EU) AQCM 035 (US)	ASTM D6866	
Unit	°C	%	mPa.s / cps		%	
AQUATAC™ XR-4343	85	60	780	8.5	97	EU
AQUATAC™ FC-8560	83	60	610	8.2	96	EU
AQUATAC™ 2685	85	58	720	8.8	92	US
AQUATAC™ 6025	30	62	5700	7.4	89	US
AQUATAC™ 6085	82	61	5200	7.3	97	US
AQUATAC™ E 6180	80	61	460	9.1	98	US

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** USDA Biobased product certificate available upon request.

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SYLVARES™ AMS Tackifiers

These aromatic tackifiers have a very light color, along with excellent oxidative stability. AMS resins can be used to modify styrene end blocks of SBC in order to improve the range of temperature performance. AMS resins may be used in EVA- and SBC-based adhesives for packaging, bookbinding, nonwovens and assembly applications.

Typical Property	SP	Mw	Color	Tg	Manufacturing Region*
Method	AQCM 003	AQCM 217	AQCM 002	AQCM 218	
Unit	°C	g/mol	Hazen (1:1 toluene)	°C	
SYLVARES™ SA 85	85	1210	17	39	EU
SYLVARES™ SA 100	101	1540	15	52	EU
SYLVARES™ SA 115	117	2160	12	67	EU
SYLVARES™ SA 120	120	1880	12	70	EU
SYLVARES™ SA 140	137	4050	12	87	EU

* Please contact your Sales Manager for product availability in your region.

SYLVARES™ AMS Phenolic Tackifiers

The phenolic component of these tackifiers improves compatibility with high polarity polymers such as EVA, PUR and acrylics. AMS phenolic resins are recommended for use in applications that require water-white color, excellent adhesion and oxidative stability. The low Tg improves elasticity at low temperature, which makes these tackifiers suitable for bookbinding and packaging adhesives.

Typical Property	SP	Mw	Color	Tg	Manufacturing Region*
Method	AQCM 003	AQCM 217	AQCM 002	AQCM 218	
Unit	°C	g/mol	Hazen (1:1 toluene)	°C	
SYLVARES™ 520	75	940	20	38	EU
SYLVARES™ 540	76	880	19	38	EU
SYLVARES™ 525	95	1770	17	51	EU

* Please contact your Sales Manager for product availability in your region.

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SYLVARES™ Styrenated Terpene Tackifier

Adhesive formulators can benefit from the aliphatic-aromatic nature of styrenated terpenes, which result in high compatibility with EVA, SIS and SBS polymers. Kraton offers a non-limonene-based styrenated terpene, SYLVARES 6100. Combining broad compatibility and light color, it can be the right choice for premium hot-melt applications.

Typical Property	SP	Mw	Color	Tg	Biobased %**	Manufacturing Region*
Method	AQCM 003	AQCM 217	AQCM 002	AQCM 218	ASTM D6866	
Unit	°C	g/mol	Gardner (neat)	°C	%	
SYLVARES™ 6100	98	1260	2	51	66	US

* Please contact your Sales Manager for product availability in your region.
** USDA Biobased product certificate available upon request.

SYLVARES™ Polyterpene Tackifiers

Polyterpene grades with a high softening point have shown to combine high heat resistance and excellent tack and peel for pressure-sensitive adhesives. These resins offer the highest amount of biorenewable content of Kraton's product lines and are compatible with polyolefins and the mid-block of SIS co-polymers.

Typical Property	SP	Mw	Color	Tg	Biobased %**	Manufacturing Region*
Method	AQCM 003	AQCM 217	AQCM 002	AQCM 218	ASTM D6866	
Unit	°C	g/mol	Gardner (neat)	°C	%	
SYLVARES™ 3025	26	420	5	-20	100	US
SYLVARES™ TR M1115	116	1680	2	60	100	US
SYLVARES™ 3115	116	1970	4	61	100	-
SYLVARES™ 3125	126	1850	2	76	100	US
SYLVARES™ 3127	124	1030	3	76	100	US

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** USDA Biobased product certificate available upon request.

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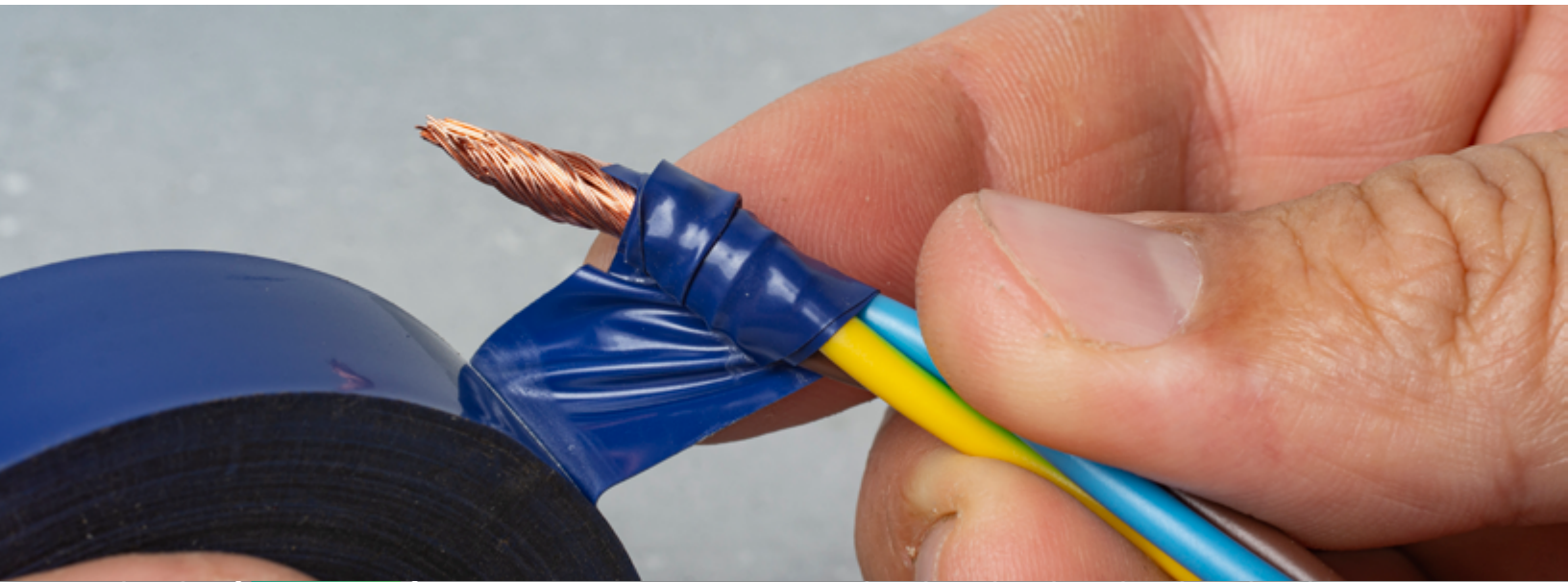

SYLVARES™ Terpene Phenolic Tackifiers

Our terpene phenolic resins are available in a wide range of polarities, which increases the versatility of adhesive formulation. High functionality terpene phenols provide outstanding adhesion when formulated with EVA and other polar polymers. The low polarity terpene phenolic resins improve adhesion of pressure-sensitive adhesives (in SIS, SBS and acrylic systems) to difficult-to-bond substrates like coated and recycled paper, glass and metal foils.

Typical Property	SP	Color	Tg	Biobased %**	Manufacturing Region*
Method	AQCM 003	AQCM 002	AQCM 218	ASTM D6866	
Unit	°C	Gardner (neat)	°C	%	
SYLVARES™ 1095	96	4	40	83	US
SYLVARES™ 1105	105	4	50	83	US
SYLVARES™ 1150	150	4	93	83	US
SYLVARES™ 1115	115	4	60	83	US
SYLVARES™ TP 96	95	7	50	83	US
SYLVARES™ TP 2019	124	4	74	80	US
SYLVARES™ TP 7042	148	3	97	74	US
SYLVARES™ TP 300	112	4	68	71	US
SYLVARES™ TP 2040	118	4	71	71	US
SYLVARES™ TP 2040HM	126	4	78	71	US

LOW

Increasing Hydroxyl Functionality

HIGH

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GLOBAL INTEGRATED TEAM APPROACH

We engage experts from a variety of disciplines to consult on challenges in order to solve them more effectively and efficiently for our customers.

Our worldwide multi-functional team provides:

ACCESSIBLE AND PERSONALIZED TECHNICAL SUPPORT

Kraton technical service teams provide support from Innovation Centers located in APAC, the US and EU. We have in-house capabilities to assist adhesive formulators with the selection of raw materials and to provide expert support from development to commercial application. The teams assist in scale-up trials and our Innovation Centers are equipped to fulfill all standard adhesive application testing. Alongside our sales managers, the technical service teams regularly call on customers at all levels of the organization to provide training on our products.

HANDS-ON OPERATIONAL ASSISTANCE

To ensure that our communications with adhesive manufacturers are clear and complete, our operations personnel work closely with customers to enable smoother logistics across the supply chain. In order to improve process efficiency, we conduct site visits and interactive engineering exchanges that facilitate the review and understanding of particular technologies. We focus on continuous improvement in manufacturing and use root cause analysis to fully understand any issue that might arise.

PERSONALIZED SUPPORT FROM APAC, EU AND US INNOVATION CENTERS

ENGINEERING SITE VISITS AND INTERACTIVE EXCHANGES

EXPERT REGULATORY GUIDANCE

The highly regulated chemical industry requires in-depth and current knowledge of the latest regulatory developments. Thanks to a dedicated global product regulatory team with comprehensive regional expertise, Kraton provides global support to customers on complex and changing regulations including EU Food Contact, US FDA Ingredient Status, international chemical control laws such as EU REACH, US TSCA, Japan CSCL and Decree 591 in China.

INNOVATIVE SOLUTIONS

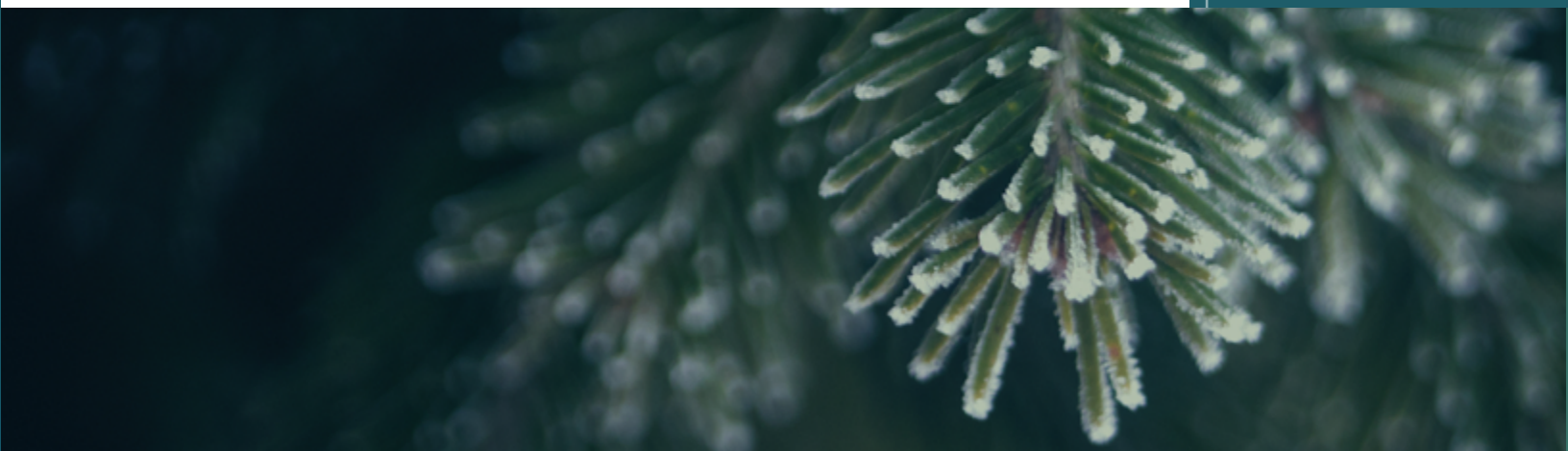
Sustainable Innovation

At Kraton, we are creating innovative solutions for a sustainable tomorrow. Our innovation is geared to support the bioeconomy and is driven by creativity, passion, and active assessment of market trends. We work in state-of-the-art Kraton Innovation Centers on technology platforms focused on pine rosin and terpene-based product opportunities. We ensure our innovation takes into account emerging customer needs, polymer advances, and regulatory changes. We collaborate with adhesive manufacturers as well as internal and external experts. Kraton's own analytical, application, and regulatory teams support our global product development initiatives and our continuous drive to understand structure-property relationships. We encourage close cooperation, knowledge-sharing, and transparency in our customer relationships to take advantage of our combined strengths.

INNOVATION DRIVEN BY CREATIVITY, PASSION AND CUSTOMER NEEDS

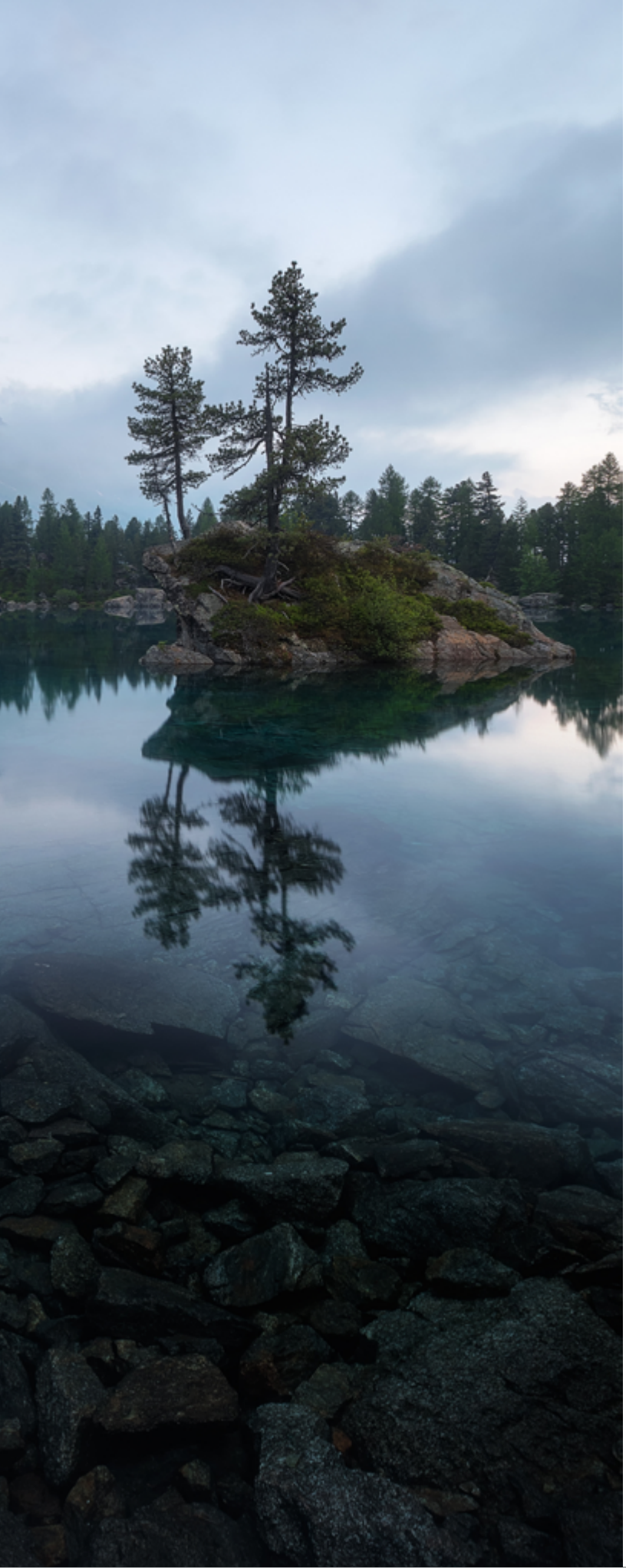
Analytical Expertise

Kraton has three highly-specialized analytical laboratories with advanced equipment and techniques that include (pyrolysis) GC-MS, (oxidative) DSC, TGA, GPC, HPLC, FTIR, NIR, UV-Vis, ICP - AES, sulfur analysis and preparative flash chromatography. Our chemists in the US, EU and China can perform in-depth analyses to characterize raw materials and adhesives, as well as investigate process and application issues.



GLOSSARY

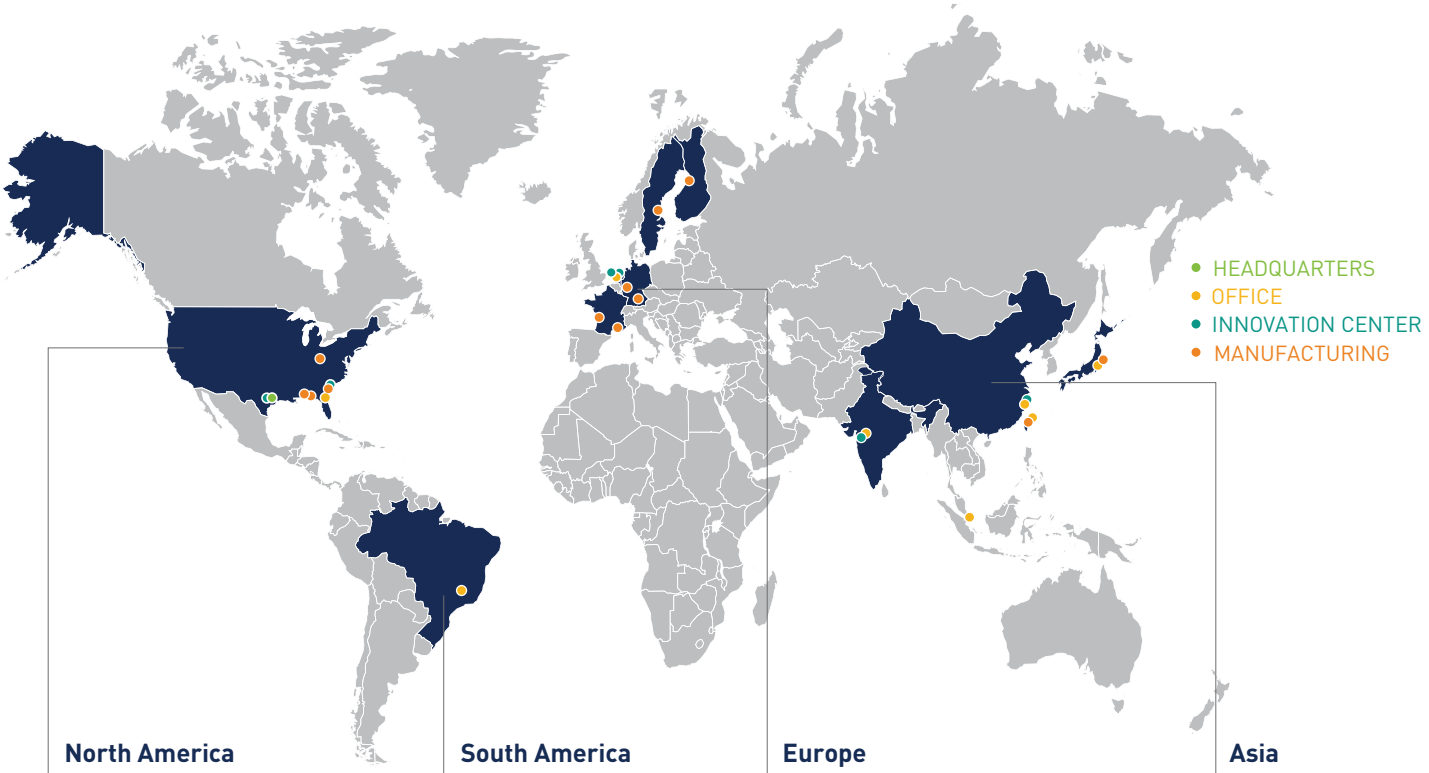
AES	Atomic Emission Spectroscopy
AMS	Alpha Methyl Styrene
AN	Acid Number
AQCM	Arizona Quality Control Method
ASTM	American Society for Testing and Materials
C-SBR	Carboxylated Styrene Butadiene Rubber
CSCL	Chemical Substance Control Law
CST	Crude Sulfate Turpentine
CTO	Crude Tall Oil
DSC	Differential Scanning Calorimetry
EPD	Environmental Product Declaration
EVA	Ethyl Vinyl Acetate
FDA	Food and Drug Administration
FTIR	Fourier transform infrared spectroscopy
GC-MS	Gas Chromatography Mass Spectrometry
GPC	Gel Permeation Chromatography
HPLC	High Performance Liquid Chromatography
ICP	Inductively Coupled Plasma
ISCC	International Sustainability and Carbon Certification
LCA	Life Cycle Assessment



Mw	Molecular Weight
NIR	Near-Infrared
OH	Hydroxyl Value
PEF	Product Environmental Footprint
PSA	Pressure Sensitive Adhesives
PUR	Polyurethane
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SBC	Styrenic Block Co-polymers
SBR	Styrene Butadiene Rubber
SBS	Styrene Butadiene Styrene
SIS	Styrene Isoprene Styrene
SP	Softening Point
Tg	Glass Transition Temperature
TRACI	Tools for Reduction and Assessment of Chemicals and other environmental Impacts
TGA	Thermogravimetric Analysis
TSCA	Toxic Substances Control Act
USDA	United States Department of Agriculture
UV-Vis	Ultraviolet-Visible
VA	Vinyl Acetate

KRATON

GLOBAL FOOTPRINT



North America

- The Woodlands, TX
- Houston, TX
- Belpre, OH
- Jacksonville, FL
- Panama City, FL
- Pensacola, FL
- Savannah, GA

South America

- Paulínia, Brazil

Europe

- Almere, The Netherlands
- Amsterdam, The Netherlands
- Berre, France
- Niort, France
- Oulu, Finland
- Gersthofen, Germany
- Wesseling, Germany
- Sandarne, Sweden

Asia

- Shanghai, China
- Kashima, Japan (JV)
- Tokyo, Japan
- Mumbai, India
- Taipei, Taiwan
- Mailiao, Taiwan (JV)
- Singapore

KRATON CORPORATION

For more information, visit our website at www.kraton.com.

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