SIOResin® Castor Oil Polyols

What is Castor Oil Polyol?

Castor Oil Polyol is a bio-based polyurethane polyol derived from natural castor oil or modified castor-oil chemistry, in which hydroxyl groups provide the reactive sites needed to form polyurethane with isocyanates. What makes Castor Oil Polyol distinctive is that castor oil naturally contains hydroxyl-bearing fatty chains, so it already has polyurethane-reactive functionality before further molecular modification. We can then refine or modify this natural structure to control hydroxyl value, functionality, molecular weight, viscosity, flexibility and crosslinking behavior. This gives Castor Oil Polyol a particularly useful combination of renewable origin, hydrophobic fatty-chain structure and tunable polyurethane performance.

What Makes Castor Oil Polyol Attractive?

Renewable Raw Material
Castor oil comes from a renewable agricultural source and provides a route toward higher bio-based content in polyurethane materials.
For customers developing more sustainable formulations, this is an important starting point. But we prefer to make the distinction clear: bio-based does not automatically mean biodegradable, compostable or carbon-neutral. Those are separate technical claims.

Natural Hydrophobic Character
The long fatty-chain structure gives castor-oil-derived materials a naturally hydrophobic character. This can be useful when the polyurethane needs to tolerate moisture or maintain performance in humid environments. For coatings, sealants and construction materials, that characteristic can become particularly valuable.

Good Moisture and Water Resistance

The hydrophobic structure can help reduce the sensitivity of polyurethane systems to water. We see this as one of the practical reasons Castor Oil Polyol works well in applications where moisture exposure matters, especially when combined with an appropriate isocyanate and formulation design.

Flexibility

The long aliphatic chains can introduce flexibility into the polyurethane structure. This makes Castor Oil Polyol attractive for elastomers, flexible coatings, sealants and other materials where excessive brittleness would be undesirable.

Tunable Hardness

This is perhaps the most useful feature from a formulator's perspective. Castor Oil Polyol does not have one fixed performance profile.

By selecting different hydroxyl values, functionalities and molecular structures, we can move from soft, flexible polyurethane systems to hard, high-Tg protective materials. That is also the principle behind our SIOResin® product portfolio.

Castor Oil Polyol Applications

Polyurethane Coatings

Castor Oil Polyols can be used in 2K polyurethane coatings, solvent-free coatings, high-build systems, protective coatings and weather-resistant formulations.
The choice of polyol has a major effect on the final coating. Softer grades can improve flexibility and crack resistance, while higher-OH grades can build hardness and chemical resistance.

Polyurethane Elastomers

For cast elastomers, we can combine different Castor Oil Polyols with polymeric MDI, modified MDI or aliphatic polyisocyanates. The formulation can then be tuned for hardness, tensile strength, elongation and tear resistance.

Adhesives and Sealants

Castor Oil Polyols can contribute flexibility and hydrophobicity to polyurethane adhesives and sealants. They are particularly interesting for solvent-free or high-solid systems where the polyol itself becomes part of the final polymer network.

Flooring and Construction

In flooring and construction materials, water resistance and mechanical durability often matter as much as hardness. Castor-oil-based polyurethane chemistry gives formulators another way to balance these properties.

Protective and Anticorrosion Coatings

Hydrophobicity, flexibility and chemical resistance make selected Castor Oil Polyol grades suitable for protective coating systems. The correct grade depends heavily on the desired hardness and weathering requirements.

Our SIOResin® Castor Oil Polyol Portfolio

At SIOResin®, we have developed several Castor Oil Polyol grades for different polyurethane design requirements. Rather than offering several products with only minor differences, we position each grade around a specific formulation role. The more useful approach is to start with the molecular structure and then tune the formulation around the required result. A soft elastomer needs one type of polyol architecture. A high-hardness weather-resistant coating needs another. A reactive viscosity modifier has a completely different job. This is why we have developed the **SIOResin® Castor Oil Polyol** range as a family of complementary materials rather than a single universal product.

Our goal is straightforward: **use the distinctive chemistry of castor oil to give polyurethane formulators more choices in hardness, flexibility, viscosity, moisture resistance and renewable content.**

Product	Chemical Type / Functionality	Hydroxyl Value	Viscosity	Key Characteristics	Typical Applications
H-8031	Castor Oil-Based Polycarbonate Diol	55-65 mg KOH/g	9,000-9,500 mPa·s @ 25°C	Good gloss development, good pigment wetting, flexibility	PU, TPU, coatings
H-8019	Aliphatic Dimer Alcohol Polyol	200–215 mg KOH/g	1,800–2,800 mPa·s @ 25°C	Hard-elastic, hydrophobic, crack-bridging, high renewable content	PU coatings, elastomers, adhesives
H-8916	Branched Polyether/Polyester	165–176 mg KOH/g	2,800–4,000 mPa·s @ 25°C	Universal grade, excellent impact and chemical resistance	2K coatings, casting, flooring, adhesives
H-8861	Branched Polyether/Polyester	315–320 mg KOH/g	750–1,200 mPa·s @ 25°C	High hardness, high Tg, hydrophobic, UV/weather resistant	Protective and weather-resistant coatings
H-8871	Branched Polyether/Polyester	390–400 mg KOH/g	2,000–2,500 mPa·s @ 25°C	Very high hardness, extremely high Tg, excellent chemical resistance	High-performance coatings
H-8141	Castor Oil-Based Polyol	155–165 mg KOH/g	660–720 mPa·s @ 25°C	Low viscosity, flexible, hydrolysis and water resistant	2K PU, elastomers, flooring, adhesives
H-8142	Monofunctional Castor Oil Polyol	157–170 mg KOH/g	≤40 mPa·s @ 25°C	Reactive diluent, viscosity reducer, hardness modifier	PU modifiers, flexible elastomers, coatings
H-8173	Castor Oil-Based Modified Diol	245–275 mg KOH/g	240–290 mPa·s @ 25°C	High hardness, relatively low viscosity, good mechanical strength	Cast elastomers, coatings, adhesives
H-8941	Soft-Grade Castor Oil Polyol	72–100 mg KOH/g	700–1,600 mPa·s @ 25°C	Low modulus, high flexibility, high elongation, moisture/heat resistant	Soft elastomers, flexible coatings, sealants

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SIOResin® Castor Oil Polyol Selection Guide

For quick selection, we can look at the portfolio from a performance perspective:

Main Formulation Goal	Recommended Grade
Soft, flexible, high-elongation PU	H-8941
Reactive dilution / viscosity reduction / hardness reduction	H-8142
Low viscosity with balanced PU performance	H-8141
High-hardness elastomer	H-8173
General-purpose PU with impact and chemical resistance	H-8916
Hard-elastic / crack-bridging coating	H-8019
High-hardness, UV/weather-resistant coating	H-8861
Very high hardness / high-Tg PU	H-8871
Castor Oil-Based Polycarbonate Diol / TPU	H-8031

The table above provides a quick overview of our Castor Oil Polyol portfolio. In practice, we recommend selecting a grade according to the target polyurethane properties rather than OH value alone. Hydroxyl value, functionality, viscosity, molecular weight, isocyanate type and target hardness should be considered together. For a soft and flexible system, H-8941 is a natural starting point; for high-hardness systems, H-8173, H-8861 and H-8871 provide progressively different performance directions. H-8142 serves a different purpose as a monofunctional reactive modifier rather than a conventional structural polyol.

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