ENABLING SUSTAINABLE POLYURETHANES

INTRODUCTION

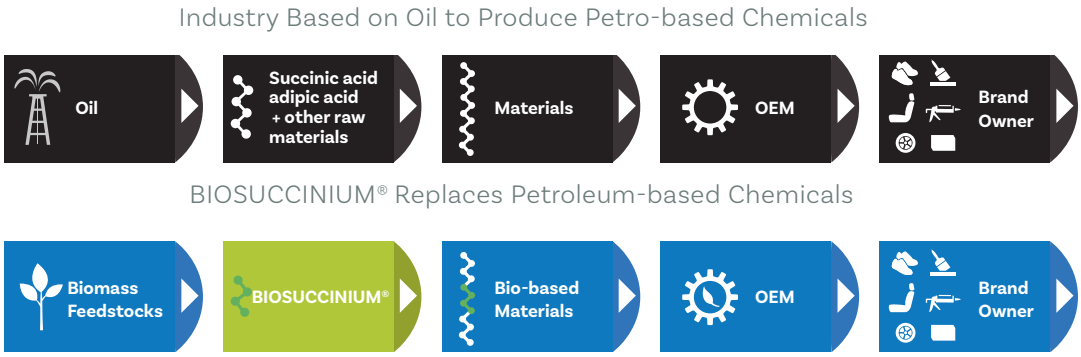
BIOSUCCINIUM®, a 100% bio-based succinic acid, enables polyester polyol-based polyurethane products with substantially lower environmental footprint

A UNIQUE RENEWABLE RAW MATERIAL

A 100% bio-based alternative to traditional raw materials for polyurethanes

BIOSUCCINIUM® sustainable succinic acid is produced from renewable, plant-based resources. It is a viable and more eco-friendly alternative to conventional chemical raw materials used for the production of polyester polyols and polyurethanes such as fossil-based succinic acid and adipic acid (see figure 1). Thus, BIOSUCCINIUM® enables the opportunity for polyester polyol and polyurethane producers to provide unique and more sustainable polyurethanes.

Figure 1: Bio-Based BIOSUCCINIUM® is an Alternative to Fossil-Based chemicals



BIOSUCCINIUM®
sustainable succinic acid

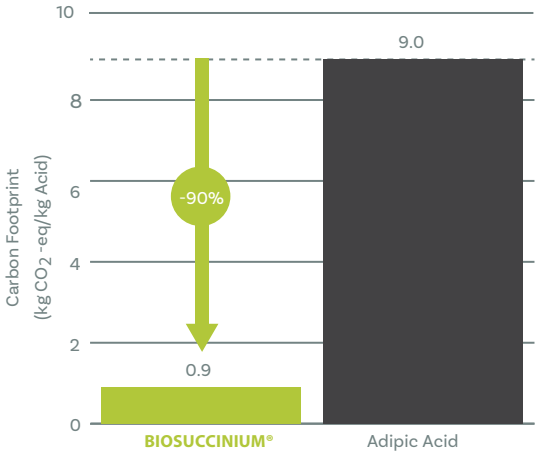
ROQUETTE
Offering the best of nature™

BIOSUCCINIUM® IN POLYURETHANES

A green di-acid for polyester polyols

Polyurethanes are manufactured from isocyanates and polyols. Polyester polyols are one of two types of polyols used in polyurethanes and they are typically made from di-acids, such as adipic acid and glycols. By using BIOSUCCINIUM® as a "green" di-acid to produce the polyester polyol, polyurethane made from this more sustainable polyol has a greatly improved environmental footprint. Subsequently, polyurethane products containing BIOSUCCINIUM® are at least partially bio-based, requiring less from the earth's limited fossil resources, as well as delivering a reduction in greenhouse gas emissions (see figure 2). Polyurethanes are formulated for performance in their respective applications and the successful use of BIOSUCCINIUM®-based polyester polyols has been demonstrated in many polyurethane applications.

Figure 2: Reduction of the Carbon Footprint Using BIOSUCCINIUM® vs. Petrochemical Adipic Acid[1]

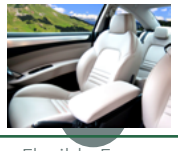


[1] Executed by the Copernicus Institute at Utrecht University, the Netherlands. Data is published as an early view (August 2013). The adipic acid data is reflects a best in class plant with 98% N_2O abatement.

ENVIRONMENTAL IMPACT

Figure 3 shows examples with indications of the potential sustainability improvements through the use of BIOSUCCINIUM® in polyurethane materials.

Figure 3: Examples of BIOSUCCINIUM® Improving the Environmental Footprint of Polyurethane-based Products

	Running shoes	Automotive textiles	Wheels	Wood & furniture coatings	Construction
Use					
Polyurethane type	Thermoplastic	Flexible Foam	Elastomers	Coatings	Adhesives
Renewable Content	25%	30%	10%	5%	5%
CO_2 Reduction	20% ↓	45% ↓	30% ↓	15% ↓	20% ↓

HOW TO ORDER BIOSUCCINIUM®

Production

BIOSUCCINIUM® is available in commercial quantities from the first large scale commercial production plant, located in Cassano, Italy. Samples for evaluation are available, as well. The biotechnology process to produce BIOSUCCINIUM® was developed by Reverdia, a joint venture between DSM and Roquette. Since Reverdia's dissolution in April 2019, Roquette now manufactures and sells BIOSUCCINIUM® under licence from DSM. Please contact Roquette at www.roquette.com for more information.

USDA CERTIFICATION

Roquette has earned the U.S. Department of Agriculture (USDA) Certified Biobased Product label. The product, BIOSUCCINIUM® succinic acid, is now able to display a unique USDA label that highlights its percentage of biobased content. It shows that BIOSUCCINIUM® contains 100% USDA certified biobased content.

USDA CERTIFIED BIOBASED PRODUCT PRODUCT 100%

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