

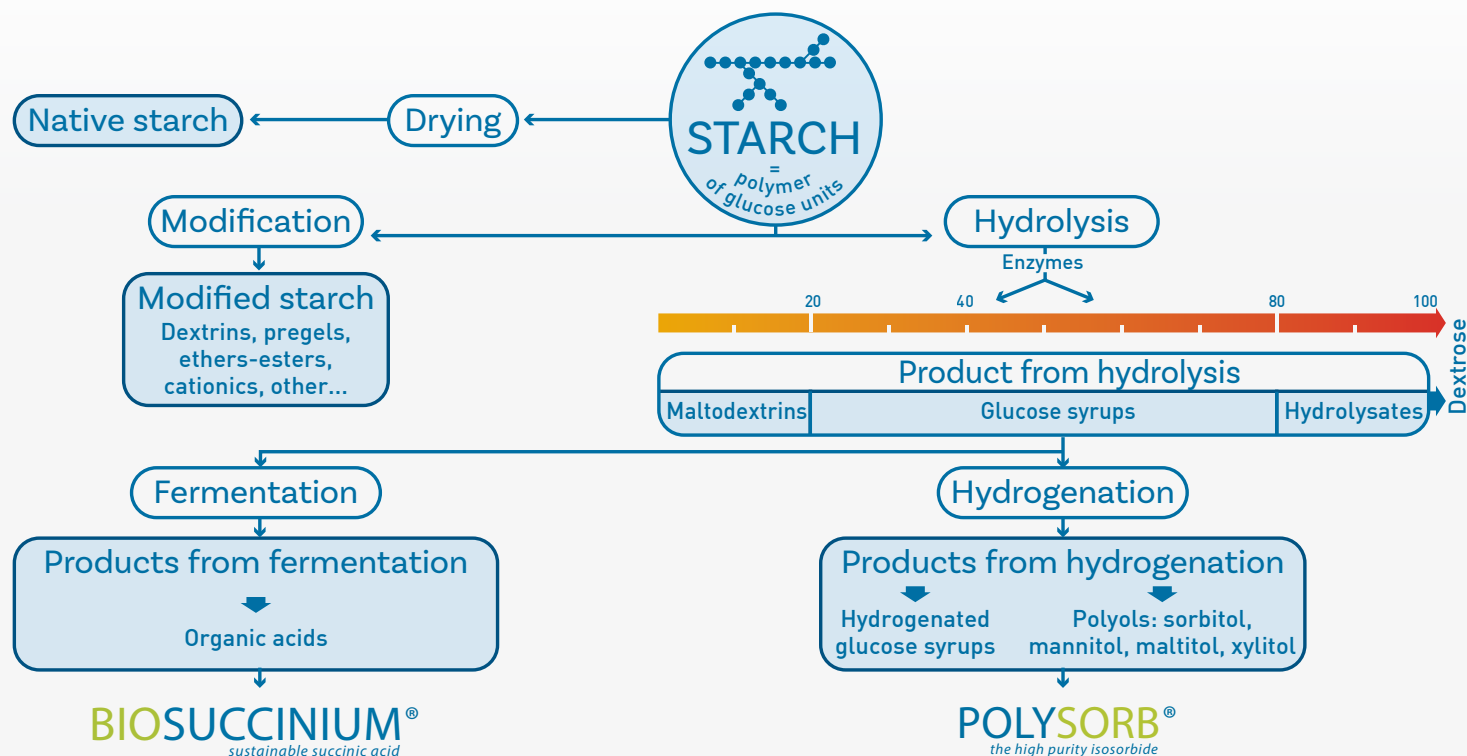
BIOBASED MATERIALS

BRIDGING THE GAP BETWEEN SUSTAINABILITY
AND PERFORMANCE



ROQUETTE
Offering the best of nature™

STARCH PRODUCTION SCHEME



INDUSTRIES EXPERTISE

Our Customer Technical Services dedicated to industries' applications plays a key role in our ambition to be the key provider of plant-based solutions delivering performances and health benefits for industrial customers.

We work **hand-in-hand** on developments to create new products, processes and solutions adapted to your needs by offering:

Our expertise: know-how, in-depth knowledge of products used in your applications;

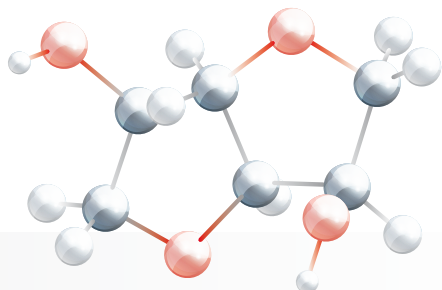
Our technologies: equipment, laboratories, pilots, pre-industrial units;

Our formulation support: always listening to your needs and providing sustainable, cost-effective and innovation solutions.



OUR BIO-BASED SOLUTIONS

Roquette offers the industrial markets innovative and 100% bio-based monomers to create solutions for safer and more sustainable polymers.



. Isosorbide $C_6H_{10}O_4$
. 146.14 g/mol
. CAS 652-67-5

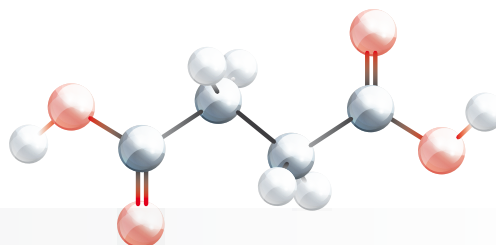
POLYSORB® ISOSORBIDE - THE FIRST HIGHEST PURITY ISOSORBIDE IN THE WORLD

Roquette is the global leader in production and supply of high purity isosorbide for the polymer industry.

For almost 20 years, Roquette has acquired and developed a special knowledge in production and stabilization of isosorbide, which materializes into the first worldwide scale plant in Lestrem, France.

POLYSORB® is a plant-based molecule, sustainable and non-toxic, and is REACH compliant. There are different grades adapted to all applications including pharmaceuticals and polymers.

We provide the highest purity and the most stable isosorbide to our customers.



. Succinic acid $C_4H_6O_4$
. 118.09 g/mol
. CAS 110-15-6

BIOSUCCINIUM® BIO-SUCCINIC ACID FROM THE BEST-IN-CLASS BIOTECHNOLOGY PROCESS

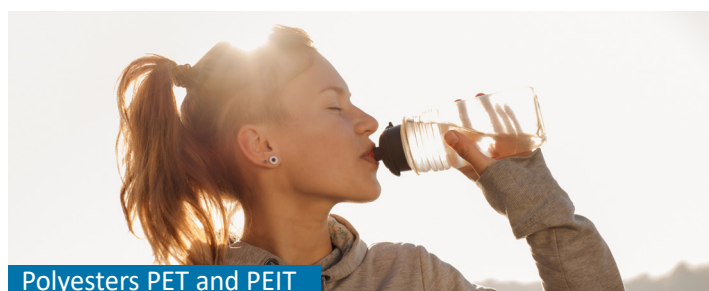
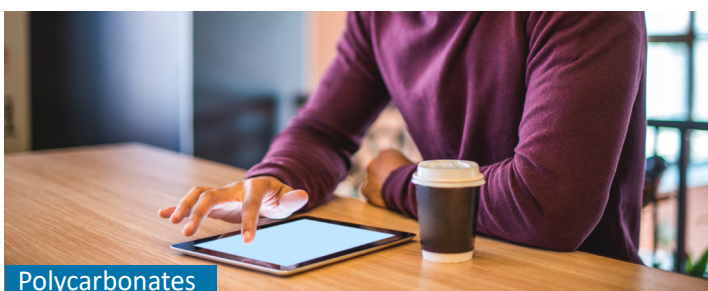
The biotechnology process to produce BIOSUCCINIUM® was developed by Reverdia, a joint venture between DSM and Roquette. Since Reverdia's dissolution in April 2019, Roquette now manufactures and sells BIOSUCCINIUM® under license from DSM.

This unique production process generates no by-products and very little impurities. BIOSUCCINIUM® has been produced for several years and has been tested and validated in various applications and by numerous customers.

BIOSUCCINIUM® is available from the first large scale commercial production plant, located in Cassano Spinola, Italy.



ROQUETTE PROVIDES HIGH PERFORMING, INNOVATIVE AND SUSTAINABLE PLANT-BASED SOLUTIONS FOR INDUSTRIAL APPLICATIONS



Applications

- Polyester, polyester-copolymers, polyester polyol
- Polycarbonate, polyester-polycarbonate -copolymers, polycarbonate-polyols
- Polyurethanes
- Epoxy, epoxy resins
- Acrylates, acrylic resins
- Plasticizer, additives
- Solvents
- Surfactants

Benefits

- Bio-based, sustainable, renewable
- Safe, non-toxic, low VOC
- Non-endocrine disruptor
- BPA replacement
- For bio-based recyclable, biodegradable, compostable plastics

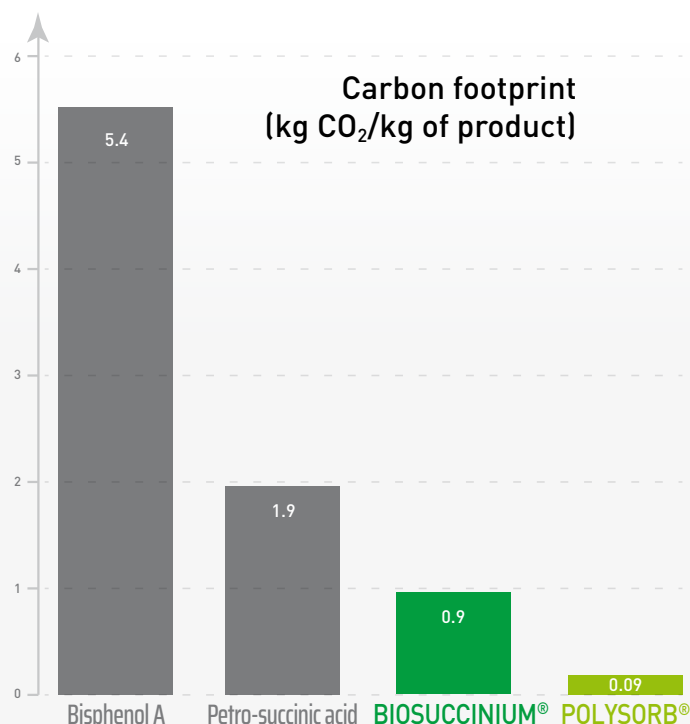
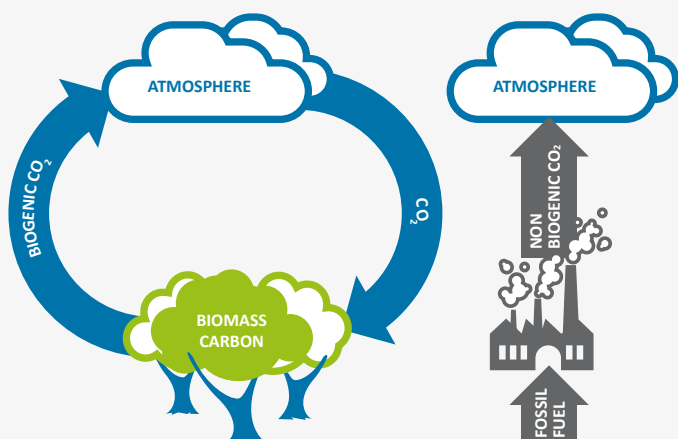
Performances

- Tg values, thermal behavior
- UV resistance, optical properties
- Mechanical, chemical properties
- Adhesion, hardness

LOW ENVIRONMENTAL FOOTPRINT

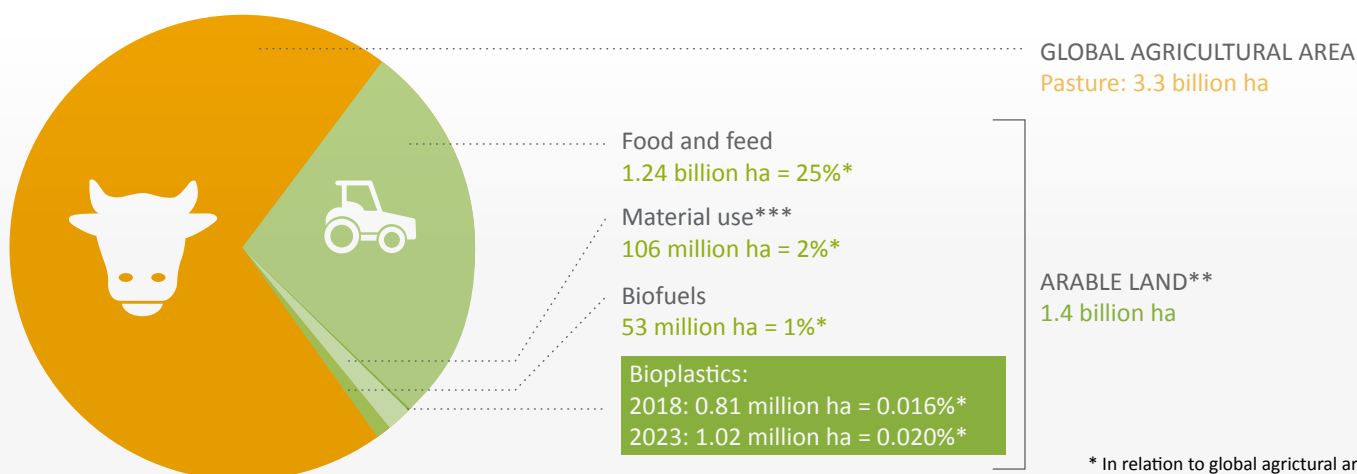
Our BIOSUCCINIUM® and POLYSORB® solutions have low carbon footprint because:

- Raw materials partake in the natural carbon cycle.
- Production takes place in a highly efficient biorefinery.



- Biogenic carbon (Carbon retained by a plant during its development.) reduction is taken into account.
- POLYSORB®: Internal comparative study based on LCA methodology, which was peer reviewed by an external auditor.
- BIOSUCCINIUM®: Executed by the Copernicus Institute at Utrecht University, the Netherlands. Data is published as an early view (August 2013).

LAND USE ESTIMATION FOR BIOPLASTICS 2018 AND 2023



Source: European Bioplastics (2018), FAO stats (2014), nova-Institute (2018), and Institute for Bioplastics and Biocomposites (2016). More information: www.european-bioplastics.org

* In relation to global agricultural area
** Including approx. 1% fallow land
*** Land-use for bioplastics is part of the 2% material use

ONLY 0.02% OF GLOBAL AGRICULTURAL AREA USED FOR BIOPLASTICS

OUR PROMISES FOR SUSTAINABLE PACKAGING

The high amount of plastic waste has led the industries to move toward more sustainable production. Our innovative solutions allow the production of recyclable, reusable and biodegradable plastics. POLYSORB® and BIOSUCCINIUM® solutions are 100% bio-based monomers for your sustainable packaging.

RECYCLABLE PLASTICS

PET modified with POLYSORB® keeps their semi-crystalline properties to a certain extent. In that case, the material could be mechanically recycled in the PET stream. The properties of the resulting recycled material fulfill all tests described by EPBP up to 50% of modified PET. In addition, the material could be identified with the Recycling Identification Code #1 based on the requirements of Standard ASTM D7611-D7611M. It is a good solution for hot fill, pasteurization, aerosols and cosmetic bottles.

REUSABLE PLASTICS PACKAGING

PEIT is high temperature, dishwashing resistant and safer material for reusable plastic packaging such as sports bottles and food containers.



PEIT (PolyEthylene co-Isosorbide Terephthalate)
“glass-like, heat resistant, hot fillable copolyester”

BIODEGRADABLE PLASTICS

Environmentally-friendly packaging is not just about recycling. The production process and raw materials can also boost the sustainability of packaging. Modern bio-based plastics, based on BIOSUCCINIUM®, can completely degrade in compost or soil. Biodegradable plastics offer alternative disposal scenarios when it is difficult to collect and recycle products at the end of their lifespan. Biodegradable plastic bags based on bio-based PBS copolyesters can help to meet regulations such as France and Italy's ban on disposable bags.



PBS (PolyButylene Succinate)
“biodegradable aliphatic polyester”

REUSABLE PLASTICS

Glass / metal replacement



Sports bottles



Baby bottles



Food container

BIODEGRADABLE PLASTICS



Packaging film



Shopping bag

RECYCLABLE PLASTICS



Hot fill, pasteurization



Aerosol



Cosmetic bottles

Flexible packaging/coating



Paper coating

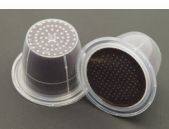
Other rigid packaging



Water jar



Cutlery



Coffee capsule



Blister



Medical package

OUR PROMISES FOR SAFE COATINGS AND ADHESIVES

Environmental concerns are key drivers of the coatings, adhesives, sealants and elastomers (CASE) market.

Consumers and regulatory authorities demand products that are more sustainable and eco-friendly. The market search solutions to eliminate hazardous chemicals, to lower the emissions of greenhouses gases and VOC and to replace fossil-based chemicals by bio-based raw materials without compromising performance.

POLYSORB® isosorbide and BIOSUCCINIUM® bio-succinic acid are two bio-based raw materials that can fine-tune applications and bring valuable properties to coatings, adhesives, sealants and elastomers.



**Biodegradability
recyclability**



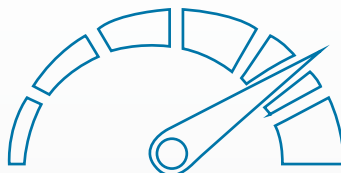
Eco-toxicity



**Reduction
of emissions**



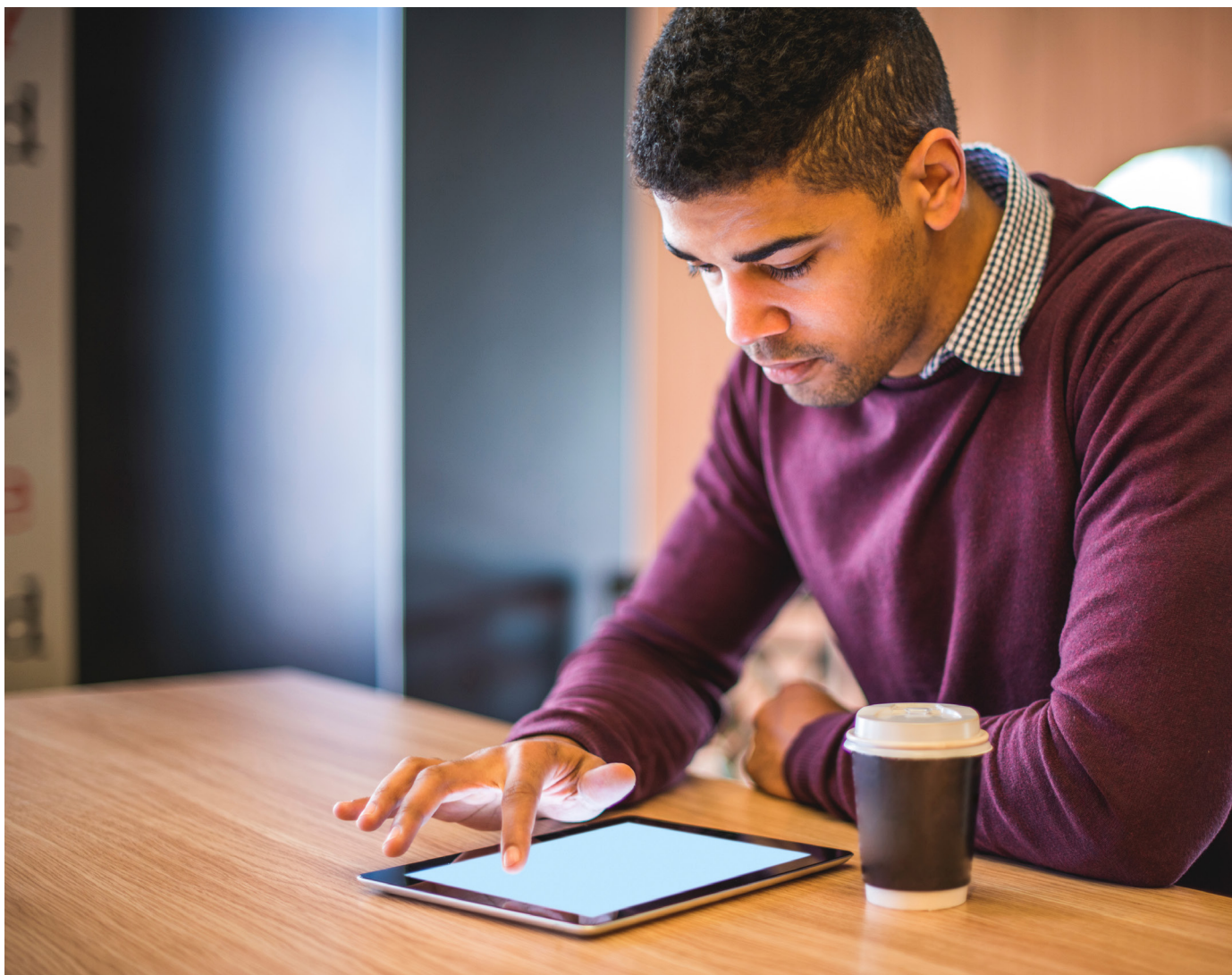
**Renewable raw
materials**



Performance



Eco-friendly



For more information:

Contact us

www.roquette.com

Request a sample

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