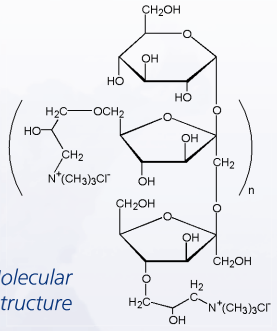
Cosun Biobased Products

ROYAL COSUN Biobased Products

QUATIN® Footprint

- INCI: ***Hydroxypropyltrimonium Inulin***
- Feedstock: Inulin
- Produced in The Netherlands
- Supplied as 40% active solution in water
  - ✓ Cold processing
  - ✓ Highly compatible
  - ✓ Preservative free
- Verified:
  - ✓ Non-toxic
  - ✓ Inherently biodegradable



Molecular structure

- More natural alternative to: polyquaterniums (PQ's), cationic guar, esterquats

Functional claims:

- Anti-spotting and filming
- Film former
- Softening
- Anti-static
- Deposition of actives

Properties and functionalities

Product	Degree of modification	Charge density (meq/g)	Molecular weight (g/mol)	Use level	Solubility in water	Viscosity 1% @ 25C°(cps)	Transmittance (600 nm)	Applicable pH range
QUATIN 350	0.35	1.50	± 3,000	0.1 – 2.0%	High	1.1	100%	3 – 12
QUATIN 680	0.68	2.92	± 4,000	0.1 – 2.0%	High	1.1	100%	3 - 12
QUATIN 1280	1.28	5.49	± 5,000	0.1 – 2.0%	High	1.1	100%	3 - 12

Beta*bind*®-A Footprint

- Feedstock: Sugar beet pulp
- Produced in The Netherlands
- Supplied as dry powder
  - ✓ Free flowing
  - ✓ Water binding
  - ✓ Very good ecological profile
- Verified:
  - ✓ Readily biodegradable
  - ✓ 100% natural

Product appearance

- More natural alternative to: cellulose based, silica excipients/carriers

Functional claims:

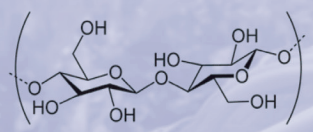
- Control water activity
- Anti-caking
- Disintegration
- Increase tablet properties
- Binding of bivalent/trivalent free metal ions

Properties and functionalities

Product	Dry matter (%)	Bulk density (g/l)	Water holding capacity (ml/g)	Particle size distribution (example)	Appearance (as is)	Appearance (in application)
Beta*bind*®-A	95	600 - 700	5 - 8	10% < 80 µm, 10% > 400 µm	Off white free flowing powder	Insoluble particle

Beta*fib*® Footprint

- INCI: ***Cellulose***
- Feedstock: Sugar beet pulp
- Produced in The Netherlands
- Supplied as dry powder
  - ✓ 2% active ready-to-use slurry
  - ✓ 25% moist powder
- Verified:
  - ✓ Non-toxic
  - ✓ Inherently biodegradable
  - ✓ All natural
- Extremely tolerant w.r.t. pH (2 to 11), temperature (up to 180 °C) and electrolytes



Molecular structure

Functional claims:

- Structuring
- Foaming properties (duration)
- Particle carrying
- Stabilizing
- Spread ability
- Rinsibility
- Opacifying
- Neutral olfactory

Properties and functionalities

Product	Type of structure	Particle size (µm by Malvern)	Use level (%)	Solubility in water	Rheology Viscosity (mPa.s)	Rheology Flowing behavior	Rheology Yieldpoint (Pa)	Applicable pH range
Beta*fib*®	Suspension gel	40-60	0.15 – 0.8	None	± 600	Shear thinning	> 2	2 – 11

Rheometer: Physica MCR 301, Anton Paar. Measuring system: Parallel Plates. Plate 5cm, gap 1mm. Rotational tests. Betafib concentration 1% DM (w/w) in water @ 20°C

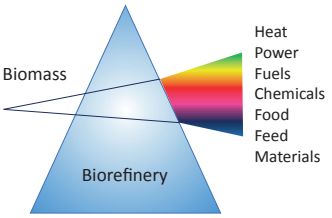
Who are we?

Our role in the biobased economy

The biobased economy is unstoppable and will affect the current supply chains and business structures. Royal Cosun is committed to the biobased economy and therefore invested in an integrated and cost-effective cascading biorefinery to refine sugar beet pulp and isolate high-value components. The overall objective is to establish new value chains based on microcellulose fibers, L-arabinose and galacturonic acid in high-value markets. These new products are an extension of Cosun's current portfolio of available biobased products such as carboxymethyl inulin, cationic inulin and bio-methane.

We serve markets such as home & personal care, paints & coatings, oil & gas, food, construction, water treatment and the chemical industry.

Cosun is backward integrated and has direct access to large quantities of feedstock. This allows Cosun to provide security of supply to its customers.



Drivers for the biobased economy

There is a growing concern and increasing awareness in society and at governmental level regarding the environment and sustainability. Drivers that fuel the biobased economy include climate change, expected future scarcity of fossil-based raw materials and the need for rural area development. Biomass is becoming a very important renewable source for chemicals and materials. The emerging biobased economy is inevitable and will have a major influence on the supply chains and business structures of many industrial sectors.

Our biobased solutions

The development of biobased solutions is an ongoing process. Our present portfolio of products includes:

- **Beta*fib*®** microcellulosic fibers – structuring of liquids;
- **Carboxy*line*®** carboxymethyl inulin – scale inhibition;
- **QUATIN®** cationic inulin – surface modification;
- **Beta*well*®** L-arabinose – sucrase inhibition;
- **Beta*well*®** galacturonic acid – pH control and chelation;
- **Beta*well*®** galactaric acid – pH control and chelation;
- **Beta*bind*®** powdered sugar beet pulp – water binding;
- **Biobased building blocks** for new chemical products and polymers.

Besides that, we have multiple innovative products under development with new interesting functionalities.

For Cosun, to be a successful player in the biobased economy, several strategic aspects are of importance:

- Focus on high-value products and 100% utilization of raw materials;
- Continuous investment in research and development;
- Strategic partnerships and co-development throughout the whole value chain.

Contact

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2019-03