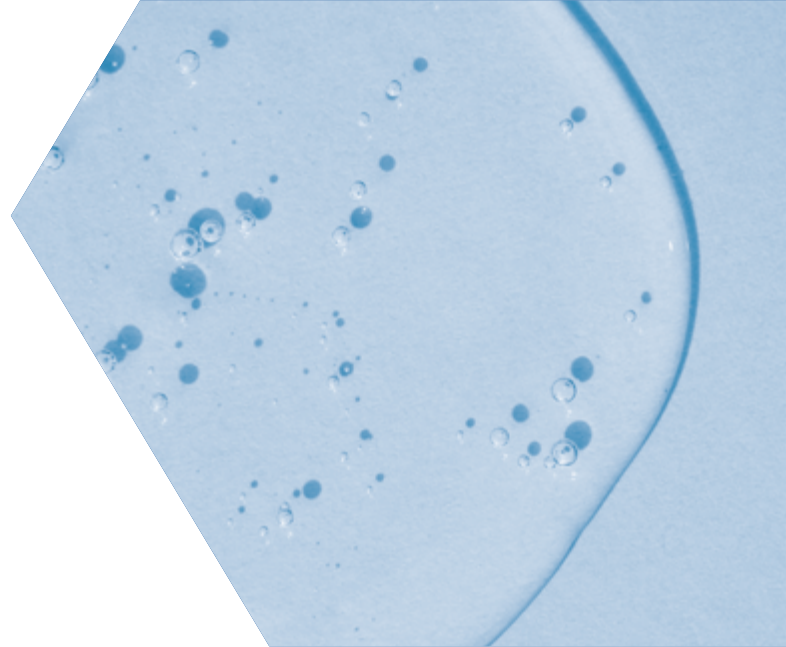


Spotlight Rheology Modifiers



Rheology

Rheology is the science of the deformation and flow of matter. It describes the relationship between force, deformation and time.



Types of Rheology:

Newtonian fluid:



At a given temperature, the measured viscosity remains constant as the shear rate varies



E.g. water and thin motor oil



Newtonian fluids are not very common in reality

Non-Newtonian fluid:

Pseudoplastic rheology

- › Viscosity decreases as shear rate increases (shear-thinning)

Dilatant rheology

- › Viscosity increases as shear rate increases (shear-thickening)
- › Rare in practice and mainly observed in fluids containing high levels of solids
- › E.g. cheese spread, starch & water

Rheopectic rheology

- › Viscosity increases over a measurable period of time as shear rate increases (time-dependent shear-thickening)
- › E.g. gypsum-water suspension

Thixotropic rheology

- › Viscosity decreases over a measurable period of time as shear rate increases (time-dependent shear-thinning)
- › E.g. ketchup, lipstick, printing ink

Rheology modifiers

What is a Rheology Modifier?

Rheology modifiers act as thickeners or viscosity modifiers. A good rheology modifier is able to structure the formulation and can become flowable if a force is applied. They help in controlling shelf stability, ease of application, open time/wet edge and sagging.

Biesterfeld Offers

Biesterfeld offers a range of rheology modifiers from our suppliers. These serve several functions including thickening, suspension, stabilization, and gelation for different aspects of rheology control.

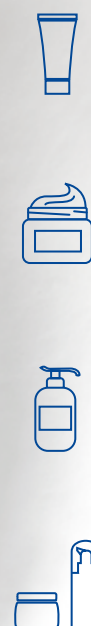


Lab & Innovation Centre

At our Lab and Innovation Centre in Hamburg we work with our customers to develop tailored solutions. We can provide a selection of sample formulations to serve as a good starting point for your project. By including additives from our wide-ranging portfolio, we can also enhance existing formulations.

If you have an idea for a project get in touch:

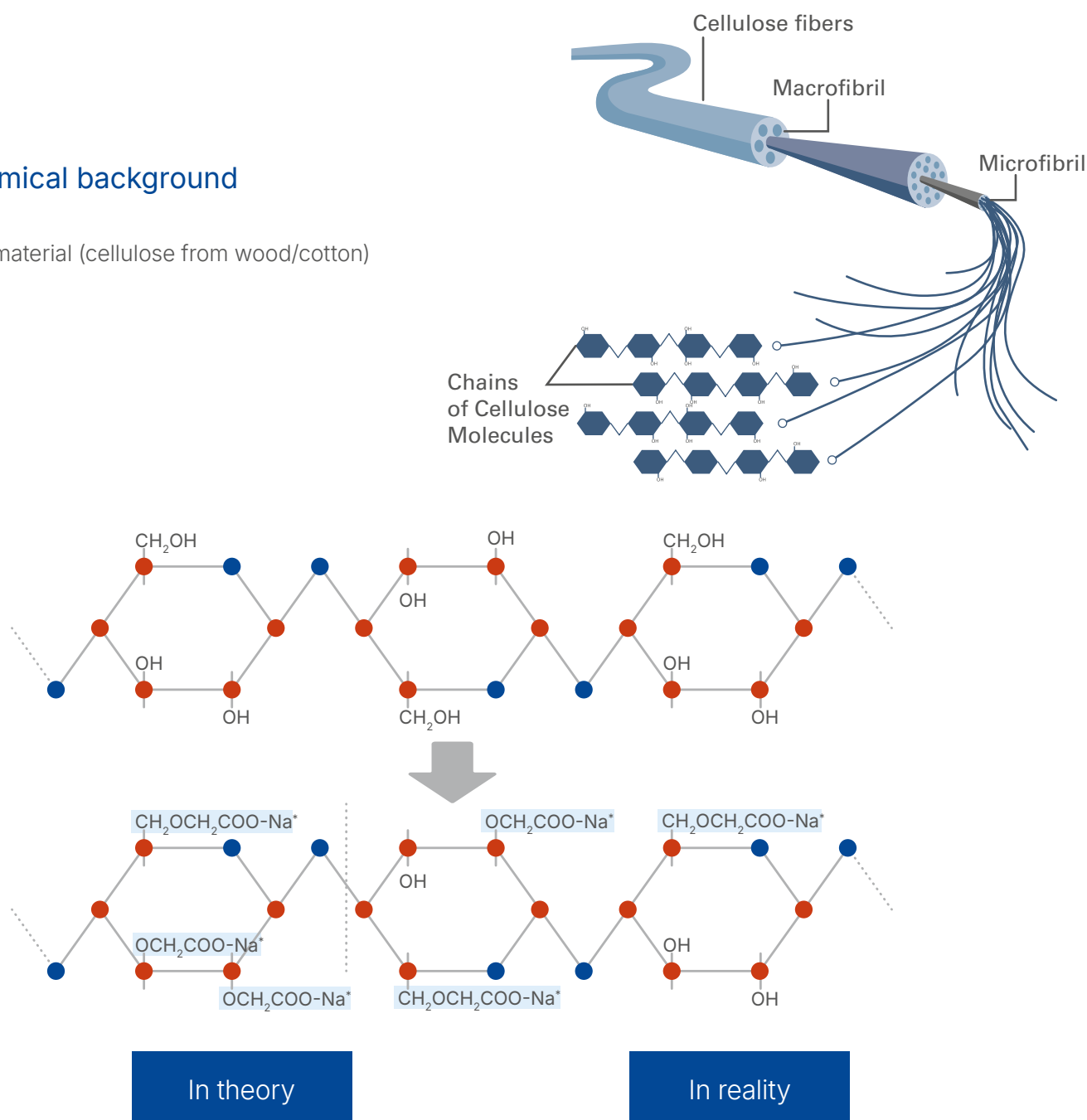
pharma@biesterfeld.com



Nouryon manufactures a range of products for applications in the pharmaceutical industry. It works according to the highest international standards and continuously carries out product testing to ensure these standards are met. Today, with sustainability and green values being the key drivers in product innovations, CEKOL® cellulose gum is a preferred choice as a bio-based and biodegradable hydrocolloid. By selecting the right raw materials and adjusting the production process steps, it is possible to tailor the functionality of specific CEKOL® grades to different applications. CEKOL® cellulose gum is a water-soluble polymer derived from wood or cotton cellulose and produced to minimum 99.5% purity. Products manufactured from wood cellulose satisfy GMO-free requirements. The product hydrates and dissolves readily in hot and cold water. By choosing the right CEKOL® type, the formulator can achieve the desired rheology for any aqueous system, including suspensions and emulsions. Besides controlling the rheology, CEKOL® cellulose gum is known for its excellent water-retaining and film-forming capacity.

Chemical background

Raw material (cellulose from wood/cotton)



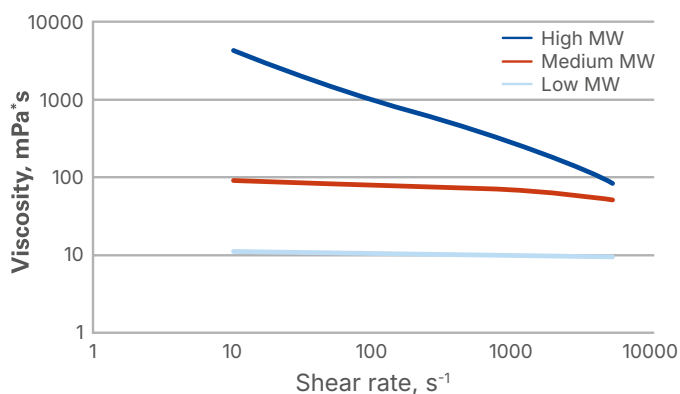
- › CMC has a cellulose backbone with carboxymethyl groups on some of the C2, C3 and C6 positions
- › Number and distribution of carboxymethyl groups influence solution rheology, stability and viscosity

Rheology modification:

- › CMC influences flow properties
- › Behaviour in the application depends on
 - › CMC grade
 - › Other ingredients
 - › Process conditions

Besides rheology modification, it has additional properties:

- › Water binding
- › Surface activity (anionic polymer – hydrogen bonding / charge interaction / crosslinking reaction)
- › Film-forming agent



For pharmaceutical and medical applications we offer different grades of Cekol (99.5% pure CMC):

Product	Viscosity, mPas	Solution concentration %	Powder form			DS Range	
			Granular (G)	Standard	Fine (P)		
CEKOL 30	25-50	2		•		0.80 – 0.90	Low viscosity
CEKOL 150	150-300	2		•	•	0.75 – 0.85	
CEKOL 150 A	150-300	2		•		0.85 – 0.95	
CEKOL 700	500-900	2		•	•	0.75 – 0.85	Medium viscosity
CEKOL 2000	1500-2500	2		•	•	0.75 – 0.85	
CEKOL 2000 A	1500-2500	2	•	•	•	0.85 – 0.95	
CEKOL 4000	300-700	1		•	•	0.75 – 0.85	
CEKOL 10000	1000-1500	1		•	•	0.75 – 0.85	
CEKOL 20000	1500-2500	1		•	•	0.75 – 0.85	High viscosity
CEKOL 30000	2500-3500	1	•	•	•	0.75 – 0.85	
CEKOL 30000 A	2500-3500	1		•		0.85 – 0.95	
CEKOL 40000	3500-4500	1		•	•	0.75 – 0.85	
CEKOL 50000 W	4000-6000	1		•		0.75 – 0.85	
CEKOL 50000	4500-7500	1		•	•	0.80 – 0.90	
CEKOL 100000	7500-10000	1		•		0.80 – 0.90	

Particle Size Distribution

Standard grades
40 – 75% on 75µm

Granular Grades (G)
max 85% on 75µm

Fine grades (P)
max 20% on 75µm

Cekol can be used for the following pharmaceutical applications:

Solid dosage forms:

Capsules, solid-particle powders, granules and pellets, tablets and coated tablets

CEKOL® 30000 and CEKOL® 50000 (base for ointments)

Semi-solid dosage forms:

Ointments, creams, gels, pastes

CEKOL® 4000 to CEKOL® 30000 (syrops and solid & liquid dosage forms)

Liquid-dosage forms:

Solutions, suspensions and emulsions, e.g. eye drops, cough syrup

CEKOL® 700 (nasal and eye drops)

Learn more about Cekol in our on-demand webinar



Contact

For more information feel free to reach to the Healthcare experts at Biesterfeld at pharma@biesterfeld.com

Keep up with what's shaping Pharma

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