

## PRODUCT SPECIFICATION - TECHNICAL DATA SHEET

### CIP<sup>®</sup> amino-methylated CNF (CNC)

Hexamethylenediamino functionalized CNF (CNC)

CAS Number: 9004-34-6



USE ONLY FOR R&D PURPOSES

#### MANUFACTURER:

PULP AND PAPER INSTITUTE, Bogiščeva 8, SI- 1000 Ljubljana in association with University in Maribor,  
Faculty for mechanical engineering, Smetanova 8, SI 2000 Maribor.

**APPLICATIONS:** emulsifiers, lubricates, suspensions, strengthener, thickener

Paints and coatings, films, paper and packaging, aerogels, nonwoven, textile, filtration, environmental remediation, electronic devices, personal care products, cosmetic, art conservation, agro products, 3D printing, electrospinning

#### PREPARATION OF SAMPLE BEFORE USE

- Ultra-Turrax homogenization: 3 x 3 min at 10000 rpm
- Dispersibility in different media: water, acetone, ethanol, etc.

**Parameters:**

<b>TEST</b>	<b>Specification</b>
Appearance	White suspension
Solids	1 wt %, 5 wt%
pH	7-9
FTIR Identification	Confirmed
Content of aldehyde groups (spectroscopic method using TTC/KOH)	<0.05 mmol/g
Surface charge (potentiometric or conductimetric titration; zeta potential)	pK~4-5: >1.0 mmol/g, pK~9.5: >1.3 mmol/g ZP at pH7: ~40 mV, at pH 9: ~32 mV
Degree of crystallinity (XRD spectroscopy)	~32%
Morphology (SEM image)	Microscaled particles with a nanosized network substructure without separated nanofibrils.
Decomposition temperature (TGA in N <sub>2</sub> )	n.d.
Antimicrobial activity for CNF containing at least 1 mmol/g aldehydes (standard dilution antibiogram method)	<i>Escherichia coli</i> (G-): MIC 0.78 wt%, MBC 1.34 wt% <i>Staphylococcus aureus</i> (G+): MIC 0.33 wt%, MBC 0.44 mmol/g
Acute aquatic toxicity with <i>Daphia magna</i> for CNF containing at least 1 mmol/g aldehydes (ISO 16197:2014)	Nonhazard (up to 10% mortality)
Citotoxicity on A594 human lung adenocarcinoma cells for CNF containing at least 1 mmol/g aldehydes	No effect on cells viability up to 100 mg/l
Persistence and degradability in composting soil at 20±2 °C and 65±3% RH (ISO 11721-1:2001) for CNF containing at least 1 mmol/g aldehydes	Up to 90% biodegradable after 28 days

Available packaging: 250 ml, 1000 mL, 5000 mL plastic containers. Addition packaging option on request. To be stored in original container under refrigeration 2 -8 °C. Do not freeze.

REFERENCES

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