Characterization of specialty cellulose

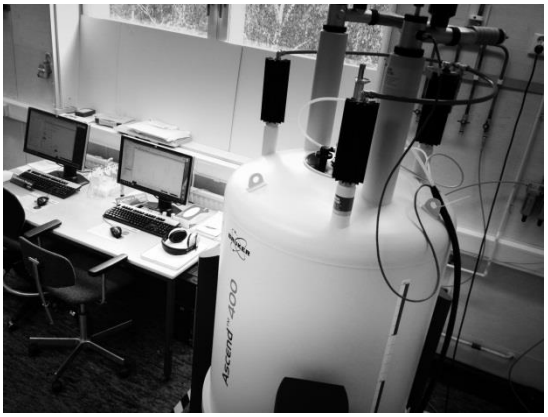
Do you know what's in your sample? Innventia has experienced staff and advanced equipment for complete characterization of specialty celluloses such as dissolving grade pulps and high reactivity cellulose.

The properties of specialty celluloses are to a great extent influenced by their chemical composition and supramolecular structure.

What can we do for you?

Innventia offers unique analysis of the specific surface area of cellulose in water swollen state. The method utilizes solid state nuclear magnetic resonance (NMR) spectroscopy. Furthermore, Innventia offers a wide range of tests of specialty cellulose samples, from chemical and macromolecular characterization, to characterization of supramolecular, fibrillar and bulk properties, for instance:

- Cellulose and hemicellulose content
- Content of impurities (lignin, inorganic matter, *etc.*)
- Degree of polymerization
- Surface area and porosity
- Water retention value and fibre saturation point
- Fibre length, width and coarseness
- Alkali resistance and solubility
- Fock reactivity



Innventia has access to advanced equipment – such as solid state NMR – for characterization of cellulose.

A list of the most frequently ordered testing services related to specialty cellulose is appended. Please contact us for a discussion about how we may help you!

Contact

For more information, please contact Dr Tomas Larsson (tomas.larsson@innventia.com, tel. +46 8 676 7130), or Dr Fredrik Aldaeus (fredrik.aldaeus@innventia.com, tel. +46 8 676 7188). We look forward to your inquiries!

INNVENTIA AB
Box 5604, SE-114 86 Stockholm, Sweden
Tel +46 8 676 70 00, Fax +46 8 411 55 18
info@innventia.com
www.innventia.com

INNVENTIA

CHEMICAL AND MACROMOLECULAR PROPERTIES

Cellulose and hemicellulose content

Carbohydrate composition
The content of non-glucose monosaccharides is assumed to correspond to the hemicellulose content. We measure the carbohydrate composition according to standard SCAN-CM 71, and deliver the content of glucose, mannose, arabinose, xylose and galactose in mg per g dry pulp. 2 g of sample is required.
This analysis is accredited by Swedac according to ISO 17025.

Carbohydrate composition incl. uronic acids
In order to determine both neutral and acidic carbohydrates we use enzymatic hydrolysis in combination with capillary electrophoresis. In addition to the saccharides obtained by the standard method, this procedure provides the content of hexenuronic acid, 4-*O*-methylglucuronic acid and galacturonic acid. 1 g of sample is required.

Alpha-, beta-, and gamma cellulose
We measure the content of alpha-, beta-, and gamma cellulose according to standard TAPPI T 203 om, and deliver the results in percent cellulose per dry pulp. 4 g of sample is required.

Degree of polymerization

Molecular mass distribution
We measure the molecular mass distribution relative to polystyrene using size exclusion chromatography after tricarbanilation, and deliver the results of the weight-average, number-average and peak molecular mass in g per mole, as well as the polydispersity index. 1 g of sample is required.

Viscosity
We measure the viscosity according to standard ISO 5351, and deliver the results in mL/g. 5 g of sample is required.

Lignin content

Acid-insoluble (Klason) and acid-soluble lignin
We measure the content of acid-insoluble (Klason) and acid-soluble according to standards TAPPI T 222 om and TAPPI UM 250, and deliver the results in mg per g dry pulp. At least 2 g of sample is required (more if the lignin content is low).

Kappa number
We measure the kappa number according to standard ISO 302. 5 g of sample is required.

Low molecular mass compounds

Acetone extractable matter
We measure the acetone extractable matter (*ie*. extractives) according to standard SCAN-CM 49, and deliver the results in percent extractives per dry pulp. 2 g of sample is required.

Inorganic content

Ash content
We measure the residue (*i.e.* ash) on ignition at 525°C according to standard ISO 1762, and deliver the results in percent ash per dry pulp.2 g of sample is required.

Acid-insoluble ash content
We measure the acid-insoluble residue (*i.e.* acid-insoluble ash) on ignition at 525°C according to standard ISO 776, and deliver the results in mg per g dry pulp. 2 g of sample is required.

Metals/elements content
A variety of different metals and elements may be measured using atomic emission spectroscopy (ICP-AES), for instance Al, Ba, Ca, Cu, Fe, K, Mg, Mn, Ma, S and P. We deliver the results in mg of each element per g dry pulp. 2 g of sample is required.

SUPRAMOLECULAR AND FIBRE PROPERTIES

Cellulose supramolecular properties

Specific Surface area of cellulose I
One unique analysis at Innventia is the ability to measure the specific surface area of cellulose in water swollen state. The method utilizes solid state nuclear magnetic resonance (NMR) spectroscopy. The result is reported as square meters of surface area per gram cellulose. Approximately 200 mg of cellulose is needed for the analysis.

Average fibre wall pore size
Using heavy water for swelling fibre materials makes it possible to measure average pore sizes in fibre walls by NMR relaxation time measurements. Depending on how the measured data can be interpreted average pore size can be reported in absolute units such as nano-meters or relative units such as percentage of the average pore size in some suitable reference sample. 1–3 g of sample material is required.

Fibre dimensions

Fibre length and width
We measure the fibre length and width using an L&W FiberTester, and deliver the results in mm and µm, respectively. 30 g of sample is required.

Coarseness
We measure the coarseness using an L&W FiberTester, and deliver the results in µg/m. 30 g of sample is required.

Hornification

Water retention value
We measure water retention area according to SCAN-C 62:00, and deliver the results in g per g dry pulp. 1–3 g of sample is required.

Fibre saturation point
We measure fibre saturation point by the classical method developed by Stone & Scallan. The inability of water bound in fibre wall pore to dilute a high molecular mass dextran solution is used for calculating the fibre saturation point when and an excess of liquid is present. The results are reported as the dimensionless ratio of the mass of the fibre wall water divided by the mass of the mass solids. 5–10 g of sample is required.

BULK PROPERTIES & REACTIVITY MEASUREMENTS

Properties in alkali

Alkali solubility (S_x)
We measure the solubility in alkali of different concentrations according to standard ISO 692, and deliver the results in percent dissolved per dry pulp. 4 g of sample is required.

Alkali resistance (R_x)
We measure the resistance to alkali of different concentrations according to standard ISO 699, and deliver the results in percent undissolved per dry pulp. 4 g of sample is required.

Reactivity

Fock reactivity
We measure the reactivity for CS_2 (*i.e.* Fock reactivity) according to a modified Fock method, and deliver the results in percent reacted cellulose per dry pulp. 2 g of sample is required.

INNVENTIA AB is a world leader in research and development relating to pulp, paper, graphic media, packaging and biorefining. Our unique ability to translate research into innovative products and processes generates enhanced value for our industry partners. We call our approach *boosting business with science.* Innventia is based in Stockholm, Bäckhammar and in Norway and the U.K. through our subsidiaries PFI and Edge respectively.