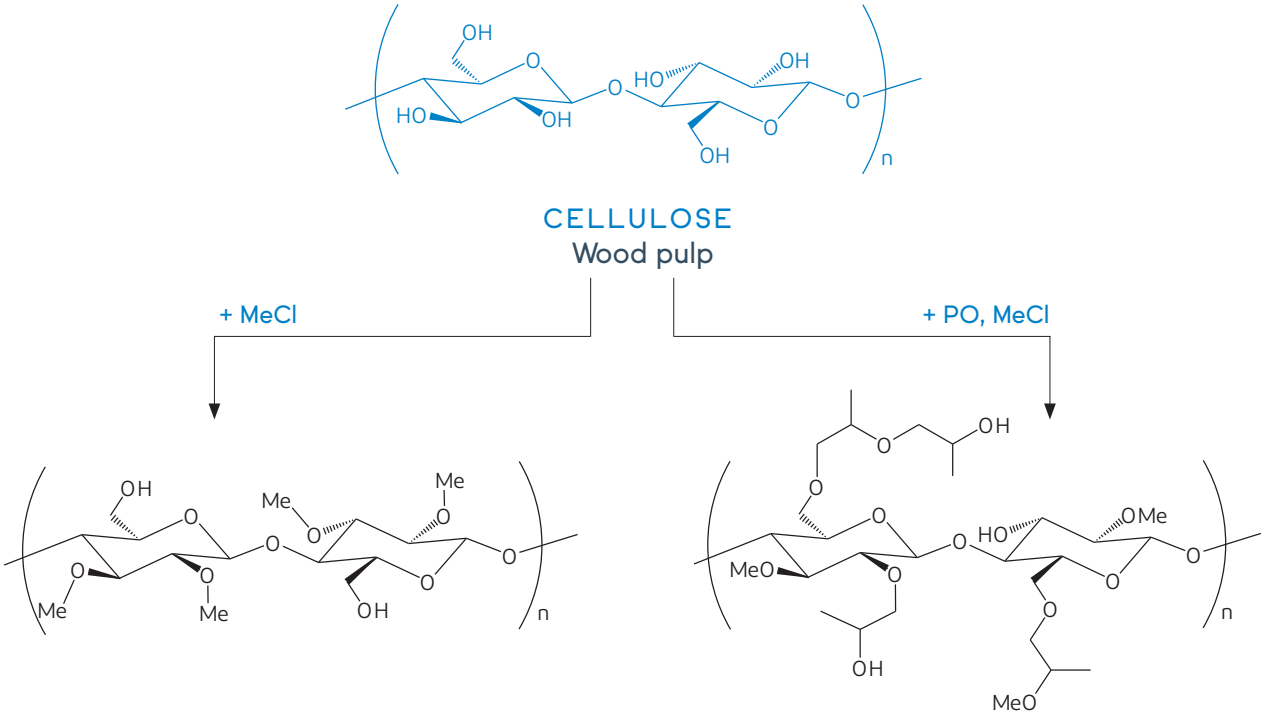
METHOCEL™

Water-Soluble Cellulosic Polymers for Industrial Applications

Where science & creativity meet

WHAT ARE METHOCEL™ WATER-SOLUBLE POLYMERS?

METHOCEL™ Methylcellulose (MC) and Hydroxypropyl Methylcellulose (HPMC) Water-Soluble Polymers are cellulose ethers that are derived from cellulosic materials such as natural wood or cotton linters. To obtain METHOCEL™ Water-Soluble Polymers, wood pulp is treated with sodium hydroxide to form alkali cellulose. Alkali cellulose is then treated with either methyl chloride or a combination of methyl chloride and propylene oxide to obtain, respectively, methylcellulose or hydroxypropyl methylcellulose.



IFF IS A WORLD LEADER IN CELLULOSIC DERIVATIVES

METHOCEL™ Water-Soluble Polymers offer an exceptional range of properties that can be fine-tuned to create custom solutions. A key component of many consumer products, industrial products and intermediates, METHOCEL™ Water-Soluble Polymers are backed by a world-class Research & Development team, regional Technical Application teams and regional laboratories.

METHOCEL™ Water-Soluble Polymers are widely used in pharmaceutical, medical, food ingredients, nutritional supplements, home and personal care, automotive, electronics, agriculture, paper and many other industries.

A RANGE OF FUNCTIONAL PROPERTIES

METHOCEL™ is a single product that combines a variety of functional properties such as:

- Lubricity
- Binding
- Water retention
- Thickening and rheology modification
- Film formation

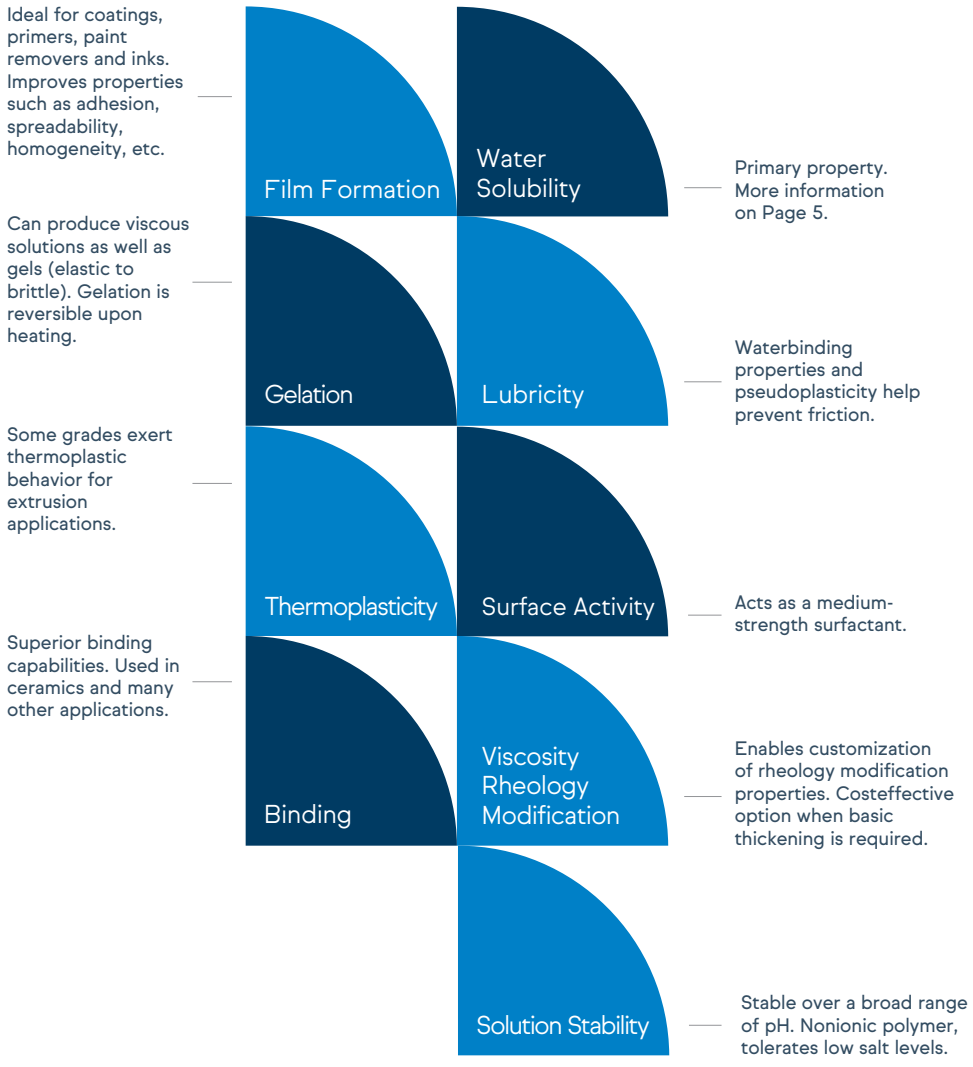
METHOCEL™ Water-Soluble Polymers are versatile, and their many synergistic properties make them a cost-effective formulation component. Benefits include:

- Water solubility (all grades)
- Solvent solubility (specific grades)
- Wide range of viscosities (3 to 200,000 mPas in 2% solution)
- Rheology modification, from pseudoplastic/ shear thinning to Newtonian behavior
- Gelation, reversible gel formation upon heating
- Water-binding
- Lubricant
- Film-forming (e.g., for coatings)
- Thermoplasticity (specific grades)
- Approved for food contact
- "Surface active," emulsion stabilizer
- No ionic charge
- Enzyme resistant or biodegradable dependent on substitution level
- pH stable in range 2.0–12.0

UNIQUE PROPERTIES DEVELOPED FOR YOUR APPLICATION NEEDS

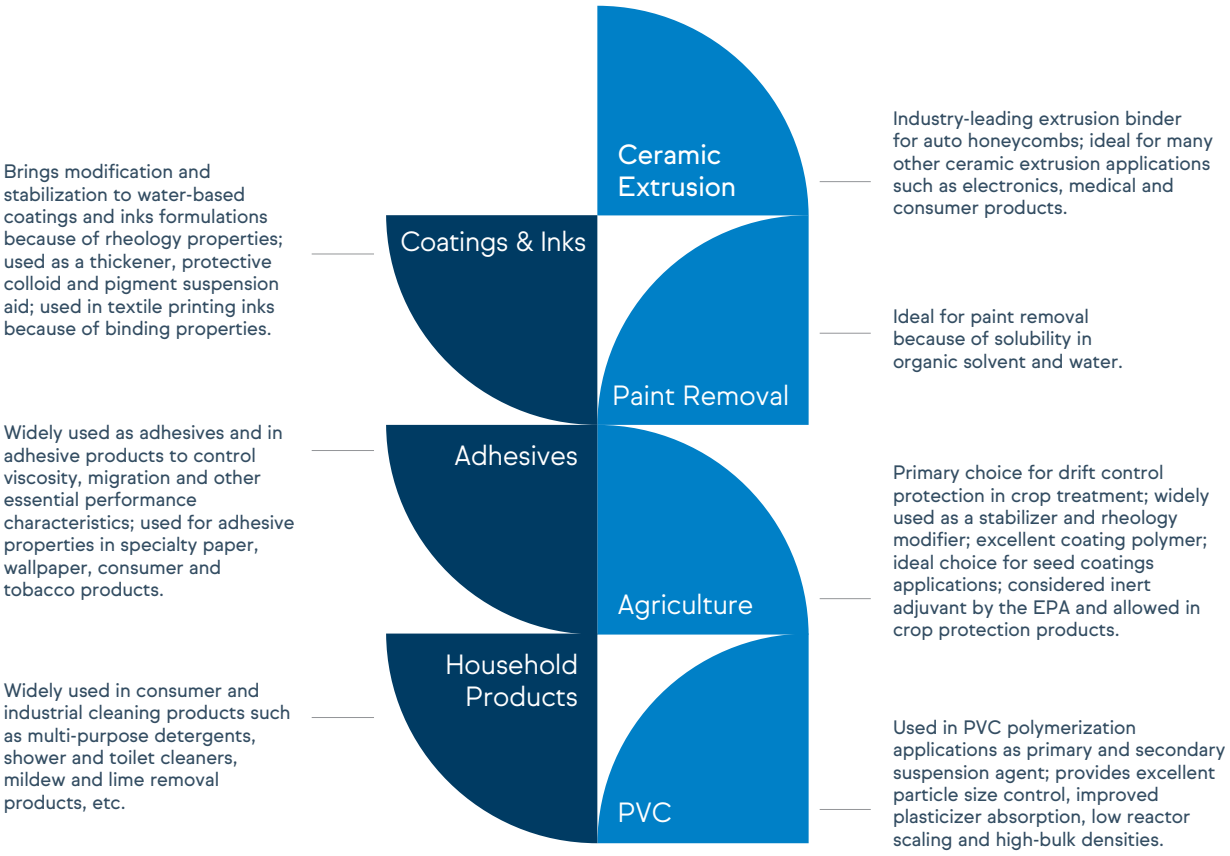
METHOCEL™ has a well-established history in a variety of industries and is used across a wide range of applications. The use of METHOCEL™ continues to expand due to these key factors:

- Combines many desirable and unique properties into one form
- Manufactured globally at four production sites, increasing business continuity planning
- Cost-effective compared to many functional alternatives
- Backed by IFF's Technical Service, Quality, Regulatory and Research & Development teams



METHOCEL™ APPLICATIONS*

METHOCEL™ Water-Soluble Polymers are versatile polymers, soluble in not just water but many other organic solvents. Though they are used in a wide variety of applications, a selected list is provided below.



Industry-leading extrusion binder for auto honeycombs; ideal for many other ceramic extrusion applications such as electronics, medical and consumer products.

Brings modification and stabilization to water-based coatings and inks formulations because of rheology properties; used as a thickener, protective colloid and pigment suspension aid; used in textile printing inks because of binding properties.

Ideal for paint removal because of solubility in organic solvent and water.

Widely used as adhesives and in adhesive products to control viscosity, migration and other essential performance characteristics; used for adhesive properties in specialty paper, wallpaper, consumer and tobacco products.

Primary choice for drift control protection in crop treatment; widely used as a stabilizer and rheology modifier; excellent coating polymer; ideal choice for seed coatings applications; considered inert adjuvant by the EPA and allowed in crop protection products.

Widely used in consumer and industrial cleaning products such as multi-purpose detergents, shower and toilet cleaners, mildew and lime removal products, etc.

Used in PVC polymerization applications as primary and secondary suspension agent; provides excellent particle size control, improved plasticizer absorption, low reactor scaling and high-bulk densities.

*Pharmaceutical, Food, Personal Care and Construction applications are not covered in this brochure.

FIND THE PRODUCT THAT BEST MEETS YOUR APPLICATION REQUIREMENTS

Several factors affect your choice of METHOCEL™.

- What purity level do you require?
- What chemistry is most appropriate?
- What viscosity and molecular weight will optimize your product and process performance?

Purity

Purity is driven by market requirements, regulations and application requirements. IFF offers a wide range of METHOCEL™ for pharmaceutical, food and industrial applications.

Viscocity

METHOCEL™ is available in a wide range of viscosities (3 – 200,000 mPas in 2% solution).

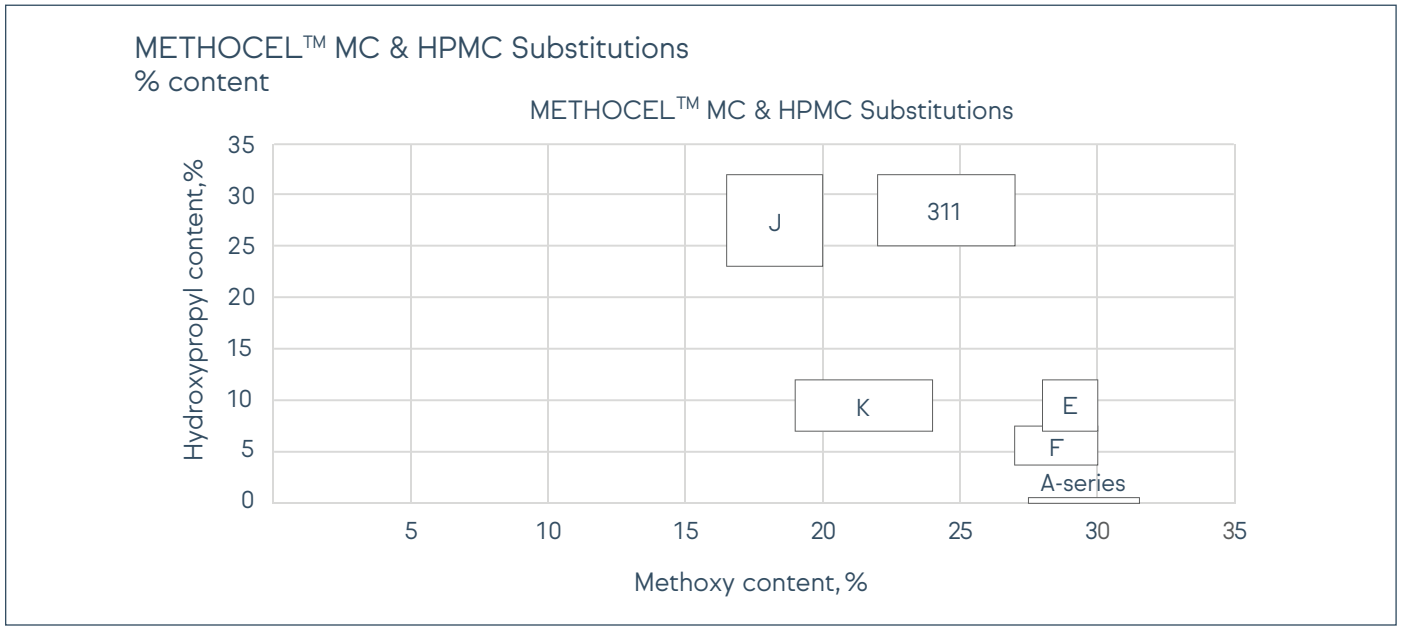
Chemistry

Six chemistries are available in the METHOCEL™ portfolio. The substitution level influences the performance attributes in the customer application.

Segment	METHOCEL™ HPMC
Adhesives	●
Ceramic extrusion	●
Ceramic glazes	●
Coatings, inks	●
Paint removers	●
PVC	●
Agriculture, crop protection	●
Pulp and paper	●
Mining	●
Water drilling	●
Other industrial app.	●

● Often used - Reference material
● Occasionally used

OUR LARGE PRODUCT LINE OPTIMIZES YOUR APPLICATION PERFORMANCE



COMMON METHOCEL™ PRODUCTS

METHOCEL™	Chemistry	Viscosity in 2% solution	Primary applications
311	Special grade	7,500 (1%)	Paint removers, gelled fuels
A15LV	A	15	General purpose
A4C	A	400	General purpose
A15C	A	1,500	General purpose
A4M	A	4,000	Ceramic extrusion
E5	E	5	General purpose
E50	E	50	PVC
F50	F	50	PVC
F4M	F	4,000	Ceramic extrusion
F4M PRG	F	4,000	General purpose
228	F	5,000	General purpose
240	F	40,000	Ceramic extrusion
240S	F	40,000	General purpose
J12MS	J	12,000	General purpose
J75MS	J	75,000	General purpose
K100LV	K	100	PVC
K4M	K	4,000	Ceramic extrusion
K4MS	K	4,000	General purpose
K15M	K	15,000	Ceramic extrusion
K15MS	K	15,000	General purpose

PROCESSING RECOMMENDATIONS FOR METHOCEL™

Basic processing recommendations can be found below. A more detailed technical brochure is also available. Please connect with our sales and technical service teams for customized recommendations.

How to prepare aqueous solutions of METHOCEL™

In cold water, METHOCEL™ particles swell and hydrate to solubilize. Depending on the grade, concentrations in water can reach 2-3% (high viscosity grades) to 10-15% (low viscosity grades). To obtain a METHOCEL™ solution, use the correct concentration, rate of addition and shear.

It is preferable to disperse METHOCEL™ in a small amount of hot water (>90°C). Once METHOCEL™ is dispersed in hot water, add the remaining volume of cold water to fully dissolve. For details, please see our technical handbook.

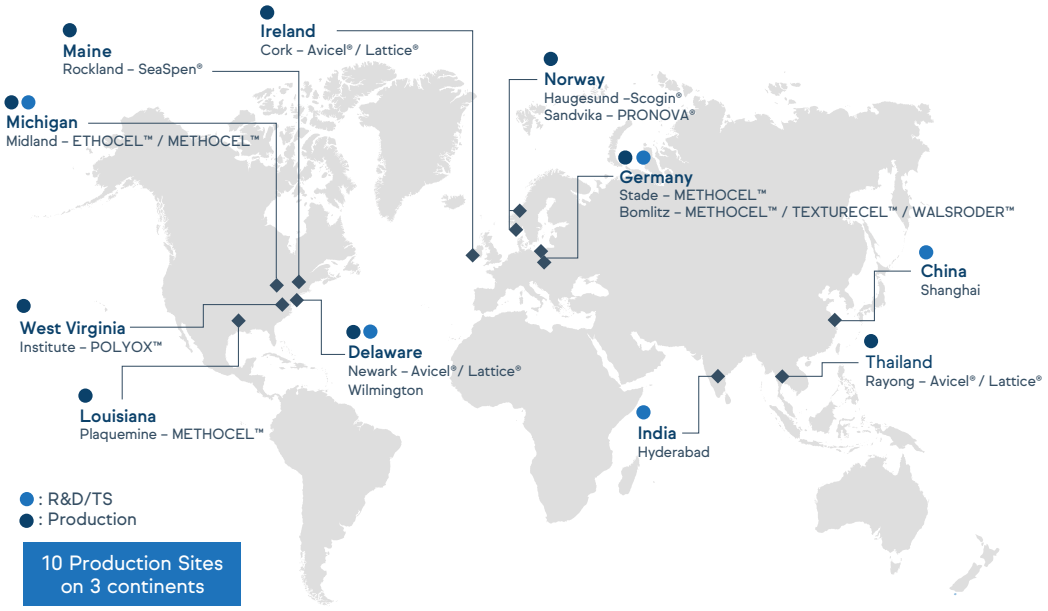
How to prepare METHOCEL™ solutions in Non-aqueous solvent or media

It is possible to use METHOCEL™ in non-aqueous media by pre-dispersing METHOCEL™ with other formulation components prior to the addition of water. Please consult our technical handbook or contact a IFF representative for details.

GLOBAL SPECIALTY SOLUTIONS

- Global manufacturing and technology footprint
- Robust business continuity planning

MANUFACTURING & RESEARCH SITES



WHAT WE DO

METHOCEL™ Water Soluble Polymers for industrial applications are available only from IFF and its distributors. IFF's Global Specialty Solutions business, manufactures cellulosic polymers alongside other IFF portfolio products. Our dedicated team of experts commercializes these products into various global markets.

WHO WE ARE

We are innovative problem solvers, drawing on deep application understanding and market insight to help our customers turn challenges into high-value business opportunities.

Connect with us

For more information connect with IFF sales and application experts

iff.com

Product Safety

When considering the use of any IFF products in a particular application, please review our latest Material Safety Data Sheets first to ensure that your intended use can be accomplished safely. For Material Safety Data Sheets and other product safety information, contact IFF at the provided numbers. Before handling any other products mentioned in the text, obtain available product safety information and take necessary steps to ensure safety of use.

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