

Pharma Solutions

# Smart Pharma Solutions

Essential Excipients and Vital Expertise to Help Customers Thrive

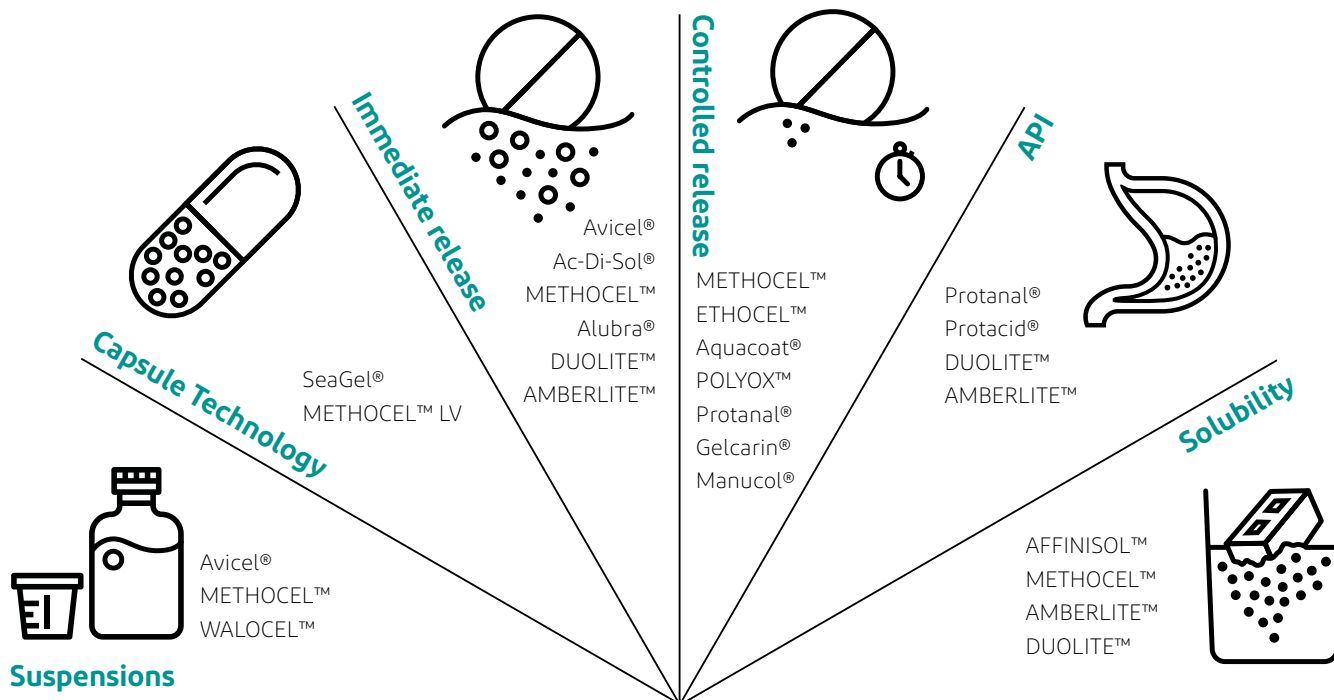




# Because health matters

At DuPont, we aim to help our pharma customers overcome everyday challenges and innovate future solutions. Armed with essential excipients and vital expertise, our broad portfolio is designed to deliver performance and cost advantages in various oral solid dosage forms. Couple that with leading QbD programs, regulatory expertise and a wide network of global problem-solving experts, we can help deliver a consistent, high-quality offering, at the right time, every time.

## Broad Portfolio, Boundless Opportunities



### BECAUSE EFFICIENCY MATTERS

To help you streamline your processes and improve your cost efficiency and product performance, we offer:

- An expanded, innovative productivity platform and co-processed excipients portfolio
- METHOCEL<sup>™</sup> DC2, which helps reduce manufacturing costs by up to 60%
- Novel co-processed excipients Avicel<sup>®</sup> DG and Avicel<sup>®</sup> SMCC that can increase tablet compactibility by 30 to 50%

### BECAUSE SPEED MATTERS

To answer your requests in a timely manner and help you bring new products to the market more quickly, we:

- Provide increased capacity with expanded manufacturing sites across Europe and North America
- Create shorter lead times for European and Indian customers,
- Increase our customers' flexibility to balance supply and demand
- Help customers navigate complex regulatory environments

### BECAUSE QUALITY & RELIABILITY MATTERS

To deliver the highest quality ingredients each and every time, we combine:

- Quality by Design (QbD) components, such as historical manufacturing data and variability analysis (Multivariate Analysis) to improve scale up, robust manufacturing process, and lower manufacturing costs
- A strong business continuity plan for reliability of supply
- Regulatory track record of success with strong collaboration with the International Pharmaceutical Excipients Council

### BECAUSE INNOVATION MATTERS

To help you bring new products to the market, we combine decades of expertise with passionate curiosity, producing:

- Immediate, sustained and enteric release formulations
- Solubility enhancing excipients
- Sharing knowledge and generating ideas that deliver future innovation

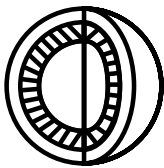
# Smart Pharma Solutions with Reliable Products

We have the excipients and APIs that can help you meet your formulation needs. When you need a pharmaceutical solution and the technical expertise to put it to work quickly in your formulation, there are more reasons than ever to rely on us. Our products comply with the requirements of Food and Drug Administration (FDA), Food Chemicals Codex, Codex Alimentarius, United States Pharmacopeia (USP), National Formulary (NF), Japanese Pharmacopoeia, European Pharmacopoeia and British Pharmacopoeia. In addition, they can meet most requirements of Chinese Pharmacopoeia.



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**METHOCEL™** Cellulose Ethers are water-soluble polymers derived from cellulose. The METHOCEL™ product range encompasses methylcellulose and hydroxypropyl methylcellulose (hypromellose) – each available in different grades, physical properties and a wide range of viscosities. They enable formulators to create tablet coatings, granulation binders, sustained release matrix systems and for controlled viscosity in liquid formulations.



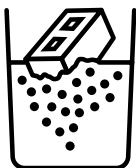
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**ETHOCEL™** Premium Ethylcellulose Resins are water-insoluble polymers. They are soluble in a wide range of pharmaceutically acceptable organic solvents used for spray coating. Their excellent compatibility allows use of ETHOCEL™ polymers with many basic ingredients across a broad array of pharmaceutical applications such as controlled-release matrix systems, multiparticulate coatings, and microencapsulation. They are also useful as non-aqueous granulation binders and in taste-masking of actives.



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**POLYOX™** Resins are nonionic poly (ethylene oxide) polymers. They possess thermoplastic properties, are fast-hydrating and very quickly form hydrogels. They are essentially tasteless, colorless, nonionic and non-caloric. Their unusual combination of properties makes them useful in a surprisingly broad array of pharmaceutical formulations such as osmotic pump technologies, tablet binding, mucosal bioadhesives and abuse deterrent applications.



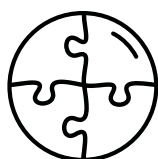
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**AFFINISOL™** Hydroxypropyl Methyl Cellulose (HPMC) is a water soluble polymer that can help optimize solubility enhancement by maintaining stable solid dispersions and inhibiting API crystallization.



**AMBERLITE™ and DUOLITE™** Ion Exchange Resins are polymers capable of exchanging ions with a solution that is passed through them. AMBERLITE™ and DUOLITE™ ion exchange resins are well-known and globally recognized excipients as well as APIs with a long history of safe use. As excipients, they are used for sustained release in liquid suspensions, taste-masking, abuse deterrence, and solubility enhancement. As APIs, they are recommended to treat hypercholesterolemia and hyperkalemia.

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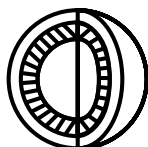
**Avicel® PH** represents the largest portfolio of microcrystalline cellulose standard and co-processed grades with legacy of superior quality for more than 50 years. Through continuous innovation, differentiated grades have been developed to make Avicel® PH an indispensable formulation tool, boosting productivity and meeting tough formulation challenges in particular in wet and dry granulation and in direct compression applications.

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**Ac-Di-Sol®** croscarmellose sodium is an internally cross-linked sodium carboxymethyl cellulose (NaCMC) that aids in the disintegration and dissolution of tablets, capsules and granules. Ac-Di-Sol's performance is attributed to its superior water uptake and rapid swelling properties. Ac-Di-Sol shows superior performance at low concentration and is the choice of superdisintegrant for wet granulation and orally disintegrating tablets.

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**Aquacoat®** pseudo latex aqueous dispersion of ethyl cellulose enables aqueous coating of multiparticulates and tablets. They are widely used for achieving controlled release profile for tablets and multi-particulate dosage forms.

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**Protanal® and Manuacol®** Alginates, NF, Ph. Eu are natural hydrocolloids that harness unique properties of brown seaweed. They are widely used in pharmaceutical controlled release applications as a gel former, thickener or stabilizer as well as an API against acid reflux.

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**SeaGel®** is a patented technology, developed using our unique knowledge of seaweed science, which enables manufacturing of carrageenan based soft capsules using existing soft capsule equipment. Seagel® capsules feature excellent thermal stability and high transparency and is a leading solution for vegetarian soft gel capsule.

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**Alubra™** sodium stearyl fumarate is used as a hydrophilic lubricant in capsule and tablet formulations. The fumarate moiety of Alubra increases its melting temperature, which allows for greater functionality at high press speeds while the stearate chain maintains the lubricity of the compound, supporting low ejection forces. Alubra™ is an effective alternative to traditional magnesium stearate solutions and can reduce over-lubrication and incompatibilities with certain APIs.

### Product catalog

Chemical name	Product brand name	Applications
Hydroxylpropyl methylcellulose	METHOCEL™	Sustained release matrix tablets, coating and vegetable capsule
Methyl cellulose	METHOCEL™	Thickening agent
Ethyl cellulose	ETHOCEL™	Controlled release coating tablets and multiparticulates
Sodium carboxymethylcellulose	WALOCEL™	Thickening agent
Polyethylene oxide	POLYOX™	Osmotic pump tablets and abuse deterrent
Hydroxypropyl methylcellulose for hot-melt extrusion	AFFINISOL™	Solubility enhancement
Ion exchange resin	DUOLITE™ & AMBERLITE™	Taste masking agent and sustained release
Sodium alginate	Protanal®/Manucol®	Anti-reflux and sustained release
Microcrystalline cellulose	Avicel®	Binder, compression aid and filler
Croscarmellose sodium	Ac-Di-Sol®	Super Disintegrant
Sodium stearyl fumarate	Alubra®	Lubricant
Carrageenan	SeaGel®	Vegetable soft capsules
Ethylcellulose aqueous dispersion coating Cellulose acetate phthalic aqueous dispersion coating	Aquacoat®	Controlled release coating for tablets and multiparticulates



## Elements of market success

DuPont pharma solutions offers unique capabilities to meet customers' needs

### Manufacturing excellence

- Large manufacturing network
- Robust business continuity plans for all chemistries
- Global logistics capabilities that provide consistent and secure supply worldwide
- Commercial scale-up capabilities

### Broad portfolio and product leadership

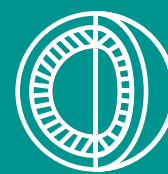
- Highest quality for consistent, reproducible performance
- Regulatory expertise through leadership in IPEC
- Global R&D and application development to offer product innovations, solutions and technical support

### Technical depth and polymer design - from lab to market-development scale

- Ability to leverage fundamental chemistry knowledge into pharmaceutical applications
- Rapid R&D prototyping
- Market development scale-up
- Analytical capabilities to support QbD initiatives
- Ability to formulate and characterize a variety of drug delivery systems
- Deep understanding of the influence of polymer properties on end-use performance to guide formulation

### Global presence

With a large manufacturing and technical footprint, strong R&D and a broad portfolio, we can provide high-quality, consistent solutions to our customers and help them deliver on the promise of a healthier life.





## Nutrition & Biosciences

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[www.dupontnutritionandbiosciences.com](http://www.dupontnutritionandbiosciences.com)

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