



## Oral Drug Delivery

### Excipients for oral solids, solutions, and suspensions

The Health business of Lubrizol Life Science (LLS Health) offers an array of solutions for oral drug delivery, including extended-release, taste masking, rheology and mucoadhesive pharmaceutical excipients. We combine in-depth understanding of drug delivery systems with a portfolio of specialty materials to deliver application-specific solutions to ease your development process, for both prescription and over-the-counter drug products.

Our **Carbopol® polymers, Pemulen™ polymers, and Noveon® polycarbophil** have been used successfully in prescription and over-the-counter commercial formulations for decades, allowing for efficient rheology modification, extended drug release, taste masking, and mucoadhesion and are listed at various strengths in the FDA Inactive Ingredient Database.

**Oral Treatment Applications** - All polymers listed in the chart below are suitable for use in oral applications and are present in commercialized oral products.

Product Trade Name	Suspensions or Solutions	Extended Release (Tablets and Capsules)	Bioadhesive Applications
Carbopol® 971P NF polymers	•	•	•
Carbopol® 71G NF polymers	–	•	•
Carbopol® 974P NF polymers	•	•	•
Noveon® AA-1 Polycarbophil USP	•	–	•

## Enabling innovation through our multifunctional excipients, which are:

- **Compatible** with a broad spectrum of active pharmaceutical ingredients (APIs), and co-excipients
- Highly **efficient** at low polymer usage levels
- Ideal for imparting **rheology** properties to oral liquids and stability for permanent suspensions, at low inclusion levels (0.2 - 1%)
- Effective extended **release** polymers, with the ability to produce smaller, easier to swallow tablets compared to other polymers such as cellulosics (typical use level 5 - 30%)
- Available in both **powder and granular forms** (Carbopol® 71G NF polymers) and can be used in all types of tablet manufacturing processes (wet and dry granulation, direct compression) without the addition of a tablet binder.
- Impart functional attributes such as **bioadhesion and taste-masking**
- Proven safe for **oral** administration
- Compliant with global **pharmacopeial** and **regulatory** requirements

Pharmacopeia Monograph Compendial Name					
Product Trade Name	Polymerization Solvent	United States (USP/NF)	Europe (Ph. Eur.)/ India (I.P.)	Japan (JPE) <sup>1</sup>	China (Ch.P.)
Carbopol® 971P NF polymers	Ethyl Acetate	Carbomer Homopolymer Type A	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer
Carbopol® 71G NF polymers	Ethyl Acetate	Carbomer Homopolymer Type A	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer
Carbopol® 974P NF polymers	Ethyl Acetate	Carbomer Homopolymer Type B	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer
Noveon® AA-1 Polycarbophil USP	Ethyl Acetate	Polycarbophil	-	-	Carbomer Homopolymer

<sup>1</sup>Based on customer request, Lubrizol certifies select lots of product against the JPE Carboxyvinyl Polymer monograph.

## Formulating with confidence:

### Our Excipients:

- Are manufactured under GMPs in ISO:9001 certified facilities
- Have established DMFs
- Have been extensively tested for safety

### Partnering for all Development Phases:

- Worldwide technical and application support services
- Dedicated global regulatory staff and quality assurance



- Sustainable supplier owned by Berkshire Hathaway
- Decades of manufacturing and polymer expertise

### Driven by Consumers:

- Improving patient lives by providing a full excipient portfolio for nearly all dosage forms
- Advancing innovation by progressing partner products quickly to market
- Proactively responding to ever-changing regulatory and market needs