HEALTH

Pharmaceutical Excipients Guide

Lubrizol Life Science Health is the world's largest manufacturer of pharmaceutical grade carbomers and polycarbophils, and has been manufacturing pharmaceutical excipients for more than 35 years. Our Carbopol®, Pemulen™, and Noveon® polymers have been successfully used in over-the-counter and pharmaceutical formulations to impart rheology modification, mucoadhesion, controlled drug release, and many other unique properties.

Topical Applications - All polymers listed in the chart below are suitable for use in topical applications and are present in commercialized topical products. Topical applications can include creams, lotions, gels, and ointments for dermal, vaginal, and rectal use, among others.

Pharmacopeia Monograph Compendial Name						
Product Trade Name	Polymerization Solvent	United States (USP/NF)	Europe (Ph. Eur.)	Japan (JPE)[1]	China (ChP)[2]	India (IP)
Carbopol® 971P NF Polymer	Ethyl Acetate	Carbomer Homopolymer Type A	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 974P NF Polymer	Ethyl Acetate	Carbomer Homopolymer Type B	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 980 NF Polymer	Cosolvent	Carbomer Homopolymer Type C	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 981 NF Polymer	Cosolvent	Carbomer Homopolymer Type A	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 5984 EP Polymer	Cosolvent	Carbomer Homopolymer Type B	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® ETD 2020 NF Polymer	Cosolvent	Carbomer Interpolymer Type B	–	–	–	–
Carbopol® Ultrez 10 NF Polymer	Cosolvent	Carbomer Interpolymer Type A	–	–	–	–
Pemulen™ TR-1 NF Polymer	Cosolvent	Carbomer Copolymer Type B	–	–	–	–
Pemulen™ TR-2 NF Polymer	Cosolvent	Carbomer Copolymer Type A	–	–	–	–
Noveon® AA-1 Polycarbophil USP	Ethyl Acetate	Polycarbophil	–	–	–	–

[1]Based on customer request, Lubrizol certifies select lots of product against the JPE Carboxyvinyl Polymer monograph.
[2]Lubrizol certifies select lots of product shipped to China against the ChP Carbomer Homopolymer Monograph.

Oral Treatment Applications - All polymers listed in the chart below are suitable for use in oral applications and are present in commercialized oral products. Oral applications can include capsules, tablets, solutions and suspensions.

Pharmacopeia Monograph Compendial Name						
Product Trade Name	Polymerization Solvent	United States (USP/NF)	Europe (Ph. Eur.)	Japan (JPE)[1]	China (ChP)[2]	India (IP)
Carbopol® 71G NF Polymer	Ethyl Acetate	Carbomer Homopolymer Type A	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 971P NF Polymer	Ethyl Acetate	Carbomer Homopolymer Type A	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 974P NF Polymer	Ethyl Acetate	Carbomer Homopolymer Type B	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Noveon® AA-1 Polycarbophil USP	Ethyl Acetate	Polycarbophil	–	–	–	–

[1]Based on customer request, Lubrizol certifies select lots of product against the JPE Carboxyvinyl Polymer monograph.
[2]Lubrizol certifies select lots of product shipped to China against the ChP Carbomer Homopolymer Monograph.

Ophthalmic Applications - All polymers listed in the chart below are suitable for use in ocular applications and are present in ophthalmic commercialized products. Ocular applications can include solutions, suspensions, emulsions, and gels.

Pharmacopeia Monograph Compendial Name						
Product Trade Name	Polymerization Solvent	United States (USP/NF)	Europe (Ph. Eur.)	Japan (JPE)[1]	China (ChP)[2]	India (IP)
Carbopol® 974 NF Polymer	Ethyl Acetate	Carbomer Homopolymer Type B	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Carbopol® 980 NF Polymer	Cosolvent	Carbomer Homopolymer Type C	Carbomers	Carboxyvinyl Polymer	Carbomer Homopolymer	Carbomers
Pemulen™ TR-1 NF Polymer	Cosolvent	Carbomer Copolymer Type B	–	–	–	–
Pemulen™ TR-2 NF Polymer	Cosolvent	Carbomer Copolymer Type A	–	–	–	–
Noveon® AA-1 Polycarbophil USP	Ethyl Acetate	Polycarbophil	–	–	–	–

[1]Based on customer request, Lubrizol certifies select lots of product against the JPE Carboxyvinyl Polymer monograph.
[2]Lubrizol certifies select lots of product shipped to China against the ChP Carbomer Homopolymer Monograph.

Reference Information - Lubrizol continues to offer additional benzene-polymerized polymers not listed in the tables above. Due to regulatory restrictions on the use of benzene in pharmaceutical formulations, Lubrizol recommends that carbomers polymerized in either ethyl acetate or a cosolvent mixture of ethyl acetate and cyclohexane be used for all new drug development projects. Additionally, it may be desirable to substitute a benzene polymerized carbomer with a non-benzene polymerized carbomer in a pharmaceutical formulation. The following table shows recommended alternatives for the benzene-grade Carbopol® polymer products based on viscosity criteria. If a substitution is made in a pharmaceutical formulation, it is recommended that key performance properties be ascertained, and regulatory considerations be taken into account. Depending on the desired dosage requirements, other Carbopol® polymers may be suitable alternatives.

Benzene-Grade Carbopol® Polymers	Recommended Non-Benzene Carbopol® or Pemulen™ Polymers
Carbopol® 934 NF Polymer	Carbopol® 5984 EP and Ultrez 10 NF Polymer
Carbopol® 934P NF Polymer	Carbopol® 974P NF Polymer
Carbopol® 940 NF Polymer	Carbopol® 980 NF and Ultrez 10 NF Polymer
Carbopol® 941 NF Polymer	Carbopol® 71G NF, 971P NF and 981 NF Polymer
Carbopol® 1342 NF Polymer	Pemulen™ TR-1 NF and TR-2 NF Polymer

About Lubrizol Life Science Health - The Health business team partners with customers to speed their innovative medical devices and differentiated pharmaceutical products to market. Our dedicated team provides best-in-class polymers and excipients, along with state-of-the-art product design, development, and manufacturing services, with the ultimate goal of creating solutions that improve patient outcomes.

LUBRIZOL LIFE SCIENCE
9911 Brecksville Road
Cleveland, OH 44141-3201 USA
Lubrizol.com/Health