



Lubrizol

Dermal Treatments

Drug Delivery Solutions for Wound Care,
Transdermal and Topical Applications



Lubrizol LifeSciences

Links Science to Life™



Lubrizon LifeSciences: Partners in Innovation

Lubrizon LifeSciences combines an in-depth understanding of functional polymer systems with a portfolio of specialty materials to deliver application-specific solutions to the medical device, pharmaceutical and healthcare industries. As a technology leader and one of the largest providers of engineered polymers, Lubrizon offers polymer based drug delivery solutions. Together, we help link science to life.

Technical Collaboration

We work closely with every customer from the beginning to identify unique needs and overcome hurdles to create complete, total solutions.

Lubrizon LifeSciences aims to support our customers' success at every stage of development: advanced polymer materials, R&D/engineering, quality processes and manufacturing efficiency.

Lubrizon LifeSciences has intimate knowledge of the healthcare industry, and is actively involved in collaborating with hospitals, universities, research institutes and other professionals to accelerate the development of the latest healthcare technology, ultimately seeking to improve quality of life.

Formulation Expertise

Customers can take advantage of our formulation expertise and application labs for polymer processing, formulation and testing. We also offer our customers field support services, responding to customers' technical service questions and visiting customers to provide application support, technical seminars, testing assistance, processing advice and more.

By drawing upon a comprehensive portfolio, we have the knowledge and means to deliver precisely tailored, high-performance polymer-based solutions to meet our customers' requirements.

Global Capabilities

Our global presence links you to even more opportunities by supporting growth in emerging markets, maintaining global supply and sales support, and understanding international regulatory requirements.

Compliant and Safe

Lubrizon has qualified regulatory staff assigned specifically to support the LifeSciences division to assure all solutions meet compliance and safety requirements.



Dermal Treatments

From patch to cream to film to gel, Lubrizol LifeSciences is your supplier for dermal treatment applications. With our extensive portfolio of polymeric products, we have the ability to deliver medical and pharmaceutical solutions that meet diverse needs across the dermal treatment market.

Products we offer yield desirable properties for use in:

Medicated Creams, Lotions and Gels

Specialty pharmaceutical polymers used in topical applications have been used successfully in commercial formulations to yield desired rheological properties, stabilization of emulsions and suspensions, and other effects that bolster the integrity and effectiveness of topical products.



Transdermal Delivery

Thanks to more than 50 years of experience working with specialty thermoplastic polyurethanes (TPUs), Lubrizol can customize properties of films, transport membranes and hydrogels to be most conducive to the transdermal delivery of active pharmaceutical ingredients (APIs).



Wound Care

Lubrizol's innovative wound dressing materials have an extraordinary ability to absorb wound exudate and aid in blood clotting. In conjunction with proper adhesives our wound care films are durable, adhere comfortably to the patient's skin, and can be easily removed without damaging healthy tissue.



Polymer Solutions and Systems

Lubrizol's extensive portfolio of specialty polymers includes a wide variety of technologies that have been successfully used commercially for both medical and healthcare applications. From specialty TPUs with customized properties to pharmaceutical polymers that keep suspensions and emulsions stable, Lubrizol has the technology and capabilities to guide you toward a solution.

Specialty TPUs for Dermal Treatments

Thanks to more than 50 years of experience working with specialty thermoplastic polyurethanes (TPUs), Lubrizol can customize properties of films, transport membranes and hydrogels to be most conducive to the transdermal delivery of active pharmaceutical ingredients (APIs).

Pellethane®	A flexible and thermoplastic elastomer available in a wide range of hardness. A desirable material for films, backing and short-term use applications.
Tecophilic™	A TPU formulated to absorb equilibrium water contents for 20 – 1,000 percent of its dry resin weight. Available in extrusion or solution grades.
Tecothane™	A TPU that is solvent resistant and biostable regardless of its level of hardness.
Tecoflex™	A material with an inherent ultraviolet stabilizer that resists yellowing. It can be formulated in a variety of ways, including extrusion, injection molding and solution coating.

Convenient Customization

Lubrizol is one of the largest global suppliers of TPU and can provide the widest range of polymer properties based on TPU technology as a result. Depending on our customers' needs, Lubrizol LifeScience Polymers has the ability to provide specific customized polymers ranging from hard to soft, non-permeable to permeable, clear to colored/filled, highly stable to biodegradable and more.

Lubrizol-produced TPU characteristics can be altered to suit application needs with regard to:

- Hardness/Durometer
- Tensile Strength
- Elongation
- Biocompatibility
- Hydrophobic and Hydrophilic Properties
- Moisture Vapor Transmission Rate (MVTR)

Lubrizol LifeSciences' ability to offer TPU technology tailored to a customer's needs means that there are an abundance of potential advantages to using versatile Lubrizol polymers.

Transportation: Water, moisture, gases and drug transmission rates can be balanced by delivering appropriate levels of barrier/protection properties and breathability/permeability.

Biocompatibility/biostability: Lubrizol TPUs have a long history of bio-safe use in contact with and inside the human body.

Microbial resistance: TPUs do not encourage microbial growth and will not be damaged by microbial attacks.

Chemical/abrasion resistance: TPUs can be made to stand up to harsh environments.

Sterilizability: Materials can be sterilized without losing integrity.

Strength/elasticity: TPUs can demonstrate high-tensile strength and elongation.

Color/clarity: TPUs can be made clear, opaque, filled or pigmented as necessary.

Flexibility/softening: Flexible materials that soften in or on the body increase patient comfort.

Processing ease: TPUs can be extruded, injection molded or solution coated in some cases.

Non-yellowing: Some TPU varieties have non-yellowing properties to maintain appearance.

Hydrolytic stability: Materials will remain stable during extended exposure to fluids.

Applications

The specialty TPU grades created by Lubrizol LifeSciences can be used in a wide variety of dermal treatment applications, including:

Wound care applications



- Reconstructive surgery materials
- Wound dressings
- Antimicrobial encapsulation
- Scaffolds
- Films
- Skin dressings and tapes
- Other uses

Transdermal delivery systems



- Films
- Hydrogels
- Transport membranes
- Other uses

Regulatory Status

LifeSciences' custom medical-grade specialty TPUs are manufactured in ISO 9001-2008 compliant facilities in accordance with industry standards. These materials have also undergone biocompatibility and biostability testing, confirming their applicability for medical devices.

Pharmaceutical Polymers for Dermal Treatments

Lubrizol produces multiple grades of high molecular weight polymers for the pharmaceutical market. These specialty polymers have been used successfully in commercial formulations that are designed for topical and bioadhesive applications. Product families include:

Carbopol® Polymers: Impart a wide range of flow and rheological properties for topical formulations. These polymers offer exceptional thickening, suspension and stabilization, and can be used as a controlled release agent.

Pemulen™ Polymeric Emulsifiers: Used primarily to create stable oil-in-water emulsions. An efficient suspension agent and an effective stabilizer of insoluble materials, its shear thinning properties yield easy pumping and spraying.

Noveon® AA-1 Polycarbophil: A bioadhesive for use in contact with mucous membranes or for creating suspensions. It is generally used as a release agent and deliverer of APIs.

Technological Benefits

Lubrizol pharmaceutical polymers are versatile and efficient, multifunctional and stable, providing the properties needed for topical and transdermal applications. Benefits include:

Rheology modification: Highly efficient products yield desirable rheological properties at low usage levels and result in topical formulations with excellent aesthetics and skin feel.

Stability: Materials yield long-term stability for suspensions and emulsions and can permanently suspend non-soluble ingredients.

Bioadhesion: Products maximize contact with biological tissues which can lead to lower active usage concentrations due to enhanced API bioavailability.

Compatibility: Products can be used effectively with most APIs.

Resilience: Polymers in the dry powder state are chemically and thermally stable under typical storage and processing conditions, and are minimally affected by temperature fluctuation.

Viscoelasticity/shear thinning: Materials are ideal for pouring, pumping, spreading and spraying applications.

Microbe resistance: Products do not support microbial growth.

Non-irritating: Materials are demonstrated to have low irritancy and non-sensitizing properties.

With a range of pharmaceutical ingredients in Lubrizol's portfolio, there are many opportunities for customization of pharmaceutical products to meet your precise needs.



Applications

Lubrizol specialty pharmaceutical polymers can be used to enhance both topical and transdermal products, including:

Topical applications



- Medicated creams
- Lotions
- Ointments
- Gels

Transdermal drug delivery systems



- Formulated API hydrogel stabilization
- Patch bioadhesion

Regulatory Status

Lubrizol works with all relevant regulatory bodies to establish and maintain the global pharmacopeial status of its pharmaceutical ingredients. In addition, Lubrizol supports its pharmaceutical ingredients with Drug Master Files (DMFs) in the United States and Europe. All Lubrizol pharmaceutical excipients are manufactured under GMP conditions in ISO 9001-certified facilities.

Carbopol®, Pemulen™ and Noveon® polymers, as a class, have received extensive review and toxicological evaluation. The safety of these products is supported by a history of over 50 years of successful use in commercial drug and cosmetic product formulations.

Other Ingredients for Dermal Treatments

Lubrizol LifeSciences also offers ingredients for non-prescription dermal applications, which include film formers, emollients, stabilizers, emulsifiers, surfactants and more.

Diverse Knowledge, Comprehensive Solutions

With expertise in the formulation of diverse polymer technologies and experience processing a wide range of materials, Lubrizol can offer solutions where other material suppliers cannot. Lubrizol LifeSciences utilizes knowledge of polymer technologies for the medical market, pharmaceutical market and more to empower customers to be more efficient and effective with their formulation and design. For instance, in the transdermal delivery system market, customers can utilize Lubrizol LifeSciences' specialty TPU technology expertise to develop films with desirable permeability and barrier properties while integrating pharmaceutical polymer technology that yields exceptional bioadhesion, viscosity and controlled API release. Regardless of the application or end use, Lubrizol's intimate knowledge of ingredient interactions means customers ultimately have more robust, effective products.

Quality Polymers for Superior Products

Lubrizol is committed to quality and has integrated quality management systems that are suitable for the materials supplied across a variety of applications and industries. We take pride in providing the highest levels of quality, service and innovation to all of our customers.

We also pride ourselves on our ability to work collaboratively with customers to create products that possess all the properties and functionality they desire. For more information on how you can benefit from Lubrizol LifeSciences' dermal treatment technologies, visit Lubrizol.com/LifeSciences.



Lubrizol

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