

Intermediates

Expand your success
on elastomers:

PolyTHF

 **BASF**
The Chemical Company

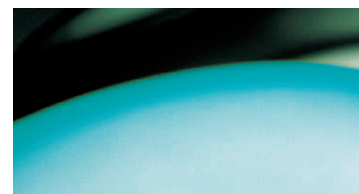
 **BASF**
We create chemistry

BASF – We create chemistry

BASF is the world's leading chemical company. Its portfolio ranges from chemicals, plastics, performance products and crop protection products to oil and gas. We combine economic success, social responsibility and environmental protection. Through science and innovation we enable our customers in almost all industries to meet the current and future needs of society. Our products and system solutions contribute to conserving resources, ensuring healthy food and nutrition and helping to improve the quality of life. We have summed up this contribution in our corporate purpose: We create chemistry for a sustainable future.

Top intermediates supplier

The BASF Group's Intermediates division develops, produces and markets a comprehensive portfolio of more than 600 intermediates around the world. The most important of the division's product groups include amines, diols, polyalcohols, acids and specialties. Among other applications, intermediates are used as starting materials for coatings, plastics, pharmaceuticals, textile fibers, detergents and crop protectants. Innovative intermediates from BASF help to improve the properties of final products and the efficiency of production processes. The ISO 9001:2000-certified Intermediates division operates plants at production sites in Europe, Asia and the Americas.



BASF's PolyTHF

BASF's PolyTHF® is an important intermediate in manufacturing thermoplastic polyurethane elastomers. These products are used for the manufacturing of highly abrasion-resistant and flexible hoses, films and cable sheatings. Other applications include thermoplastic polyetheresters, polyetheramide and cast polyurethane elastomers, proven for example in their use for skateboard and inline skates wheels.



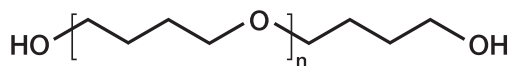
BASF's PolyTHF laboratory in Shanghai is the first of its kind in the Asia Pacific region.

PolyTHF is used as a building block for special coatings formulations (photo) and many more.



What is PolyTHF?

PolyTHF is a hygroscopic polymer made up of linear diols with a backbone of repeating tetramethylene units which are connected by ether linkages. The chains are capped with primary hydroxyl units and are produced by polymerizing tetrahydrofuran. It is a white solid that melts into a clear, colourless liquid when heated to between -15 and 30 °C depending on its molecular weight.



Formula: HO[(CH₂)₄O]_nHCAS
Registry Number: 25190-06-1



The PolyTHF plant at the Chinese site Caojing near Shanghai where BASF has been producing top-quality PolyTHF since 2004. Besides, BASF is producing PolyTHF at three other plants in USA, Germany and Korea.

“We understand consistent quality of raw materials is paramount in the manufacturing of spandex- as well as of non-spandex-products. Our customers rely not only on the exceptional quality of our PolyTHF, but also on our technical expertise. This is how we help our customers become more successful.”

Matt Monahan, Product Manager Butanediol, Tetrahydrofuran, Polytetrahydrofuran, BASF Corporation, USA



PolyTHF: a highly versatile building block



PolyTHF is especially beneficial when used as a building block for soft segment elastomers such as polyurethanes, co-polyetheresters and co-polyetheramides. Its hydroxyl groups react with other functional groups such as organic acids or isocyanates. The most significant reactions are polyaddition, and polycondensation reactions.

Thermoplastic elastomers made with PolyTHF can be processed into finished articles via injection-moulding or extrusion and fiber spinning.



“BASF’s global PolyTHF technical service team fully believes that tailor-made technical services and innovative solutions not only bring additional value to BASF high-quality PolyTHF, but also help our customers to be more successful.”

Dr. Xiaoyin-Toni Yang, Senior Manager, Technical Service PolyTHF, Intermediates division, Asia Pacific

Wide range of applications for PolyTHF

Coatings

When used to formulate coating materials, PolyTHF improves surface finishing, water-resistance, as well as microbe and abrasion resistance. As a result, it is ideal for use in water-borne or radiation-curable coatings for wooden or plastic surfaces. PolyTHF-based coatings can also be used to produce waterproof, yet breathable fabrics and textiles.

Adhesives and sealants

PolyTHF containing polyurethane (PU) adhesives are suited for a wide range of properties and operating temperatures. The versatile choices on offer include simple one-component adhesives, two component reaction adhesives, solvent-based adhesives, or hot melt adhesives for construction, footwear or automotive applications as well as in packaging, lamination and binders.

Textiles

High-quality PolyTHF is the main raw material in the production of highly elastic spandex fibers found in many textiles. While lightweight, such fibers are long-lasting, smooth to the touch and can easily be dyed. They also resist humidity and microbes across a wide temperature range.

Artificial leather

In micropore technology, artificial leather made by PolyTHF as raw material can be used in the manufacture of shoes, luggage and upholstered chairs and sofas.



Automotive

PolyTHF is an important building block for the production of thermoplastic polyurethane and polyetherester elastomers (TPU, TPEE). Parts made from these elastomers can be used in seals and gaskets, covers, hoses, air bag covers, transmission boots, and constant velocity joints.

Industrial applications

PolyTHF can also be used in many heavy-duty performance industrial applications. Specific examples included gears, printer rolls, belts, wheels, tires for fork lift trucks, escalator wheels, hopper car liners, conveyor belts, grain chute liners, pipe linings, pads for rail tracks, marine hoses, mining screens, and animal tags.

Leisure and sports

In the wide area of leisure and sport's products, PolyTHF-based plastics are preferred for their wide range of hardness, high E-modulus and high-level impact resistance at low temperature. Uses include rollerskate wheels, ski boots, bicycle tires, and athletic shoes.



Benefits of using BASF's PolyTHF

BASF is dedicated to offering products that make customers more successful by providing:

A global network close to customers

BASF produces PolyTHF at a worldwide production network spanning Asia, the NAFTA region and Europe. With plants in Ludwigshafen (Germany), Geismar (USA), Ulsan (Korea) and Caojing (China). Leveraging its global production network and highly reliable production process, BASF offers consistently high-quality and supply security.

Reliable and efficient technologies

BASF's PolyTHF is produced in a continuous process. As a result, BASF is a leader in product consistency and purity, fulfilling today's high quality demands.

Complete product range for polyurethanes

BASF supplies both PolyTHF and all other basic raw materials for spandex and the polyurethane industry. Available products range from diols, triols, polyalcohols, amines, various chain extenders, and specialty acids to isocyanates, solvents and additives.

Customized technical support

To further enhance the comprehensive technical support it offers PolyTHF customers, BASF has established a PolyTHF applications laboratory in Shanghai, China – the first facility of its kind in Asia. BASF's PolyTHF laboratory in Shanghai offers:

- state-of-the-art polymer analytics
- lab-scale synthesis of small volume samples in order to optimize the characteristics of spandex/elastane, thermoplastic polyurethane and cast polyurethane elastomer polymers
- development of new PolyTHF-based formulations and improvement of existing ones
- analysis of samples and specimens
- laboratory support for starting up customer plants

Proven global expertise

- experienced polymer physics and analytics department
- elastomer experience
- design and optimization of solvent recycling facilities by BASF's process engineering team
- product stewardship/environmental support in the areas of eco-labeling, safe product handling, toxicology and REACH



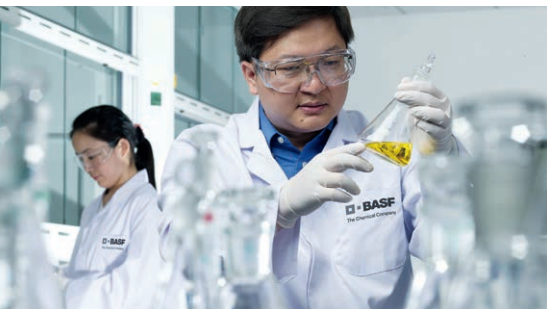
With its laboratory in Shanghai, BASF will further improve the regional technical customer support for PolyTHF.

PolyTHF's advantages as soft segment for elastomers:

- good mechanical properties and excellent resiliency over a wide range of temperatures
- low temperature flexibility
- superior hydrolytic stability
- superior resistance against microbes and fungus attack
- high abrasion resistance
- non-allergenic
- superior dynamic properties (minimum heat build-up)
- high reactivity (bi-functional primary alcohol)
- high tear strength
- PolyTHF itself and its prepolymers have comparatively low viscosities, leading to easier processing and handling
- prepolymers based on PolyTHF have long shelf lives



Almost 30 years of top-level PolyTHF production: the PolyTHF facility at BASF's integrated "Verbund" site Ludwigshafen, Germany. Besides, BASF is producing PolyTHF at three other plants in USA, China and Korea.



Selection of PolyTHF grades

In the PolyTHF laboratory of BASF in Shanghai, BASF employees make customer wishes a reality, fast and efficiently.

Product	PolyTHF 250	PolyTHF 650	PolyTHF 1000	PolyTHF 1400	PolyTHF 1800	PolyTHF 2000
Molecular (g/mol)	225 – 275	625 – 675	975 – 1025	1350 – 1450	1750 – 1850	1950 – 2050
Hydroxyl number (mgKOH/g)	408.0 – 498.7	166.2 – 179.5	109.5 – 115.1	77.4 – 83.1	60.6 – 64.1	54.7 – 57.5
Acid number (mgKOH/g)	max. 0.05	max. 0.05	max. 0.05	max. 0.05	max. 0.05	max. 0.05
Color (APHA)	max. 40	max. 40	max. 40	max. 40	max. 40	max. 40
Water (ppm)	max. 150	max. 150	max. 150	max. 150	max. 150	max. 150
BHT (ppm)	200 – 350	200 – 350	200 – 350	200 – 350	200 – 350	200 – 350
Typical physical properties						
Density 40 °C (g/cm ³)	0.988	0.975	0.975	0.975	0.975	0.975
Density 60 °C (g/cm ³)	0.975	0.964	0.962	0.961	0.960	0.960
Softening point T _m (°C)	-15	18	24	25	27	30
Glass transition point T _g (°C)	-98	-81	-77	-77	-77	-77
Flash Point (°C)	180	215	240	242	244	246

Contact us

Please email us at:

info.intermediates@basf.com

Visit our website at:

www.intermediates.basf.com



PolyTHF is an important component of elastic spandex fibers for textiles such as swimsuits.



The data contained in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, the data does not relieve processors from carrying out their own investigations and tests; neither does the data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. The safety data given in this publication is for information purposes only and does not constitute a legally binding Material Safety Data Sheet (MSDS). The relevant MSDS can be obtained upon request from your supplier or you may contact BASF directly at info.intermediates@basf.com. **2012 edition**

PolyTHF® is a registered trademark of BASF SE.

**PolyTHF inside –
our customers' benefits:**

- global network close to customers
- reliable and efficient technologies
- complete range for polyurethanes
- customized technical support
- proven global expertise

■ · BASF
The Chemical Company

■ · BASF
We create chemistry