



BASF Battery Offering

 **BASF**

We create chemistry

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Binder for lithium-ion battery anode

BASF is the world largest binder supplier and recent years BASF offers binders for lithium-ion battery anode.

Key properties & Features

- Waterborne polymer dispersion, fully miscible with CMC aqueous solution and compatible with common anode active materials with good slurry stability
- Excellent discharge performance at low temperature which is ideal for applications in severe cold weather

Customer benefits

- Global production network (in EU: DE, ES and FI) with regional technical support
- Worldwide R&D network to meet customers' demands, especially strong relationship with Asia
- Decades of collaboration with strategic partners, customers and academia
- Commitment to sustainable development and a responsible global supply chain



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Ethylene carbonate for lithium-ion battery electrolytes

The BASF Group's Intermediates division develops, produces and markets a comprehensive portfolio of about 700 intermediates around the world. Its most important product groups include amines, diols, polyalcohols, acids and specialties.

Benefiting from BASF's global Verbund, innovative intermediates from BASF help to improve both the properties of final products and the efficiency of production processes. Close to the market and customers, we are strong in developing new molecules, finding new applications for products in our portfolio and developing improved, more efficient manufacturing processes and technologies.

Key properties & Features

- Ethylene Carbonate (EC) is a highly polar, aprotic solvent with a high dielectric constant. It provides good solubility for salts and efficiently enables charge transfer as electrolyte component in lithium ion batteries.
- BASF with own, state-of-the art, production process: low pressure technology fulfilling all safety standards.
- Fully registered product (such as REACH) and ISO 9001 certified quality management system to enhance customer satisfaction.

Customer benefits

- BASF is the only producer of Ethylene Carbonate (EC) in industrial scale in Europe. Its production is fully integrated into BASF's Verbund concept, which enables an efficient use of energy and raw materials.
- We acknowledge that electromobility is one of the key industrial trends and batteries are a core technology underpinning the shift to energy decarbonization and transport systems. We expect a significant increase in demand for EC in Europe.
- The intermediates division is working closely with its customers in the field of electromobility to develop solutions and support sustainable growth.
- By supporting climate aspects through our products, solutions, and technologies, we live up to our purpose to create chemistry for a sustainable future.



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NMP for lithium-ion battery production

N-methyl-2-pyrrolidone (NMP), is a highly polar aprotic, general purpose organic solvent. Thanks to the very good solvating properties, NMP is used in the early steps of the lithium-ion battery production: the manufacture of the electrodes. After the application, NMP is recovered, recycled and re-introduced into the production loop. BASF is the global market leader in NMP with more than four decades of operational experience in the production, purification and handling of NMP. BASF provides for its customers NMP BG, a grade that fulfils the requirements.

Key properties & Features

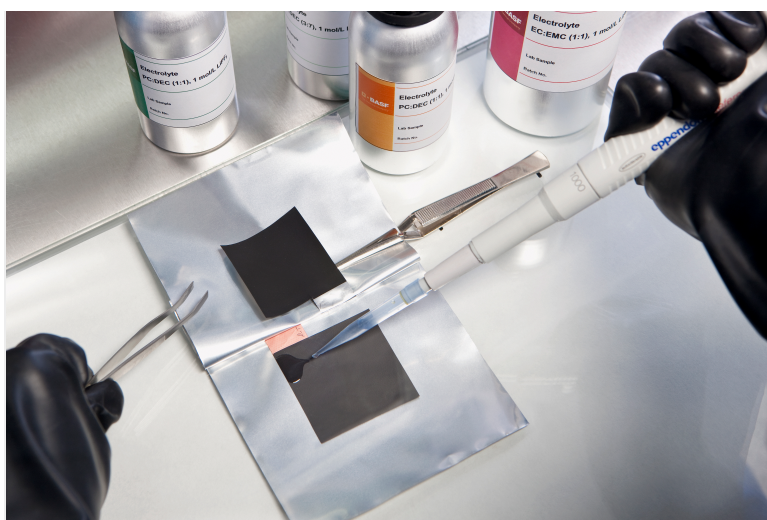
NMP BG

- NMP BG is a dedicated grade that fulfils the high-quality requirements of lithium-ion battery production
- Available in different packaging: drums, IBCs and ISO containers

Customer benefits

NMP BG

- Two production plants with NMP total capacity of 70 kt/a fully integrated into key raw materials and BASF's Verbund structure – reliable and ready to support our customers' growth
- Reliable supplier with established logistics structure to serve customers globally
- Upside to sustainable LiB production through NMP Biomass Balance possible
- Expertise on NMP regulatory aspects as well as leading position in the CEFIC expert group on NMP



High-performance plastics for electric powertrain and battery applications

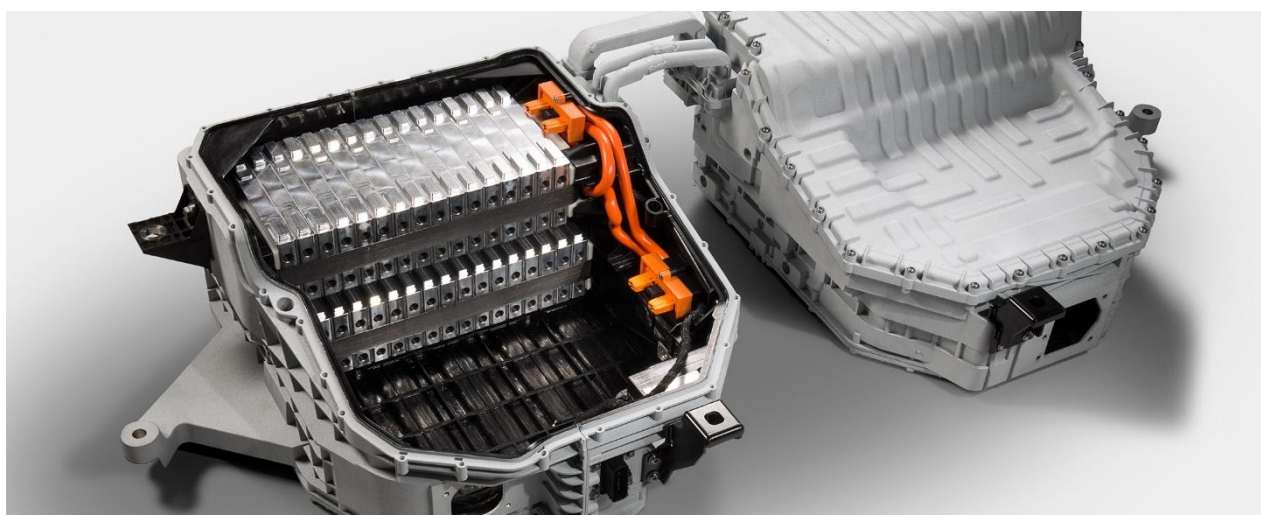
Many e-mobility solutions can only be implemented reliably and efficiently by using highly versatile plastics. For the dynamic market of electric and hybrid vehicles, BASF is expanding its range of engineering plastics and polyurethane systems.

Key properties & features

- Tailor-made Ultramid®, Ultradur® and Elastollan® grades meeting highest requirements of flame retardance, color stability, mechanics, and electrical isolation
- Comprehensive simulation support with in-house CAE tool Ultrasim®
- Engineering support through Ultratest™, Ultrajoin™ and processing facilities
- Proven track of jointly developed applications in partnership with customers

Customer benefits

- Solutions with high freedom of design and function integration
- Established lightweight concepts enabling economically viable mass production
- Global production network with local technical support
- Worldwide R&D network to meet customers' demands
- Commitment to sustainable development and a responsible global supply chain



Cathode active materials for lithium-ion batteries

Advanced battery materials are needed for automotive batteries used in full electric, plug-in, and hybrid vehicles. BASF is a leading cathode active material supplier to battery producers around the world. We are developing and producing application-specific cathode active materials with high energy, density, safety and efficiency to support lithium-ion battery technologies for electrified vehicles.

Key properties & Features

- HED™ product family with high energy cathode active material for lithium-ion batteries well-suited to the evolving requirements of automotive batteries
- Worldwide license for production and distribution of cathode active materials (NCMs and NCAs)
- Proven ability to jointly develop products in partnership with customers

Customer benefits

- Strong technology and intellectual property position in cathode active materials
- One of the broadest cathode active material portfolios in the industry, and a market leader in nickel-rich cathode active materials
- Global production network with local technical support
- Worldwide R&D network to meet customers' demands
- Decades of collaboration with strategic partners, customers and academia
- Commitment to sustainable development and a responsible global supply chain



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Metals management and hedging for cathode active materials

The metals market has experienced challenging conditions with recurring periods of heightened volatility due to a variety of external geopolitical and market factors. This uncertainty exposes users to metal availability and price risk and means that managing metals can potentially be difficult to navigate. BASF can assist you to manage and handle metals for your lithium-ion battery requirements.

Key properties & Features

- Sustainable supply chain through BASF's supply agreement with Nor Nickel for nickel and cobalt which enables locally sourced and secure supply of metals for battery production in Europe.
- BASF facilitates security of supply and helps reduce customer risk exposure to volatile metal markets by drawing on BASF's wide proficiency in the industry.
- Further, BASF prides itself on transparency and close collaboration to structure a complete solution for our customers' metal needs.

Customer benefits

- Secure source of metals for cathode active materials
- Reduce risk exposure to volatile metal markets
- Complete solution based on transparent and close collaboration
- Worldwide trading network to meet customers' demands
- Decades of experience in metals management
- Commitment to sustainable development and a responsible global supply chain

