QUALITY PERFORMS.



Product Guide

Portfolio of **Lewatit®** ion exchange resins and **Bayoxide®** iron oxide adsorbers

Lewatit® Lewatit® Scopeblue Bayoxide®

QUALITY WORKS.

LANXESS Energizing Chemistry



ABOUT LANXESS

We are a leading specialty chemicals company based in Cologne, Germany, well established on the global market. Our primary expertise lies in producing, developing, and marketing chemical intermediates, additives, specialty chemicals, and plastics. As a specialist and efficient partner, we offer solutions to all kinds of challenges faced by our customers. We focus on our customers' requirements in order to drive progress and reliably provide innovative product, material, and service solutions. Our manufacturing, administration, and logistics processes are designed for efficiency and performance.

We offer a broad range of technologies and solutions for the treatment of water and other liquid media and are one of the leading manufacturers of ion exchange resins, with production sites in Germany and India. Our **Lewatit®** ion exchange resins and adsorbers are applied in many different industries and applications to treat water and other liquid media.

With our sustainably produced **Lewatit® Scopeblue** ion exchange resins, we offer products that have a carbon footprint that is up to 61 percent smaller than products manufactured from conventional fossil sources and consist of more than 90 percent renewable raw materials. In accordance with the mass balance approach, they are chemically identical to conventional products and are produced in the same plants using the same processes.

In addition, we also offer a range of **Bayoxide®** iron oxide adsorbers for various water treatment applications. Furthermore, our unique calculation and design software **LewaPlus®** is used for modelling and dimensioning of diverse ion exchange systems, including process configurations only available with **Lewatit®** product technology.

High-quality Products
Providing high-quality products is crucial for our business success. Our global production sites are carefully controlled in order to ensure the highest quality possible, no matter where our products are produced.

Reliable Service
We provide a high level of technical expertise and do our best to support you wherever we can. Our global technical sales team will help you find the best product for your needs.

Innovative Solutions
We are continuously investing in research and development in order to optimize our products and discover innovative uses for our ion exchange resins, adsorbers, and iron oxide adsorbers.

LANXESS LEWATIT® AND BAYOXIDE® PRODUCT GUIDE



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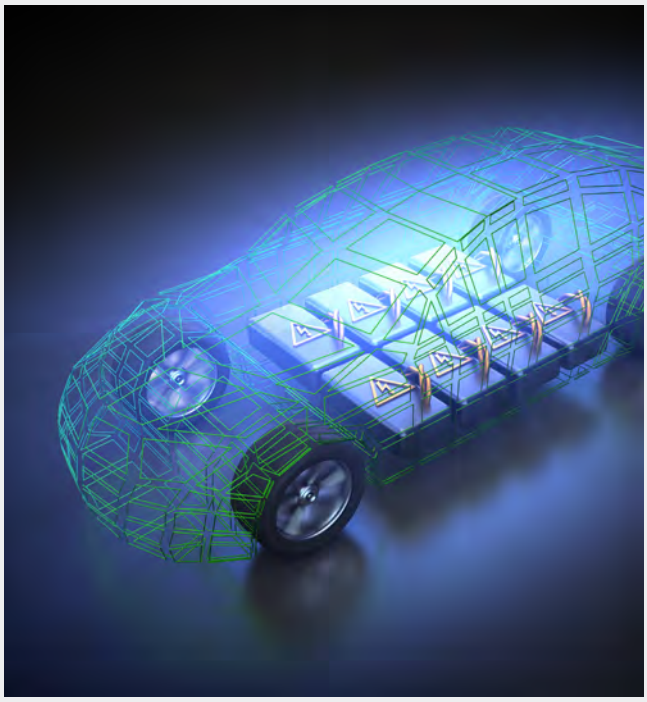
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MINING AND HYDROMETALLURGY

Battery Material Purification

Purification of intermediate and final product streams is an area where advanced solvent-impregnated resins Lewatit® TP 272 and Lewatit® VP OC 1026 play a pivotal role in meeting the stringent battery-grade material specifications of nickel and cobalt salt. Our special production process allows the extracting agent to be homogeneously distributed within the resin, leading to fast exchange kinetics and high operating capacities. Additionally, Lewatit® MDS TP 220 is well suited for the separation of nickel and cobalt.

Chelating ion exchange resins Lewatit® MonoPlus TP 208 and Lewatit® MDS TP 208 are used for the purification of lithium brines from residual quantities of contaminants such as calcium and magnesium. Our unique ion exchange resin functionalization chemistry enables the selective binding of specific metal ions from feed streams, e.g., hardness/impurity removal in lithium processing, which considerably facilitates their further processing.



The sustainable extraction of high-purity lithium, copper, nickel, cobalt, and platinum group metals that are suitable for use in batteries is essential for advancing the transition to electric vehicles. The use of Lewatit® ion exchange resins leads to highly efficient refining processes that can be used for the production of high-performance batteries with a good carbon footprint and water balance. Large quantities of water are used in ore processing – from cleaning the raw ores to isolating the pure metals. Obtaining and, if applicable, separating the metal ions from this water is indispensable for both economical and ecological reasons.

Lewatit® ion exchangers offer the fascinating possibility of binding certain metal ions selectively, such as precious, platinum, or rare earth metals. Secondary constituents can also be separated, such as zinc from copper electrolytes or cobalt from nickel or copper salt solutions. In this process, the metal ions are removed from the aqueous solution and accumulated on the ion exchange resin, which greatly facilitates their further processing – or disposal, in the case of wastewater flows.

With the aid of special ion exchange resins, metals can be obtained from ore leachates by means of direct extraction. The Lewatit® grades specially adapted for applications in hydrometallurgy possess chelating functional groups that very efficiently and highly selectively bind specific metal ions. Thus, using resin-in-pulp (RIP) technology, for example, metals like copper, nickel, and also cobalt can be extracted more efficiently and ecologically than with conventional methods. Similarly, ion exchangers for the final polishing of nickel and cobalt concentrates are used to produce high-purity cobalt and nickel. The metals are constituent parts of active materials for cell cathodes of the lithium-ion batteries.

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Chelating Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min. (H Form)	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® MDS TP 208	Styrene/DVB macroporous	Na^+	MD: 0.38 (+/– 0.04)	2.8	–35 ($Na^+ \rightarrow H^+$)	59–65	Lithium brine purification
Lewatit® MDS TP 220	Styrene/DVB macroporous	H_2SO_4 salt	MD: 0.38 (+/– 0.04)	36 g/l Cu capacity	–30 (del. → free base)	50–58	Nickel / cobalt separation
Lewatit® MDS TP 260	Styrene/DVB macroporous	Na^+	MD: 0.40 (+/– 0.04)	3.0	–35 ($Na^+ \rightarrow H^+$)	63	Lithium, nickel, and cobalt concentrate purification
Lewatit® MonoPlus TP 207	Styrene/DVB macroporous	Na^+	MD: 0.61 (+/– 0.05)	2.0	–25 ($Na^+ \rightarrow H^+$)	55–60	Base metal recovery, uranium recovery from hypersaline solutions, heavy metal removal from groundwater
Lewatit® MonoPlus TP 208	Styrene/DVB macroporous	Na^+	MD: 0.65 (+/– 0.05)	2.5	–30 ($Na^+ \rightarrow H^+$)	58–64	Lithium brine purification
Lewatit® MonoPlus TP 209 XL	Styrene/DVB macroporous	Na^+	MD: 0.85 (+/– 0.05)	2.4	–35 ($Na^+ \rightarrow H^+$)	48–53	Base metal recovery from pulps
Lewatit® MonoPlus TP 214	Styrene/DVB macroporous	H^+	MD: 0.55 (+/– 0.05)	110 g/l Ag capacity	–	55–60	Mercury removal, cadmium removal from nickel and cobalt concentrates, precious metal recovery
Lewatit® MonoPlus TP 220	Styrene/DVB macroporous	H_2SO_4 salt	MD: 0.62 (+/– 0.05)	29 g/l Cu capacity	–23 (del. → free base)	50–55	Nickel / cobalt separation
Lewatit® MonoPlus TP 260	Styrene/DVB macroporous	Na^+	MD: 0.63 (+/– 0.05)	2.4	–35 ($Na^+ \rightarrow H^+$)	58–62	Lithium, nickel, and cobalt concentrate purification
Lewatit® TP 308	Polyacrylate macroporous	H^+	0.315–1.6	4.3	22 ($Cl^- \rightarrow OH^-$)	45–50	Lithium brine purification

Strong Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min. (H Form)	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® K 6362	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.3	22 ($Cl^- \rightarrow OH^-$)	48–55	Recovery of uranium and anionic metal complexes
Lewatit® K 6367	Styrene/DVB gel	Cl^-	MD: 0.92 (+/– 0.05)	1.2	20 ($Cl^- \rightarrow OH^-$)	49–54	Resin in pulp
Lewatit® K 6462	Styrene/DVB gel	Cl^-	MD: 0.59 (+/– 0.05)	1.4	20 ($Cl^- \rightarrow OH^-$)	45–50	Resin in pulp

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Weak Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min. (H Form)	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® A 365	Polyacrylate macroporous	FB	HD: 0.4–1.6	3.4	25 (FB→Cl^-)	43–54	Uranium recovery from saline solutions
Lewatit® MP 62 WS	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	45 (FB→Cl^-)	50–55	Metal recovery from hydrochloric acid, vanadium and molybdenum recovery
Lewatit® MP 62 WS Eco	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	45 (FB→Cl^-)	50–55	Metal recovery from hydrochloric acid, vanadium and molybdenum recovery

Adsorber & Solvent-impregnated Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min. (H Form)	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® TP 272	Styrene/DVB macroporous	H^+	HD: 0.3–1.6	12.5 g/l Zn capacity	–	—	Nickel/cobalt separation
Lewatit® VP OC 1026	Styrene/DVB macroporous	H^+	HD: 0.3–1.6	13 g/l Zn capacity	–	28–33	Nickel/cobalt electrolyte purification

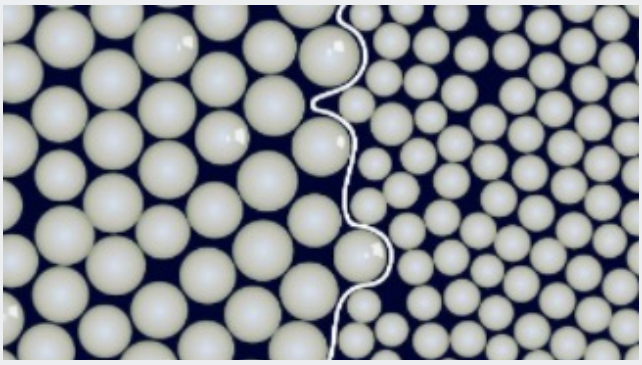


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CHEMICAL AND PETROCHEMICAL

Brine Treatment with Lewatit® MDS TP Grade Resins

Our chelating resins make brine treatment by chlor-alkali electrolysis more efficient and reliable. By better protecting the membranes they significantly save costs. They additionally provide an excellent solution to meet tighter requirements on waste reduction, finally resulting in waste and discharge cost savings. Two case studies are published allowing insights into the industrial plant operation of Lewatit® MDS TP 208 used for improvement of NaCl brine quality, extended operating cycle times, and wastewater reduction.



Steam is an important energy carrier in the chemical and petrochemical industries. Ion exchangers protect the infrastructure of boilers, pipelines, and heat exchangers against scale formation and corrosion. Similar to steam, process water is also required and must conform to certain specifications. Lewatit® ion exchangers are used to soften or demineralize the process water and can be combined with each other with beneficial effect. Another application for Lewatit® ion exchangers is selective adsorption of carbon dioxide, a greenhouse gas, from flue gas or the air.

Basic chemicals such as sodium hydroxide, chlorine gas, and hydrogen gas are needed in the production of materials and liquids such as PVC, paper, cellulose, disinfectants, bleach, and aluminum compounds. These are obtained from chlor-alkali electrolysis of sodium chloride brine, which is purified by Lewatit® TP resins to exclude, e.g., alkaline earth metals by using ion exchangers. Other process solutions, such as pickling acids, rinse, water, and electroplating baths, can be treated in a similar way.

Ion exchangers are firmly established in the chemical industry as versatile and efficient catalysts. They are used, for instance, in acid–catalyzed ester/ether synthesis and condensation reactions, such as in the production of bisphenol A.

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Chelating Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min. (H Form)	Volume Change (%) max.	Water	Applications
Lewatit® MDS TP 208	Styrene/DVB macroporous	Na^+	MD: 0.38 (+/– 0.04)	2.8	–35 ($Na^+ \rightarrow H^+$)	59–65	Hardness removal from brines
Lewatit® MDS TP 260	Styrene/DVB macroporous	Na^+	MD: 0.40 (+/– 0.04)	3.0	–35 ($Na^+ \rightarrow H^+$)	63	Hardness removal from brines
Lewatit® MonoPlus TP 208	Styrene/DVB macroporous	Na^+	MD: 0.65 (+/– 0.05)	2.5	–30 ($Na^+ \rightarrow H^+$)	58–64	Hardness removal from brines
Lewatit® MonoPlus TP 214	Styrene/DVB macroporous	H^+	MD: 0.55 (+/– 0.05)	110 g/l Ag capacity	–	55–60	Mercury removal from brines
Lewatit® MonoPlus TP 260	Styrene/DVB macroporous	Na^+	MD: 0.63 (+/– 0.05)	2.4	–35 ($Na^+ \rightarrow H^+$)	58–62	Hardness removal from brines

Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® GF 101	Styrene/DVB macroporous	H^+	HD: 0.4–1.25	4.7 eq/kg (dry)	–	58–63	Biodiesel, FFA esterification
Lewatit® GF 202	Styrene/DVB macroporous	Neutral	MD: 0.65 (+/– 0.05)	–	–	52–57	Biodiesel purification
Lewatit® K 1131 S	Styrene/DVB gel	H^+	HD: 0.8–1.25	0.7	–	77–82	BPA production
Lewatit® K 1137	Styrene/DVB gel	H^+/promoted	HD: 0.8–1.25*	0.7*	–	77–82*	BPA production
Lewatit® K 1161	Styrene/DVB gel	H^+	MD: 1.05 (+/– 0.15)	0.7	–	75–80	BPA production
Lewatit® K 1221	Styrene/DVB gel	H^+	HD: 0.4–1.25	1.2	–	66–69	BPA production
Lewatit® K 1267	Styrene/DVB gel	H^+/promoted	MD: 0.74 (+/– 0.07)*	1.2*	–	61–66*	BPA production
Lewatit® K 1461 black	Styrene/DVB gel	H^+	MD: 0.65 (+/– 0.06)	1.8	–	45–55	Esterification
Lewatit® K 2420	Styrene/DVB macroporous	H^+	HD: 0.5–1.6	1.4	–	62–67	Phenol purification
Lewatit® K 2431	Styrene/DVB macroporous	H^+	HD: 0.5–1.6	1.2	–	63–68	Phenol purification, esterification
Lewatit® K 2440	Styrene/DVB macroporous	H^+	HD: 0.4–1.6	5.4 eq/kg (dry)	–	–	Phenol alkylation
Lewatit® K 2620	Styrene/DVB macroporous	H^+	HD: 0.4–1.25	1.9	–	50–55	Etherification, esterification
Lewatit® K 2621	Styrene/DVB macroporous	H^+	HD: 0.4–1.25	1.4	–	57–63	Etherification, esterification, hydrolysis
Lewatit® K 2624	Styrene/DVB macroporous	H^+/Pd	HD: 0.4–1.25	1.4	–	57–63	Isomerization, hydro-genation, etherification
Lewatit® K 2629	Styrene/DVB macroporous	H^+	HD: 0.4–1.25	1.7	–	50–55	Etherification, esterification
Lewatit® K 2649	Styrene/DVB macroporous	H^+	HD: 0.4–1.25	4.7 eq/kg (dry)	–	–	Phenol alkylation

* Value of the unpromoted precursor

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Strong Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® K 7333	Styrene/DVB gel	OH-/Pd	MD: 0.64 (+/– 0.05)	–	–	58–63	Deoxygenation
Lewatit® S 6368 A	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.0	22 (Cl^-→OH-)	60–65	Iodide removal from sodium chloride brines

Weak Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® K 3433	Styrene/DVB macroporous	FB/Pd	HD: 0.4–1.25	–	–	51–56	Deoxygenation
Lewatit® MP 62 WS	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	45 (FB→Cl^-)	50–55	Acid removal
Lewatit® MP 62 WS Eco	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	45 (FB→Cl^-)	50–55	Acid removal
Lewatit® MP 62 WS Dried	Styrene/DVB macroporous	FB	HD: 0.4–1.25 (wet)	1.7 (wet)	–	< 0.5 (residual moisture)	Production of high-purity silicon
Lewatit® VP OC 1065	Styrene/DVB macroporous	FB	HD: 0.3–1.25	2.1	–	47–55	CO_2/COS capture, aldehyde removal

Adsorber and Carrier

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® GF 808	Acrylic	-	HD: 0.315–1.0	–	–	55–60	Biodiesel, enzyme carrier



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HOUSEHOLD

Removal of Hardness from Potable Water

The Lewatit® products applied in drinking water are mainly strong acidic cation exchangers (SAC) and weak acidic cation exchangers (WAC). SAC products are predominantly used in house installations (PoE systems – point of entry) to efficiently remove all divalent cations (total hardness removal). This process with our product Lewatit® S 1567 is also known as complete softening: glasses and dishes that come out of the dishwasher sparkling clean without a cloudy appearance: laundry is softer and cleaner; there is less detergent required when doing laundry or cleaning dishes. A big benefit is that you will find no hard water deposits on the tub, toilet, appliances and fixtures. So the SAC products prevent hardness precipitation that blocks the water pipes in your household and extends the life expectancy of your appliances and water piping systems. The strong acidic cation exchangers have to be periodically regenerated with a sodium chloride solution (NaCl).



Governments are focusing on providing safe and clean drinking water, investing in infrastructure in order to cope with improving quality. There is an upsurge in demand for purifying systems across households, restaurants, and other establishments directly at its point of use (PoU systems) providing both an additional barrier of protection against contaminant intrusion as well as achieving higher-quality taste.

With Lewatit® ion exchange resins, we offer a wide range of **weak acidic cation exchange products** suitable for dealkalization (partial softening) of potable water in PoU systems (cartridge filter applications). Calcium and magnesium can be removed and also ions that are harmful to human health such as lead and copper, releasing other safe ions into the water instead. Outstanding German product quality, long-established technical experience, production know-how covering more than 80 years, compliance with a great number of regulatory requirements globally, and drinking water certification are only a few of the characteristics found with the Lewatit® products. With our sustainably produced Lewatit® Scopeblue ion exchange resins, we offer products that have a carbon footprint that is up to 67 percent smaller than products manufactured from conventional fossil sources. **Click here** for more information.

Depending on the quality of the drinking water, post-treatment may make sense for a variety of reasons. Water hardness is defined as the sum of all alkaline earth ions, referred to as hardness components, whereby calcium represents the greatest problem. In conjunction with carbonate it forms calcium carbonate, i.e., lime, which frequently crystallizes out as a white deposit and can result in scale formation in pipes and on fittings and heat-transfer surfaces (heating, dishwashers, and washing machines, etc.) and, ultimately, damage to household installations and appliances. After all, coffee and tea taste significantly better when they are made using water with a low lime content. The complete softening is a process, where **strong acidic cation exchange resins** are being used.

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Weak Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max. approx.	Water Retention (%)	Applications
Lewatit® CNP LF	Polyacrylate macroporous	H^+	HD: 0.315–1.6	4.3	7 ($H^+ \rightarrow Ca^{2+}$)	43–49	Cartridge / dealkalization
Lewatit® CNP P	Polyacrylate macroporous	H^+	HD: 0.4–1.6	4.5	7 ($H^+ \rightarrow Ca^{2+}$)	44–58	Cartridge / dealkalization
Lewatit® CNP P Scopeblue	Polyacrylate macroporous	H^+	HD: 0.4–1.6	4.5	7 ($H^+ \rightarrow Ca^{2+}$)	44–58	Cartridge / dealkalization
Lewatit® S 8223	Polyacrylate macroporous	H^+	HD: 0.315–1.6	3.4	7 ($H^+ \rightarrow Ca^{2+}$)	53–63	Cartridge / dealkalization
Lewatit® S 8227	Polyacrylate macroporous	H^+	HD: 0.4–1.6	4.3	7 ($H^+ \rightarrow Ca^{2+}$)	47–53	Cartridge / dealkalization
Lewatit® S 8227 Scopeblue	Polyacrylate macroporous	H^+	HD: 0.4–1.6	4.3	7 ($H^+ \rightarrow Ca^{2+}$)	47–53	Cartridge / dealkalization
Lewatit® S 8229	Polyacrylate macroporous	H^+/Na^+	HD: 0.4–1.6	4.3 (H)	7 ($H^+ \rightarrow Ca^{2+}$)	47–53	Cartridge / softening, dealkalization
Lewatit® S 8229 Scopeblue	Polyacrylate macroporous	H^+/Na^+	HD: 0.4–1.6	4.3 (H)	7 ($H^+ \rightarrow Ca^{2+}$)	47–53	Cartridge / softening, dealkalization
Lewatit® S 8229 Plus X	Polyacrylate macroporous	Hv/Na^+	HD: 0.4–1.6	4.3 (H)	–4 ($H^+/Na^+ \rightarrow Ca^{2+}$)	58–63	Cartridge / softening, dealkalization
Lewatit® S 8229 Plus Ag	Polyacrylate macroporous	H^+/Na^+/ Ag	HD: 0.4–1.6	4.3 (H)	–25 ($H^+/Na^+ \rightarrow Ca^{2+}$)	58–64	Cartridge / softening, dealkalization

Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max. approx.	Water Retention (%)	Applications
Lewatit® S 1567	Styrene/DVB gel	Na^+	MD: 0.60 (+/– 0.05)	1.8	12 ($Na^+ \rightarrow H^+$)	44–50	Water treatment, softening, prod. without solvents, food grade

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MUNICIPAL WATER TREATMENT

Removal of Per- and Polyfluoroalkyl Substances (PFAS)

The current focus is on the worldwide contamination of water with a large number of per- and polyfluoroalkyl substances (PFAS), such as from firefighting foams, textile and paper impregnations, or lubricants. These harmful compounds accumulate in the bodies of living beings. Their longevity makes it necessary to remove even traces from wastewater and to remediate contaminated groundwater. Compliance with these limit values is particularly successful with our anion exchange resin Lewatit® TP 108 DW. The selective resin reliably binds even traces of PFAS down to the ppt range. For this reason, and due to its greater operating capacity – even in the presence of chlorides and sulfates – the process is clearly superior to conventional filtration using activated carbon. The service life is up to five-times longer than that of activated carbon filters.



Drinking water supply, wastewater treatment, and waste disposal are among the most critical municipal services. Strict demands are imposed on the purity of drinking water as our most important nutrient. Only responsible treatment practices make it possible to maintain a continuous cycle for turning wastewater back into water suitable for people, animals, agriculture, and industry. Waste products and other potential pollutants must be stored and disposed of in such a way that they cannot get into the water cycle. However, the latter is not always guaranteed unfortunately, making complex treatment operations necessary.

In the treatment of drinking water and wastewater, ion exchange resins benefit from their unique ability to selectively bind ions. Thus special grades of Lewatit® ion exchange resins can be used to remove harmful constituents such as iron or manganese from drinking water, as well as traces of pollutants such as arsenic and lead. Even groundwater can be treated efficiently in this way, in which detrimental constituents such as chromate, nitrate, per- and polyfluoroalkyl substances (PFAS), surfactants, and perchlorate are bound to ion exchangers. Ionic and non-ionic contaminants, which could otherwise disrupt operations in biological water treatment plants or endanger the environment, can be removed from wastewater just as efficiently.

In addition to ion exchangers, we offer inorganic adsorbers that can be used in municipal drinking water and wastewater treatment. The Bayoxide® inorganic adsorbers range comprises technical iron oxide adsorbers in granular form. The product variants are based on defined crystalline α-ferric oxide hydroxide structures and are particularly suitable for removing arsenic and phosphate from drinking water or wastewater, but can also remove other metal ions and oxyanions. Bayoxide® products are used in a continuous fixed bed process in which the contaminated water is selectively purified. As a result, this technology can be integrated in existing facilities simply and economically.

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Chelating Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® MDS TP 220	Styrene/DVB macroporous	H_2SO_4 salt	MD: 0.38 (+/– 0.04)	36 g/l Cu capacity	–30 (del.→ free base)	50–58	Chromium(III) bath purification
Lewatit® MonoPlus TP 207	Styrene/DVB macroporous	Na^+	MD: 0.61 (+/– 0.05)	2.0	–25 ($Na^+ \rightarrow H^+$)	55–60	Heavy metal removal from effluents
Lewatit® MonoPlus TP 214	Styrene/DVB macroporous	H^+	MD: 0.55 (+/– 0.05)	110 g/l Ag capacity	–	54–60	Mercury removal, precious metal recovery
Lewatit® MonoPlus TP 220	Styrene/DVB macroporous	H_2SO_4 salt	MD: 0.62 (+/– 0.05)	29 g/l Cu capacity	–23 (del.→ free base)	50–55	Chromium(III) bath purification

Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® K 2629	Styrene/DVB macroporous	H^+	HD: 0.4–1.25	1.6	–	50–55	Heavy metal removal from chromium(VI) baths, phosphoric/sulfuric acid purification
Lewatit® MonoPlus SP 112 H	Styrene/DVB macroporous	H^+	MD: 0.67 (+/– 0.05)	1.6	–8 ($H^+ \rightarrow Na^+$)	56–60	Heavy metal removal from chromium(VI) baths, phosphoric/sulfuric acid purification

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Strong Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® A 8071	Acrylic, gel	Cl^-	HD: 0.4–1.6	1.35	25 ($Cl^- \rightarrow OH^-$)	48–55	Acid retardation
Lewatit® DW 630	Styrene/DVB macroporous	SO_4^{2-}	MD: 0.62 (+/– 0.05)	1.1	16 (during exhaustion)	58–63	Uranium removal
Lewatit® K 6362	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.3	22 ($Cl^- \rightarrow OH^-$)	48–55	Removal of heavy metals from hydrochloric acid, acid retardation, PFT removal
Lewatit® S 5128	Polyacrylate gel	Cl^-	HD: 0.50–0.75 (effective size)	1.35	25 ($Cl^- \rightarrow OH^-$)	48–55	Natural organic matter removal
Lewatit® S 6368 A	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.0	22 ($Cl^- \rightarrow OH^-$)	60–65	Chromate and color removal from effluents, vanadium and molybdenum removal
Lewatit® TP 106	Styrene/DVB gel	Cl^-	HD: 0.40–0.55 (effective)	0.7	–	33–43	Perchlorate and nitrate removal
Lewatit® TP 107	Polyacrylate macroporous	Cl^-	HD: 0.45–0.65 (effective)	2.4	–	30–42	Chromate and sulfate removal
Lewatit® TP 108	Styrene/DVB gel	Cl^-	HD: 0.38–0.48 (effective)	0.7	–	33–43	PFAS removal
Lewatit® TP 108 DW	Styrene/DVB gel	Cl^-	HD: 0.46–0.61 (effective)	0.7	–	33–43	PFAS removal

Weak Base Anion Exchange Resins

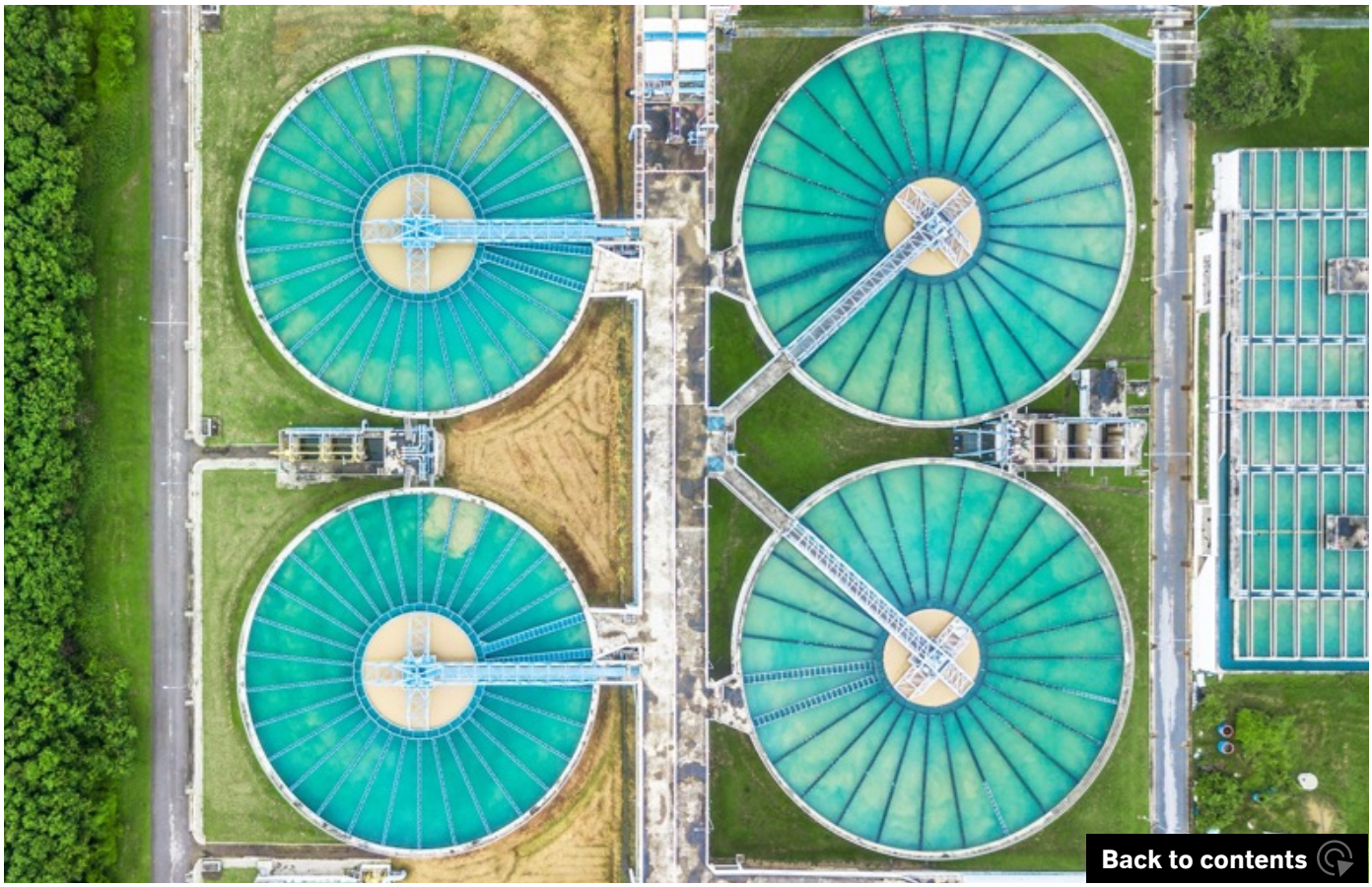
Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® A 365	Polyacrylate macroporous	FB	HD: 0.4–1.6	3.4	25 (FB→Cl^-)	43–54	Sulfate removal
Lewatit® MP 62 WS	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	45 (FB→Cl^-)	50–55	PFAS removal, vanadium and molybdenum removal, precious metal recovery from hydrochloric acid
Lewatit® MP 62 WS Eco	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	45 (FB→Cl^-)	50–55	PFAS removal, vanadium and molybdenum removal, precious metal recovery from hydrochloric acid
Lewatit® MonoPlus MP 68	Styrene/DVB macroporous	FB/Cl^-	MD: 0.55 (+/– 0.05)	1.3	24 (del. form →Cl^-)	54–60	Chromate removal from effluents

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Adsorbers & Solvent-impregnated Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® AF 5	Carbon microporous	–	HD: 0.4–0.8	–	–	–	Organics removal from effluents
Lewatit® VP OC 1026	Styrene/DVB macroporous	H^+	HD: 0.3–1.6	13 g/l Zn capacity	–	28–33	Chromium(III) bath purification
Lewatit® VP OC 1064 MD PH	Styrene/DVB macroporous	–	MD: 0.49 (+/– 0.05)	–	–	54–63	Organics removal from effluents
Bayoxide® E IN 20	FeO(OH)	–	0.315–2.0	–	0 (during exhaustion)	20	Arsenic/phosphate removal
Bayoxide® E IN 30	FeO(OH)	–	0.315–2.0	–	0 (during exhaustion)	20	Arsenic/phosphate removal
Bayoxide® E 33*	α – FeOOH	–	0.315–2.0	–	0 (during exhaustion)	20	Arsenic/phosphate removal
Bayoxide® E 33 HC*	α – FeOOH	–	0.315–2.0	–	0 (during exhaustion)	20	Arsenic/phosphate removal
Bayoxide® E 216*	α – FeOOH	–	< 0.5	–	0 (during exhaustion)	–	Arsenic/phosphate removal

* In case resin is used for potable water treatment a special start-up procedure has to be applied, which is available upon request. Country-specific potable water approval certificates can be received as a manufacturer's declaration.



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PHARMACEUTICALS AND BIOTECHNOLOGY

Heparin and Polysaccharides Purification with Lewatit® PH 1074 HEP

As one of the well-known biopharmaceuticals, heparin is applied in the prevention of venous thrombosis and as an anti-coagulant, e.g., during heart surgery and dialysis. At the present time, heparin is derived mainly from mucosal tissues of slaughtered meat animals, such as porcine intestines. Lewatit® PH 1074 HEP can be used in the production of pharmaceutical heparin and glycosaminoglycans, such as chondroitin sulfate, nadroparin calcium, dermatan sulfate, and others. It allows the reliable capture and purification and even storage of crude biomolecules for transport and further processing. The special resin matrix was designed to achieve optimum adsorption capacity and elution efficiency.



Lewatit® ion exchange resins and adsorbers are in widespread use in a variety of applications in the pharmaceutical and bioprocessing industries. Their end products range from food and animal feeds to active pharmaceutical ingredients (APIs) that are used in medicinal products. Ion exchange resins and adsorbers help in the treatment and cleaning of products obtained from biomass by providing support with capture, adsorption, and chromatography, or through their use in demineralization and neutralization. As well as being used in purification, ion exchangers can therefore also help to stabilize products such as amino acids, proteins, vitamins, alkaloids, and other active ingredients. In addition, ion exchange resins have become established as substrates for the transportation of active substances in either classic or ground form. Enzyme-catalyzed reactions can also be carried out with the aid of fixed enzymes, whereby the ion exchange matrix offers numerous benefits for the catalysis process.

Water of different qualities is required as a solvent in manufacturing processes in the pharmaceutical and bioprocessing industries. Lewatit® ion exchanger types can be combined to beneficial effect to meet different quality requirements for softening or demineralization of the necessary process water. Our LewaPlus® design software can model various combinations on a made-to-measure basis and thus provides users with maximum confidence that they will obtain the optimum treatment solution. It can also deal with wastewater from production facilities through reliable and thorough treatment.

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Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse (MD, mean value) Heterodisperse: (HD, share >90%)	Uniformity Coefficient max.	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® LGP 3789 FK	Styrene/DVB macroporous	H^+	HD: 0.1–0.5	1.8	1.0	–	50–60	Medium to large size bio-molecules, chromatography
Lewatit® LGP 5392 PH	Styrene/DVB, macroporous	H^+	HD: 0.31–0.80	1.7	2.1	–	55–65	Small to medium size biomolecules, decationisation
Lewatit® PH 1061 MDS	Styrene/ DVB gel	K^+	MD: 0.28 (+/– 0.03)	1.15	1.5	–	56–66	Biomolecules, amino acids, chromatography
Lewatit® PH 1062 MDS	Styrene/ DVB gel	Ca^{2+}	MD: 0.28 (+/– 0.03)	1.15	1.6	–	53–63	Biomolecules, amino acids, chromatography
Lewatit® PH 1061	Styrene/ DVB gel	Na^+	MD: 0.62 (+/– 0.05)	1.1	2.2	–12 ($Na^+ \rightarrow H^+$)	41–46	Antibiotics, alkaloids, amino acids
Lewatit® PH 2061	Styrene/DVB, macroporous	Na^+	MD: 0.65 (+/– 0.05)	1.1	1.7	–10 ($Na^+ \rightarrow H^+$)	50–55	Alkaloids, antibiotics, amino sugars, amino acids, vitamins
Lewatit® SC 104 PH	Styrene/ DVB gel	H^+	HD: 0.4–1.3	1.6	1.2	–	60–70	Large size biomolecules, pyrrolizidine alkaloids, tri terpene
Lewatit® SP 120	Styrene/DVB, macroporous	Na^+	HD: (<94%) 0.315–1.25	1.8	1.4	–5 ($Na^+ \rightarrow H^+$)	52–58	Large size biomolecules

Weak Acidic Cation Exchange Resins and Chelating Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse (MD,mean value) Heterodisperse: (HD, share >90%)	Uniformity Coefficient max.	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit MonoPlus® TP 207	Styrene/DVB macroporous	Na^+	MD: 0.61 (+/– 0.05)	1.1	2.0	–25 ($Na^+ \rightarrow H^+$)	55–60	Heavy metal removal from biomolecules and synthetic streams
Lewatit® PH 8021	Polyacrylate macroporous	H^+	HD: 0.4–1.6	1.8	4.3	70 ($H^+ \rightarrow Na^+$)	43–48	Alkaloids, amino acids, antibiotics

Strong Basic Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse (MD,mean value) Heterodisperse: (HD, share >90%)	Uniformity Coefficient max.	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® PH 1074 HEP	Polyacrylate macroporous	Cl^-	HD: 0,4–1,6	1,8	0.7	30 ($Cl^- \rightarrow OH^-$)	69-69	Antibiotics, heparin, chondroitin, nadroparin, dermatan, peptides
Lewatit® PH 7061	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.1	1.0	22 ($Cl^- \rightarrow OH^-$)	60 – 65	Antibiotics, vitamins, enzymes, hyaluronic acid

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Weak Basic Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse (MD,mean value) Heterodisperse: (HD, share >90%)	Uniformity Coefficient max.	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® PH 3021	Styrene/DVB macroporous	FB	HD: 0.4 – 1.25	1.6	1.7	48 (FB→Cl^-)	42 – 53	Antibiotics, biomolecules, no SBA character
Lewatit® PH 5021	Polyacrylate macroporous	FB	HD: 0.4 – 1.6	1.8	3.4	25 (FB→Cl^-)	43 – 54	Biomolecules, amino acids

Adsorbers

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse (MD,mean value)	Uniformity Coefficient max.	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® VP OC 1064 MD PH	DVB macroporous	–	MD: 0.49 (+/– 0.05)	1.1	–	–	54–63	Antibiotics, amino acids, vitamins, enzymes, surfactants, hydrocarbons
Lewatit® VP OC 1600	Polyacrylate macroporous	–	HD: 0.32–0.45 (effective size)	1.8	–	–	55–60	Enzyme carrier



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Food and Beverages – the Energy Supplier for Your Brain

Dextrose is the most important fuel for our cells. It serves our body as an energy supplier. The biggest consumer is our brain. Dextrose is also hidden in lactose, table sugar, and starch. With an energy requirement of 2,000 kcal per day, foods with a total of 264 g carbohydrates (a group that includes sugar and starch), 66 g fat, and 72 g protein should be consumed.* LANXESS Lewatit® ion exchange resins play an important role in the production of food ingredients like carbohydrates and proteins. The refining steps with our Lewatit® ion exchange resins include demineralization, decolorization, and separation.



Lewatit® ion exchange resins are an established and indispensable component in the food and beverage industry. Lewatit® S resins are certified in many countries around the world for the processing of food, beverages, and food and drink additives. The Lewatit® S series has, among other things, halal and kosher certifications.

Lewatit® ion exchangers and adsorbers play a crucial role in separation processes. Often there is no alternative to isolating, enriching, and cleaning valuable materials from the liquid phase.

An important application in the food industry is the processing of sugar. The large-scale production of crystal and liquid sugar, which is widely used in the food and beverage industry, would hardly be economically feasible without macroporous Lewatit® S types. The resins are used in the purification of raw sugar of various qualities. In addition to salt ions, they remove the yellowish-brown components that give raw sugar its color and typical taste.

Another important area of application for Lewatit® S grades is the starch industry. This produces high-quality syrups and polyalcohols on the basis of starch hydrolysates for use as sweeteners, e.g., in soft drinks. We offer a large number of special ion exchangers for the desalination and decoloring (refining) of these syrups. The LewaPlus® Food module is a tool designed for the starch industry, which enables the calculation of new and existing desalination plants. The calculation of process costs is possible via the Food module as well.

Our ion exchangers also play a decisive role in ensuring product quality in other areas of the food and beverage industry. These include the processing of fruit juices, gelatin, whey, wine, and pectin.

* The values given are for illustrative purposes only. The average calorie consumption per day depends, among other factors, on age and gender. Source: European Food Safety Authority

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Weak Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max. approx.	Water Retention (%)	Applications
Lewatit® S 8528	Polyacrylate macroporous	H^+	HD: 0.4–1.6	4.3 (H)	70 ($H^+ \rightarrow Na^+$)	43–48	Softening/demineralization

Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® S 1568	Styrene/DVB gel	Na^+	MD: 0.66 (+/– 0.05)	1.8	12 ($Na^+ \rightarrow H^+$)	45–50	Softening / demineralization / amino acids
Lewatit® S 1668	Styrene/DVB gel	Na^+	MD: 0.62 (+/– 0.05)	2.2	12 ($Na^+ \rightarrow H^+$)	41–46	Softening / demineralization / amino acids
Lewatit® S 2328	Styrene/DVB macroporous	H^+	HD: 0.315–1.25	1.0	12 ($Na^+ \rightarrow H^+$)	67–73	Inversion
Lewatit® S 2568	Styrene/DVB macroporous	Na^+	MD: 0.65 (+/– 0.05)	1.7	10 ($Na^+ \rightarrow H^+$)	50–55	Demineralization / softening
Lewatit® S 2568 H	Styrene/DVB macroporous	H^+	MD: 0.67 (+/– 0.05)	1.6	10 ($Na^+ \rightarrow H^+$)	55–61	Mixed bed / demineralization

Weak Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® S 4228	Styrene/DVB macroporous	FB/Cl^-	HD: 0.4–1.25	1.6	30 (FB→Cl^-)	53–59	Demineralization
Lewatit® S 4268	Styrene/DVB macroporous	FB/Cl^-	MD: 0.59 (+/– 0.05)	1.3	25 (FB→Cl^-)	60–65	Demineralization
Lewatit® S 4328	Styrene/DVB macroporous	FB/Cl^-	HD: 0.4–1.25	1.4	25 (FB→Cl^-)	51–58	Demineralization
Lewatit® S 4468	Styrene/DVB macroporous	FB/Cl^-	MD: 0.55 (+/– 0.05)	1.6	30 (FB→Cl^-)	52–57	Demineralization (low isomerization)
Lewatit® S 4528	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	48 (FB→Cl^-)	42–53	Demineralization (low isomerization)
Lewatit® S 4528 Eco	Styrene/DVB macroporous	FB	HD: 0.4–1.25	1.7	48 (FB→Cl^-)	42–53	Demineralization (low isomerization)
Lewatit® S 5228	Polyacrylate gel	FB	HD: 0.4–1.6	1.6	25 (FB→Cl^-)	53–61	Demineralization
Lewatit® S 5328	Polyacrylate gel	FB/Cl^-	HD: 0.4–1.6	1.25	14 (FB/Cl^-→Cl^-)	56–64	Demineralization

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Strong Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® S 5128	Polyacrylate gel	Cl^-	HD: 0.4–1.6	1.35	25 ($Cl^-\rightarrow OH^-$)	48–55	Decolorization / demineralization
Lewatit® S 5528	Polyacrylate macroporous	Cl^-	HD: 0.4–1.6	0.85	25 ($Cl^-\rightarrow OH^-$)	63–71	Decolorization
Lewatit® S 6268	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.2	25 ($Cl^-\rightarrow OH^-$)	48–55	Decolorization
Lewatit® S 6368 A	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.0	22 ($Cl^-\rightarrow OH^-$)	60–65	Decolorization / demineralization
Lewatit® S 6368 A SO4	Styrene/DVB macroporous	SO_4^{2-}	MD: 0.63 (+/– 0.05)	1.0 (Cl^-)	22 ($Cl^-\rightarrow OH^-$)	60–65	Decolorization / demineralization
Lewatit® S 6368	Styrene/DVB macroporous	Cl^-	MD: 0.61 (+/– 0.06)	1.1 (Cl^-)	22 ($Cl^-\rightarrow OH^-$)	60–65	Demineralization
Lewatit® 7468	Styrene/DVB macroporous	Cl^-	MD: 0.60 (+/– 0.05)	1.0	15 ($Cl^-\rightarrow OH^-$)	58–63	Mixed bed / demineralization

Adsorbers

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Surface BET (m^2/g) approx.	Pore Volume (m^2/g) approx.	Water Retention (%)	Applications
Lewatit® AF 5	Carbon microporous	None	HD: 1.4–1.8	1,200	0.15	–	Polisher / HMF removal
Lewatit® S 7968	Styrene/DVB macroporous	None	MD: 0.49 (+/– 0.05)	800	1.2	54–63	Polisher / Debittering

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Separation Strong Acidic Cation Exchange Resins – Solventfree Production

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® MDS 1269 Ca 290	Styrene/DVB gel	Ca^{2+}	MD: 0.28 (+/– 0.03)	1.5 (H)	–	55–66 (H)	Glucose/fructose separation
Lewatit® MDS 1269 K 290	Styrene/DVB gel	K^{+}	MD: 0.28 (+/– 0.03)	1.5 (H)	–	55–66 (H)	Size exclusion chromatography / dextrose enrichment
Lewatit® MDS 1269 Ca 310	Styrene/DVB gel	Ca^{2+}	MD: 0.31 (+/– 0.03)	1.5 (H)	–	55–66 (H)	Glucose/fructose separation
Lewatit® MDS 1269 K 310	Styrene/DVB gel	K^{+}	MD: 0.31 (+/– 0.03)	1.5 (H)	–	55–66 (H)	Size exclusion chromatography / molasses
Lewatit® MDS 1269 K 350	Styrene/DVB gel	K^{+}	MD: 0.37 (+/– 0.03)	1.5 (H)	–	55–66 (H)	Size exclusion chromatography / molasses
Lewatit® MDS 1369 Ca 290	Styrene/DVB gel	Ca^{2+}	MD: 0.28 (+/– 0.03)	1.6 (H)	–	53–63 (H)	Glucose / fructose separation
Lewatit® MDS 1369 Ca 320	Styrene/DVB gel	Ca^{2+}	MD: 0.32 (+/– 0.03)	1.6 (H)	–	53–63 (H)	Glucose / fructose separation
Lewatit® MDS 1369 Na 290	Styrene/DVB gel	Na^{+}	MD: 0.28 (+/+ 0.03)	1.6 (H)	–	53–63 (H)	Amino acid refining
Lewatit® MDS 1369 Na 320	Styrene/DVB gel	Na^{+}	MD: 0.32 (+/– 0.03)	1.6 (H)	–	53–63 (H)	Size exclusion chromatography / softening / FOS / Amino acid refining
Lewatit® MDS 1369 Na 350	Styrene/DVB gel	Na^{+}	MD: 0.37 (+/– 0.03)	1.6 (H)	–	53–63 (H)	Size exclusion chromatography / softening / FOS / Amino acid refining
Lewatit® MDS 2368	Styrene/DVB gel	Na^{+}	MD: 0.37 (+/– 0.03)	1.1	–	63–68	Size exclusion chromatography / dextrose enrichment



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Condensate Polishing

In most cases, the make-up water is conditioned with ammonia in the water-steam circuit in order to create an alkaline environment, which aids corrosion protection. Nonetheless, impurities are created during operation in a water-steam circuit, which for the most part find their way into the condensate in the form of ions.

Moreover, even very small cooling water leaks can allow the ingress of inorganic salts and organic compounds that then increase the risk of corrosion or lead to foaming under the extreme pressure and temperature conditions in the boiler. Therefore, treatment with ion exchangers is sensible or necessary in many cases in order to ensure reuse of the condensate as boiler feed water.



Water-steam circuits are at the heart of all thermal power plants that generate electricity from fossil or nuclear fuels. Here, the water and steam serve as an energy carrier and cooling medium. Around the world, Lewatit® ion exchange resins help to ensure the efficient, safe, and reliable operation of these power plants over many years. For example, they are essential for demineralizing the cooling and make-up water and for condensate polishing in the water-steam circuits. They are the only means of preventing scale formation, thus promoting optimal heat transfer on an ongoing basis. In addition, they can effectively reduce or even prevent corrosion in this way. These effects, together with the high regenerability of the resins, ensure long-term, economical power plant operation.

In nuclear power plants, ion exchangers are also important components in the chemical and volume control system (CVCS) that controls and monitors water volumes and dissolved constituents in the cooling circuits. With the aid of selective ion exchangers, both radioactive and non-radioactive ions can be removed from the process water and the wastewater flow. The water in the holding basins for spent fuel elements is also passed through ion exchangers for treatment.

For all of these and other applications, we offer a comprehensive range of ion exchangers that are tailored to specific requirements. Our LewaPlus® design software can model various combinations of ion exchange resins and exchange stages on a made-to-measure basis and analyze their properties. This provides the user with maximum confidence that they will obtain the optimum treatment solution for the relevant feed water and the required process water quality for the given situation.

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Weak Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® CNP 80	Polyacrylate porous	H^+	HD: 0.315–1.6	4.3	70 ($H^+ \rightarrow Na^+$)	41–47	Water treatment, decarbonization, softening of high TDS water
Lewatit® CNP 80 WS	Polyacrylate porous	H^+	HD: 0.4–1.6	4.5	70 ($H^+ \rightarrow Na^+$)	42–47	Water treatment, decarbonization, softening of high TDS water

Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® C 249	Styrene/DVB gel	Na^+	HD: 0.4–1.25	2.0	10 ($Na^+ \rightarrow H^+$)	45–48	Water treatment, demineralization
Lewatit® C 267	Styrene/DVB gel	H^+	HD: 0.3–1.25	1.9	–10 ($H^+ \rightarrow Na^+$)	49–55	Demineralization
Lewatit® MonoPlus S 108	Styrene/DVB gel	Na^+	MD: 0.62 (+/– 0.05)	2.2	10 ($Na^+ \rightarrow H^+$)	41–46	Demineralization
Lewatit® MonoPlus S 108 H	Styrene/DVB gel	H^+	MD: 0.65 (+/– 0.05)	2.0	–10 ($H^+ \rightarrow Na^+$)	47–53	Demineralization
Lewatit® MonoPlus S 108 KR	Styrene/DVB gel	H^+	MD: 0.65 (+/– 0.05)	2.0	–10 ($H^+ \rightarrow Na^+$)	47–53	Nuclear-grade cation exchanger for decontamination
Lewatit® MonoPlus SP 112	Styrene/DVB macroporous	Na^+	MD: 0.65 (+/– 0.05)	1.7	8 ($Na^+ \rightarrow H^+$)	51–56	Demineralization
Lewatit® MonoPlus SP 112 H	Styrene/DVB macroporous	H^+	MD: 0.67 (+/– 0.05)	1.6	–8 ($H^+ \rightarrow Na^+$)	56–60	Demineralization
Lewatit® MonoPlus SP 112 KR	Styrene/DVB macroporous	H^+	MD: 0.67 (+/– 0.05)	1.7	–8 ($H^+ \rightarrow Na^+$)	52–61	Nuclear-grade cation exchanger for decontamination
Lewatit® MDS 200 H	Styrene/DVB gel	H^+	MD: 0.33 (+/– 0.03)	2.3	–8 ($H^+ \rightarrow Na^+$)	45–50	Higher cross-linked cation with a small bead diameter
Lewatit® MonoPlus S 200 H	Styrene/DVB gel	H^+	MD: 0.60 (+/– 0.05)	2.1	–8 ($H^+ \rightarrow Na^+$)	45–50	Higher cross-linked cation for condensate polishing
Lewatit® MonoPlus S 200 KR	Styrene/DVB gel	H^+	MD: 0.60 (+/– 0.05)	2.1	–8 ($H^+ \rightarrow Na^+$)	45–50	Nuclear-grade cation for condensate polishing and decontamination
Lewatit® MonoPlus S 215 KR	Styrene/DVB gel	H^+	MD: 0.60 (+/– 0.05)	2.4	–6 ($H^+ \rightarrow Na^+$)	35–45	Nuclear-grade high cross-linked cation for condensate polishing and decontamination
Lewatit® S 100 G1	Styrene/DVB gel	H^+	HD: 0.315–1.25	1.8	–8 ($H^+ \rightarrow Na^+$)	50–55	Acid conductivity

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Weak Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® A 8072	Polyacrylate gel	FB	HD: 0.50–0.75 (effective)	1.6	25 (FB → Cl^-)	53–61	Water treatment, demineralization
Lewatit® A 8072+	Polyacrylate gel	FB	HD: 0.50–0.74 (effective)	1.4	12 (FB → Cl^-)	56–64	Water treatment, demineralization, reduced rinse water demand
Lewatit® MP 62	Styrene/DVB macroporous	FB	HD: 0.47 (+/– 0.06, effective)	1.7	45 (FB → Cl^-)	50–55	Water treatment, demineralization

Medium Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® A 8073	Polyacrylate gel	FB/Cl^-	HD: 0.50–0.75 (effective size)	1.25	14 (del. form → Cl^-)	56–64	Water treatment, demineralization
Lewatit® MonoPlus MP 64	Styrene/DVB macroporous	FB/Cl^-	MD: 0.59 (+/– 0.05)	1.3	24 (del. form → Cl^-)	61–66	Water treatment, demineralization
Lewatit® MonoPlus MP 68	Styrene/DVB macroporous	FB/Cl^-	MD: 0.55 (+/– 0.05)	1.3	24 (del. form → Cl^-)	54–60	Water treatment, demineralization

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Strong Base Anion Exchange Resins – Type I

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® A 8071	Polyacrylate gel	Cl^-	HD: 0.50–0.75 (effective size)	1.35	25 ($OH^- \rightarrow Cl^-$)	48–55	Demineralization, adsorption of TOC
Lewatit® ASB 1	Styrene/DVB gel	Cl^-	HD: 0.3–1.25	1.4	20 ($OH^- \rightarrow Cl^-$)	43–48	Demineralization
Lewatit® ASB 1 P	Styrene/DVB gel	Cl^-	HD: 0.44–0.56 (effective size)	1.3	20 ($OH^- \rightarrow Cl^-$)	49–56	Demineralization
Lewatit® MonoPlus M 500	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.3	24 ($OH^- \rightarrow Cl^-$)	48–55	Demineralization
Lewatit® MonoPlus M 500 MB	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.3	24 ($OH^- \rightarrow Cl^-$)	48–55	Demineralization, for mixed bed application
Lewatit® MonoPlus M 500 OH	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.05)	1.1	–24 ($OH^- \rightarrow Cl^-$)	57–62	Demineralization and mixed bed application
Lewatit® MonoPlus M 500 KR	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.05)	1.1	–22 ($OH^- \rightarrow Cl^-$)	56–62	For rad waste removal, demineralization, and decontamination
Lewatit® MonoPlus M 800	Styrene/DVB gel	Cl^-	MD: 0.60 (+/– 0.05)	1.4	22 ($OH^- \rightarrow Cl^-$)	43–48	Demineralization, for mixed bed applications
Lewatit® MonoPlus M 800 OH	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.05)	1.2	–22 ($OH^- \rightarrow Cl^-$)	57–62	Demineralization
Lewatit® MonoPlus M 800 KR	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.05)	1.2	–22 ($OH^- \rightarrow Cl^-$)	56–63	Low chloride content, for rad waste removal, demineralization, and decontamination
Lewatit® MonoPlus M 800 KRI	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.05)	1.2	–22 ($OH^- \rightarrow Cl^-$)	56–63	Ultralow chloride and sulfate content, for rad waste removal, demineralization, and decontamination
Lewatit® MonoPlus MP 500	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.1	22 ($OH^- \rightarrow Cl^-$)	60–65	Demineralization, adsorption of TOC
Lewatit® MonoPlus MP 500 OH	Styrene/DVB macroporous	OH^-	MD: 0.65 (+/– 0.05	0.9	–22 ($OH^- \rightarrow Cl^-$)	70–77	Demineralization, adsorption of TOC
Lewatit® MonoPlus MP 800	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.0	22 ($OH^- \rightarrow Cl^-$)	63–68	Demineralization, adsorption of TOC
Lewatit® MonoPlus MP 800 OH	Styrene/DVB macroporous	OH^-	MD: 0.65 (+/– 0.05)	0.8	–22 ($OH^- \rightarrow Cl^-$)	70–76	Water treatment, demineralization, adsorption of TOC
Lewatit® MonoPlus MP 800 KR	Styrene/DVB macroporous	OH^-	MD: 0.65 (+/– 0.05)	0.8	–22 ($OH^- \rightarrow Cl^-$)	60–68	Water treatment, demineralization, adsorption of TOC

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Strong Base Anion Exchange Resins – Type II

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® MonoPlus M 600	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.3	16 (OH^- → Cl^-)	45–50	Demineralization
Lewatit® MonoPlus MP 600	Styrene/DVB macroporous	Cl^-	MD: 0.60 (+/– 0.05)	1.1	12 (OH^- → Cl^-)	55–60	Demineralization, adsorption of TOC
Lewatit® ASB 2	Styrene/DVB gel	Cl^-	HD: 0.3–1.25	1.4	20 (OH^- → Cl^-)	38–45	Demineralization, for waters with low silica concentrations

Mixed Bed: Strong Acidic Cation Exchange Resins / Strong Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® NM 60	Styrene/DVB gel	H^+/OH^-	HD: 0.40–0.65 (effective size)	0.55**	–15 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	50–60	Production of very pure water
Lewatit® NM 91	Styrene/DVB gel	H^+/OH^-	HD: 0.315–1.25	0.30**	–15 (H^+/OH^- → Ca^{2+}, Mg^{2+}, $SO42^-$, Cl^-)	50–60	Demineralizing water in cartridges, cleaning of sewage water, electro erosion
Lewatit® SM 600 KR Cl-free	Styrene/DVB gel	H^+/OH^-	MD: 0.65 +/– 0.05 A 0.64 +/– 0.05 C	2.0 C/1.1 A	–15 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	47–62	Demineralization, decontamination, and elimination of rad waste
Lewatit® MonoPlus SM 1000 KR	Styrene/DVB gel	H^+/OH^-	MD: 0.64 +/– 0.05 A 0.60 +/– 0.05 C	2.1 C/1.2 A	–14 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	42–63	Demineralization, decontamination, and elimination of rad waste
Lewatit® MonoPlus SM 1015 KR	Styrene/DVB gel	H^+/OH^-	MD: 0.65 +/– 0.05 A 0.60 +/– 0.05 C	2.4 C/1.2 A	–14 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	54–59	Demineralization, decontamination, and elimination of rad waste
Lewatit® MonoPlus SMP 1000 KR	Styrene/DVB macroporous	H^+/OH^-	MD: 0.70 +/– 0.05 C 0.65 +/– 0.05 A	1.7 C/0.8 A	–14 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	52–68	Demineralization, decontamination, and elimination of rad waste
Lewatit® MonoPlus SM 1000 KR 7Li	Styrene/DVB gel	$Li7^+/OH^-$	MD: 0.64 +/– 0.05 A 0.60 +/– 0.05 C	2.1 C/1.2 A	–14 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	45–63	CVCS applications
Lewatit® MonoPlus SM 1015 KR 7Li	Styrene/DVB gel	$Li7^+/OH^-$	MD: 0.64 +/– 0.05 A 0.60 +/– 0.05 C	2.4 C/1.2 A	–14 (H^+/OH^- → Ca^{2+}, Mg^{2+}, SO_4^{2-}, Cl^-)	54–59	CVCS applications

** Operational capacity, end point 0.02 MOhm* cm

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SEMICONDUCTOR AND PHOTOVOLTAIC

Ultrapure Water Production

Ultrapure water (UPW) is indispensable for processing wafers or the complex, wet chemical procedural steps involved in photolithography in the production of micro- and nanoelectronics. Such processes are used to manufacture semiconductor components like computer processors, memory chips, light-emitting diodes (LEDs), liquid crystal (LC) and LED displays, and photovoltaic modules.

UPW is also used in microsystems technology for manufacturing and processing miniaturized mechanical components for micropumps, micromotors, and microvalves, for example. Ultrapure water is an important prerequisite for preventing or removing deposits or impurities from delicate structures right down to the nanometer range that would otherwise result in production faults and indefensibly high rejection rates. As electronics advances towards increasingly small dimensions, the quality requirements for UPW are becoming increasingly stringent.



Special ion exchange resins from the Lewatit® UltraPure (UP) series play a significant role in producing ultrapure water reliably and efficiently. These include individual resins as well as working mixed beds and final polishers. They are all characterized by a particularly low release of organic matter and therefore contribute little to any increase in TOC concentration in the process sequence (low ΔTOC, total organic carbon). What is more, the discharge of metals and particles right down to the nanometer range is reduced to a minimum. To produce UPW, fresh water or recycled process water is first demineralized. Then, it is taken through final polishing to reach the required extremely low levels of conductivity. After final polishing with special ion exchangers, the water obtained will be of the highest purity. If necessary, the particle content of the water is reduced further through a series of filtration steps. In addition to the filtration steps, special ion exchangers enable the formation of particles due to resin erosion in the course of UPW production to be prevented from the outset. To that end, the aggressive hydrogen peroxide is removed from the water.

Our LewaPlus® design software can model various combinations of ion exchange resins and exchange stages on a made-to-measure basis and analyze their properties. This provides the user with maximum confidence that they will obtain the optimum treatment solution for the relevant feed water and the required process water quality for the given situation.

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Strong Acidic Cation Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® UltraPure 1213 MD	Styrene/DVB gel	H^+	MD: 0.60 (+/– 0.05)	2.1	–6 ($H^+ \rightarrow Na^+$)	45–50	Uniform particle size high-purity cation exchanger
Lewatit® UltraPure 1216 MD	Styrene/DVB gel	H^+	MD: 0.55 (+/– 0.05)	2.1	–8 ($H^+ \rightarrow Na^+$)	45–50	Uniform particle size high-purity cation exchanger

Medium Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® UltraPure 1231 MD	Styrene/DVB macroporous	FB/Cl^-	MD: 0.59 (+/– 0.05)	1.4	24 (del. Form → Cl^-)	61–66	Ultrapure water

Strong Base Anion Exchange Resins – Type I

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® UltraPure 1241 MD	Styrene/DVB gel	Cl^-	MD: 0.62 (+/– 0.05)	1.3	22 ($C^- \rightarrow OH^-$)	48–55	Ultrapure water
Lewatit® UltraPure 1243 MD	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.06)	1.1	–22 ($C^- \rightarrow OH^-$)	56–66	Ultrapure water
Lewatit® UltraPure 1261 MD	Styrene/DVB macroporous	Cl^-	MD: 0.62 (+/– 0.05)	1.1	22 ($C^- \rightarrow OH^-$)	60–65	Ultrapure water
Lewatit® K 7333	Styrene/DVB gel	OH^-	MD: 0.64 (+/– 0.06)	1.1	–22 ($C^- \rightarrow OH^-$)	56–66	Ultrapure water

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Mixed Bed: Strong Acidic Cation Exchange Resins / Strong Base Anion Exchange Resins

Product	Product Matrix	Ionic Form	Bead Size (mm): Monodisperse: (MD, mean value) Heterodisperse: (HD, share > 90%)	Total Capacity (eq/l) min.	Volume Change (%) max.	Water Retention (%)	Applications
Lewatit® NM 60 SG	Styrene/ DVB gel	H^+/OH^-	HD: 0.40–0.65 (effective size)	0.55**	–15 ($H^+/OH^- \rightarrow Ca^{2+}$, Mg^{2+}, SO_4^{2-}, Cl^-)	50–60	Production of very pure water for semiconductor industry
Lewatit® UltraPure 1292 MD	Styrene/ DVB gel	H^+/OH^-	MD: 0.67 +/– 0.05 A 0.60 +/– 0.07 C	2.1 C/1.1 A	–15 ($H^+/OH^- \rightarrow Ca^{2+}$, Mg^{2+}, SO_4^{2-}, Cl^-)	SAC 45–50 SBA 59–65	Ultrapure water, very low TOC leaching
Lewatit® UltraPure 1294 MD	Styrene/ DVB gel	H^+/OH^-	MD: 0.67 +/– 0.05 A 0.60 +/– 0.07 C	2.1 C/ 1.1 A	–15 ($H^+/OH^- \rightarrow Ca^{2+}$, Mg^{2+}, SO_4^{2-}, Cl^-)	SAC 45–50 SBA 59–65	Polishing to get 18+ megohm water (pharmaceutical and semiconductor industries)
Lewatit® UltraPure 1296 MD	Styrene/ DVB gel	H^+/OH^-	MD: 0.67 +/– 0.07 A 0.50 +/– 0.05 C	2.0 C/ 1.1 A	–15 ($H^+/OH^- \rightarrow Ca^{2+}$, Mg^{2+}, SO_4^{2-}, Cl^-)	SAC 46–52 SBA 59–65	Polishing to get 18+ megohm water (pharmaceutical and semiconductor industries)
Lewatit® UltraPure 1297 MD	Styrene/ DVB gel	H^+/OH^-	MD: 0.64 +/– 0.02 A 0.35 +/– 0.02 C	2.1 C/1.1 A	–14 ($H^+/OH^- \rightarrow Ca^{2+}$, Mg^{2+}, SO_4^{2-}, Cl^-)	SAC 47–53 SBA 60–65	Polishing to get 18+ megohm water (pharmaceutical and semiconductor industries), less separable

** Operational capacity, end point 0.02 MOhm* cm



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LEWAPLUS® CALCULATION AND DESIGN SOFTWARE

LewaPlus®



LewaPlus® is a program used for the modelling and dimensioning of diverse ion exchange systems utilizing Lewatit® resins. The software contains an extensive selection of modules and configuration options for versatile use in the water treatment and food and beverage refinement industries. With the aim of creating sustainable processes, LewaPlus® will help find the ideal system configuration to maximize productivity while also saving resources.

The software contains a cross-reference tool for the best product selection as well as a quick link to product data sheets and material safety data sheets of Lewatit® ion exchange resins.

Click here in order to request a 60-day trial LewaPlus® software license and download the software directly from our website. You can also apply for a permanent license at any time during the trial period and also afterwards directly from LewaPlus®. The license key and the program installation instructions will be sent to your email address.

Available ion exchange processes include

- Softening and dealkalization (SD)
- Water demineralization (DI, MB) and demi check (DI check)
- Food and beverage ingredients demineralization
- Condensate polishing (CP)

Key benefits of the software:

- Multiple processes can be combined in one project (including IX technologies as well as membrane technologies such as UF and RO) reflecting real plant layout
- Design flexibility: selection of default units, wide range of configurable parameters
- Offers not only the possibility to treat one stream after the other (one-dimensional) but to design complex treatment systems (two-dimensional) with different technologies
- Available in ten languages
- Free of charge

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