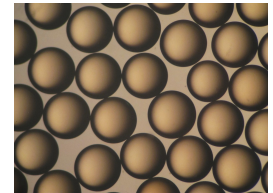


AmberTec™ UP4000 OH Ion Exchange Resin

Uniform Particle Size, Gel, Strong Base Anion Exchange Resin for Single Bed and Mixed Bed Demineralization Applications for the Semiconductor Industry

Description

AmberTec™ UP4000 OH Ion Exchange Resin is a semiconductor-grade, uniform particle size, gel, strong base anion resin developed specifically for use in producing ultrapure water for the semiconductor industry



It is intended for use in regenerable primary or polishing mixed beds, and it is sold in the fully-regenerated hydroxide form to ensure minimum impurity leakage. AmberTec™ UP4000 OH is designed to be paired with cationic AmberTec™ UP1400 H Ion Exchange Resin for mixed bed applications. Its high exchange capacity makes AmberTec™ UP4000 OH the product of choice for the removal of trace boron post-reverse osmosis in single beds regenerated with NaOH.

AmberTec™ UP4000 OH can also be used as the anion exchange resin component of a non-regenerable polishing mixed bed to achieve the lowest possible leakage of ionic species, silica, total organic carbon (TOC), and sub-micron particles.

Resin Pairings

Recommended pairing:

- AmberTec™ UP1400 H Ion Exchange Resin (gel)

Applications

- Regenerable, single beds for boron removal after reverse osmosis
- Regenerable, primary mixed beds after reverse osmosis
- Regenerable, polishing mixed beds
- Non-regenerable, polishing mixed beds

Historical Reference

AmberTec™ UP4000 OH Ion Exchange Resin has previously been sold as AMBERJET™ UP4000 OH Ion Exchange Resin.

Typical Properties

Physical Properties

| | |
|------------------|---|
| Copolymer | Styrene-divinylbenzene |
| Matrix | Gel |
| Type | Strong base anion |
| Functional Group | Trimethylammonium |
| Physical Form | White to yellow, translucent, spherical beads |

Chemical Properties

| | |
|-------------------------------|-------------------------------------|
| Ionic Form as Shipped | OH ⁻ |
| Total Exchange Capacity | ≥ 1.10 eq/L (OH ⁻ form) |
| Water Retention Capacity | 54.0 – 60.0% (OH ⁻ form) |
| Ionic Conversion | |
| OH ⁻ | ≥ 95% |
| CO ₃ ²⁻ | ≤ 5% |
| Cl ⁻ | ≤ 0.5% |

Particle Size [§]

| | |
|------------------------|-------------|
| Particle Diameter | 630 ± 50 µm |
| Uniformity Coefficient | ≤ 1.20 |
| < 425 µm | ≤ 0.5% |
| > 1180 µm | ≤ 2.0% |

Density

| | |
|-----------------|---------|
| Shipping Weight | 689 g/L |
|-----------------|---------|

[§] For additional particle size information, please refer to the [Particle Size Distribution Cross Reference Chart](#) (Form No. 45-D00954-en).

| | |
|--|-----------------------|
| Temperature Range (OH ⁻ form) † | 5 – 60°C (41 – 140°F) |
|--|-----------------------|

| | |
|-------------------|--------|
| pH Range (Stable) | 0 – 14 |
|-------------------|--------|

[†] Operating at elevated temperatures, for example above 60 – 70°C (140 – 158°F), may impact the purity of the loop and resin life. Contact our technical representative for details.

For additional information regarding recommended minimum bed depth, operating conditions, and regeneration conditions for [mixed beds](#) (Form No. 45-D01127-en) or [separate beds](#) (Form No. 45-D01131-en) in water treatment, please refer to our Tech Facts.

Suggested Operating Conditions

Hydraulic Characteristics

Estimated bed expansion of AmberTec™ UP4000 OH Ion Exchange Resin as a function of backwash flowrate and temperature is shown in Figure 1.

Estimated pressure drop for AmberTec™ UP4000 OH as a function of service flowrate and temperature is shown in Figure 2. These pressure drop expectations are valid at the start of the service run with clean water.

Figure 1: Backwash Expansion
Temperature = 10 – 60°C (50 – 140°F)

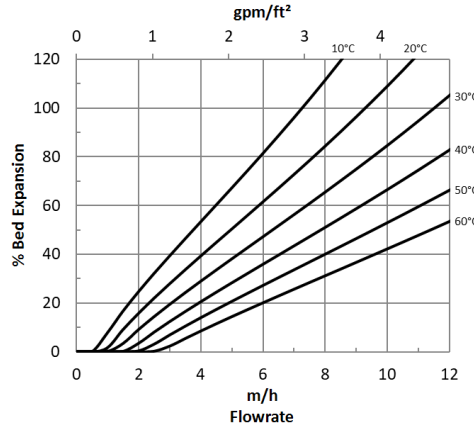
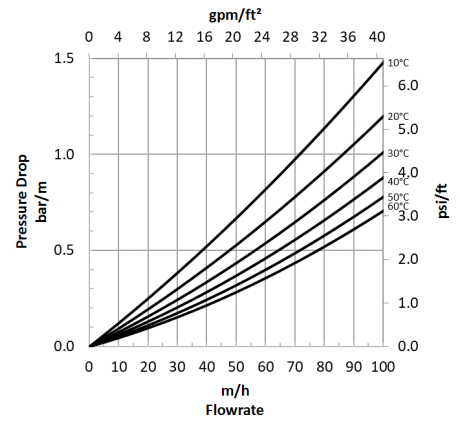


Figure 2: Pressure Drop
Temperature = 10 – 60°C (50 – 140°F)

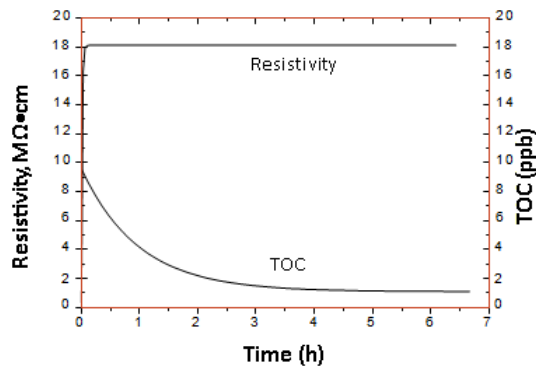


Quality Assurance

AmberTec™ UP4000 OH Ion Exchange Resin is tested by DuPont for resistivity, total organic carbon (TOC), and kinetic performance in a mixed bed with AmberTec™ UP1400 H Ion Exchange Resin. This ensures that all batches will meet stringent ultrapure water (UPW) performance requirements on these most critical parameters.

Typical rinse curves for resistivity and total organic carbon (TOC) as a function of rinse time based on our quality control procedure for AmberTec™ UP4000 OH are shown in Figure 3.

Figure 3: Resistivity and TOC Rinse Performance



Product Stewardship

DuPont has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with DuPont products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

DuPont strongly encourages its customers to review both their manufacturing processes and their applications of DuPont products from the standpoint of human health and environmental quality to ensure that DuPont products are not used in ways for which they are not intended or tested. DuPont personnel are available to answer your questions and to provide reasonable technical support. DuPont product literature, including safety data sheets, should be consulted prior to use of DuPont products. Current safety data sheets are available from DuPont.

Please be aware of the following:

- **WARNING:** Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.



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