AMBERLITE™ MAC-3 H Ion Exchange Resin
Food-grade, Macroporous, Acrylic, Weak Acid Cation Exchange Resin

Description
AMBERLITE™ MAC-3 H Ion Exchange Resin is an acrylic, macroporous weak acid cation exchange resin that offers high exchange capacity, excellent regeneration efficiency, very good resistance to osmotic shock, and good chemical and physical stability.

AMBERLITE™ MAC-3 H is effective in removing temporary hardness (hardness associated with alkalinity) and dealkalization. It can also be used for recovery of metals. AMBERLITE™ MAC-3 H is can be supplied in accordance to the TOC (Total Organic Carbon) requirements of the major European legislations for use in food and potable water applications. In such cases, a recommendation is given for resin conditioning before use.

Applications
- Softening
- Dealkalization
- Demineralization

Typical Properties

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Crosslinked acrylic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copolymer</td>
<td>Crosslinked acrylic</td>
</tr>
<tr>
<td>Matrix</td>
<td>Macroporous</td>
</tr>
<tr>
<td>Type</td>
<td>Weak acid cation</td>
</tr>
<tr>
<td>Functional Group</td>
<td>Carboxylic acid</td>
</tr>
<tr>
<td>Physical Form</td>
<td>White to off-white, opaque, spherical beads</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Properties</th>
<th>H⁺</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ionic Form as Shipped</td>
<td>H⁺</td>
</tr>
<tr>
<td>Total Exchange Capacity</td>
<td>≥ 3.8 eq/L</td>
</tr>
<tr>
<td>Water Retention Capacity</td>
<td>44 – 52%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Particle Size §</th>
<th>300 – 1180 µm</th>
<th>≥ 90%</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Stability</th>
<th>Whole Beads</th>
<th>≥ 90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling</td>
<td>H⁺ → Na⁺ : ~70%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Density</th>
<th>Particle Density</th>
<th>1.18 g/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shipping Weight</td>
<td>750 g/L</td>
</tr>
</tbody>
</table>

§ For additional particle size information, please refer to the Particle Size Distribution Cross Reference Chart (Form No. 177-01775).
### Suggested Operating Conditions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum Operating Temperature</strong></td>
<td>120°C (248°F)</td>
</tr>
<tr>
<td><strong>pH Range</strong></td>
<td>5 – 14</td>
</tr>
<tr>
<td><strong>Bed Depth, min.</strong></td>
<td>800 mm (2.6 ft)</td>
</tr>
</tbody>
</table>

**Flowrates**

- **Service**
  - 5 – 50 m/h (2 – 20 gpm/ft²)
- **Backwash**
  - See Figure 1
- **Regeneration**
  - **HCl**
    - 1 – 10 m/h (0.4 – 4 gpm/ft²)
  - **H₂SO₄**
    - 5 – 20 m/h (2 – 8 gpm/ft²)
- **Displacement Rinse**
  - **HCl**
    - 1 – 10 m/h (0.4 – 4 gpm/ft²)
  - **H₂SO₄**
    - 5 – 20 m/h (2 – 8 gpm/ft²)
- **Fast Rinse**
  - 5 – 50 m/h (2 – 20 gpm/ft²)

**Total Rinse Requirement**

3 – 6 BV*

**Regenerant**

- **HCl**
  - 1 – 5%
- **H₂SO₄**
  - 0.5 – 0.8%

* 1 BV (Bed Volume) = 1 m³ solution per m³ resin or 7.5 gal per ft³ resin

### Hydraulic Characteristics

Estimated bed expansion of AMBERLITE™ MAC-3 H Ion Exchange Resin as a function of backwash flowrate and ionic form at 25°C (77°F) is shown in Figure 1. The flowrate necessary to achieve a desired bed expansion for other water temperatures can be calculated with the provided equations.

Estimated pressure drop for AMBERLITE™ MAC-3 H as a function of service flowrate at 20°C (68°F) is shown in Figure 2. These pressure drop expectations are valid at the start of the service run with clean water and a well-classified bed. Estimated pressure drop at other water temperatures can be calculated with the provided equations.

**Figure 1: Backwash Expansion**

Temperature = 25°C (77°F)

**Figure 2: Pressure Drop**

Temperature = 20°C (68°F)

*For other temperatures use:*

For water temperatures:

\[
F_T = F_{25°C} \times [1 + 0.008 (1.8T°C - 45)], \quad \text{where} \quad F \equiv \text{m/h}
\]

\[
F_T = F_{77°F} \times [1 + 0.008 (T°F - 77)], \quad \text{where} \quad F \equiv \text{gpm/ft²}
\]

**For other temperatures use:**

\[
P_T = P_{20°C} / (0.026T°C + 0.4), \quad \text{where} \quad P \equiv \text{bar/m}
\]

\[
P_T = P_{68°F} / (0.014T°F + 0.05), \quad \text{where} \quad P \equiv \text{psi/ft}
\]
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.

Have a question? Contact us at:
www.dupont.com/water/contact-us

All information set forth herein is for informational purposes only. This information is general information and may differ from that based on actual conditions. Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where DuPont is represented. The claims made may not have been approved for use in all countries. Please note that physical properties may vary depending on certain conditions and while operating conditions stated in this document are intended to lengthen product lifespan and/or improve product performance, it will ultimately depend on actual circumstances and is in no event a guarantee of achieving any specific results. DuPont assumes no obligation or liability for the information in this document. References to “DuPont” or the “Company” mean the DuPont legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED. No freedom from infringement of any patent or trademark owned by DuPont or others is to be inferred.

DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, † or ® are owned by affiliates of DuPont de Nemours, Inc. unless otherwise noted. © 2019 DuPont.