



AmberLite™ XAD™16N Polymeric Adsorbent

Macroporous, Adsorbent Resin

Description

AmberLite™ XAD™16N Polymeric Adsorbent is supplied as white insoluble beads. It is a nonionic, hydrophobic, crosslinked polymer which derives its adsorptive properties from its macroporous structure (containing both a continuous polymer phase and a continuous pore phase), high surface area, and the aromatic nature of its surface (Figure 1). AmberLite™ XAD™16N polymeric adsorbent can be used to adsorb hydrophobic molecules from polar solvents and volatile organic compounds from vapor streams. Its characteristic pore size distribution makes AmberLite™ XAD™16N an excellent choice for the adsorption of organic substances of relatively low to medium molecular weight. It can be used in column or batch operations.

Applications

- Recovery and purification of antibiotics, water-soluble steroids, enzymes, amino acids, and proteins
- Removal of non-polar compounds, such as phenol, from polar solvents

Typical Properties

Physical Properties	
Matrix	Macroporous, crosslinked DVB
Type	Adsorbent
Functional Group	None
Physical Form	White, opaque, spherical beads
Nitrogen BET	
Surface Area	~800 m ² /g
Average Pore Diameter	~150 Å
Total Pore Volume	~0.6 mL/mL
Chemical Properties	
Ionic Form as Shipped	Not applicable
Total Exchange Capacity	Not applicable
Water Retention Capacity	62 – 70%
Particle Size §	
Particle Diameter	560 – 710 µm
< 300 µm	≤ 2.0%
> 1180 µm	≤ 2.0%
Swelling (in solvent)	
Methanol	15%
2-Propanol	15%
Acetone	20%
p-Xylene (via methanol)	25%
Density	
Particle Density	1.015 – 1.025 g/mL
Shipping Weight	650 g/L

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

Figure 1: Chemical Structure

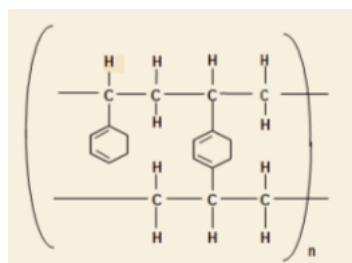


Figure 2: Pore Distribution

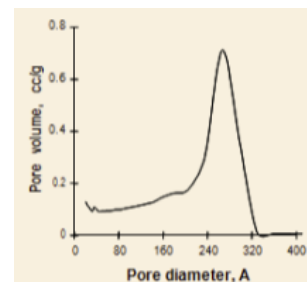
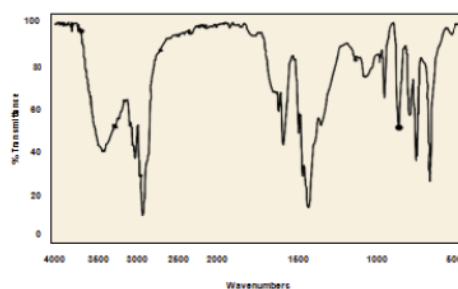


Figure 3: Infrared Spectrum



Suggested Operating Conditions

Maximum Operating Temperature	150°C (302°F)
Bed Depth, min.	
Capture	760 mm (2.5 ft)
Flowrates	
Loading	2 – 16 BV*/h
Elution/Desorption	1 – 4 BV/h
Regeneration	1 – 4 BV/h
Rinse	2 – 16 BV/h
Regenerants or Eluting Agents	• Water-miscible organic solvents (methanol, ethanol, isopropanol, acetone, etc.) for hydrophobic compounds • Pure solvents for regenerating resin fouled by oils and antifoams • Dilute bases (0.1 – 0.5% NaOH) for eluting weakly acidic compounds • Concentrated bases (2 – 4% NaOH) for regenerating resins fouled with proteins, peptides • Dilute acids (0.1 – 0.5% HCl) for weakly basic compounds • Dilute oxidizing agents (< 0.5%) such as peroxide to enhance the removal of protein fouling • Buffer elution for pH-sensitive compounds • Water when adsorption is from an ionic solution • Hot nitrogen or steam for volatile materials

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

Hydraulic Characteristics

Estimated bed expansion of AmberLite™ XAD™ 16N Polymeric Adsorbent as a function of backwash flowrate and temperature is shown in Figure 4.

Estimated pressure drop for AmberLite™ XAD™ 16N as a function of service flowrate and water temperature is shown in Figure 5. These pressure drop expectations are valid at the start of the service run with clean feed and a well-classified bed.

Figure 4: Backwash Expansion

Temperature = 10 – 50°C (50 – 122°F)

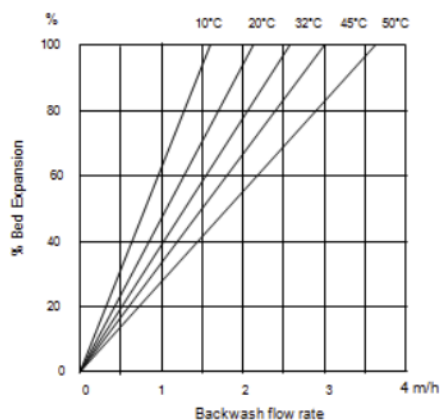
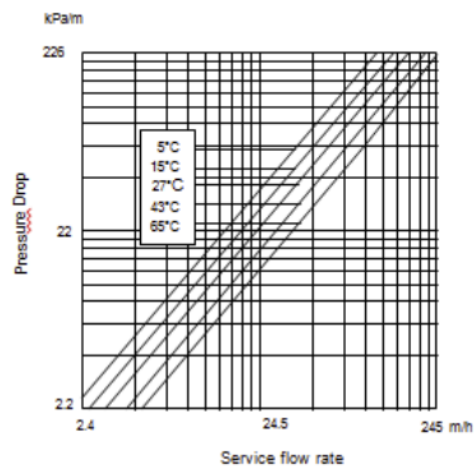


Figure 5: Pressure Drop

Temperature = 5 – 65°C (41 – 149°F)



Application Information

Pretreatment

AmberLite™ XAD™ 16N Polymeric Adsorbent is shipped as a water-wet product imbibed with sodium chloride (NaCl) and sodium carbonate (Na₂CO₃) salts to inhibit bacterial growth. These salts must be washed from the adsorbent prior to use and it is suggested that this be achieved by washing with water at a linear flowrate of 5 – 10 m/h until the required level is achieved. In some sensitive applications, residual monomeric or oligomeric compounds may be required to be removed from the adsorbent. A regeneration with the proposed regenerant is also recommended prior to beginning the first service cycle. If the regenerant is an alcohol, it must be displaced with water prior to beginning the first loading cycle.

Applications

Recovery and purification of antibiotics, water-soluble steroids, enzymes, amino acids, and proteins

AmberLite™ XAD™ 16N Polymeric Adsorbent can be considered as a general-purpose resin for these types of applications combining good mesoporosity with high surface area. In these types of applications, of which the recovery of Cephalosporin C is perhaps the best example, the loading and elution flowrates are relatively low (0.5 – 2 BV/h). The pH of the solution has a significant effect on the loading and elution and, since the feed is often derived from a fermentation, the regeneration tends to be aggressive—4% NaOH at elevated temperatures and solvents. A primary concern in this type of application is the separation of two or more similar solutes. In these cases, the engineering is a key point to consider during both pilot-scale and final plant design.

Removal of non-polar compounds, such as phenol, from polar solvents

These types of applications can be considered a simple capture step in which the adsorbent resin is used to remove a small number of solutes from a process stream, often a waste stream. AmberLite™ XAD™ 16N Polymeric Adsorbent will be useful in this type of application in which the size of the solute is relatively large (> 200 Da) and when the operating capacity AmberLite™ XAD™ 4 Polymeric Adsorbent may be lower.

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.

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.

© 2020 DuPont. DuPont™, the DuPont Oval Logo, and all trademarks and service marks denoted with ™, SM or ® are owned by affiliates of DuPont de Nemours Inc., unless otherwise noted.



info@lenntech.com Tel. +31-152-610-900
www.lenntech.com Fax. +31-152-616-289



Form No. 45-D01962-en, Rev. 3
May 2020