



AMBERLITE™ XAD™1600N

Macroreticular Polymeric Adsorbent

Introduction

AMBERLITE XAD1600N is designed for applications where the separation of two or more similar species is required. Not only does AMBERLITE XAD1600N offer the same high surface area and controlled pore size of our traditional AMBERLITE XAD resins, but also all the benefits of a closely controlled particle size to give an extra dimension to the problem of chromatographic separation on the industrial scale. The particle size chosen is a balance between the smaller particle required to achieve separation and the hydraulic limitations of using such a resin on the industrial scale.

AMBERLITE XAD1600N is a polymeric adsorbent supplied as white insoluble beads in the fully hydrated form. AMBERLITE XAD1600N has excellent physical and thermal stability in addition to a low swelling between solvent and aqueous media. While this adsorbent resin could be used in a batch operation, the principal applications are in column operations.

Properties

Matrix	Macroreticular cross-linked aromatic polymer
Physical form	White translucent beads
Moisture holding capacity	66 to 73%
Shipping Weight	660 g/L
Specific gravity	1.015 to 1.025
Particle size	
Harmonic mean size	400 ± 50 µm
Uniformity coefficient	≤ 1.25
Fines content	< 0.212 mm : 0.5% max
Maximum reversible swelling	see Table 1
Surface area	≥ 700 m ² /g
Porosity	≥ 1.4 cc/g

Suggested Operating Conditions

pH stability range	1 to 14
Maximum temperature limit	150°C
Minimum bed depth	1500 mm (Chromatography)
Flow rate	
Loading	1–4 BV/h
Displacement	1–4 BV/h
Regeneration	1–4 BV/h
Rinse	1–4 BV/h

Figure 1 : Chemical structure of AMBERLITE XAD 1600 polymeric adsorbent

Figure 2 : Pore distribution of AMBERLITE XAD 1600 polymeric adsorbent

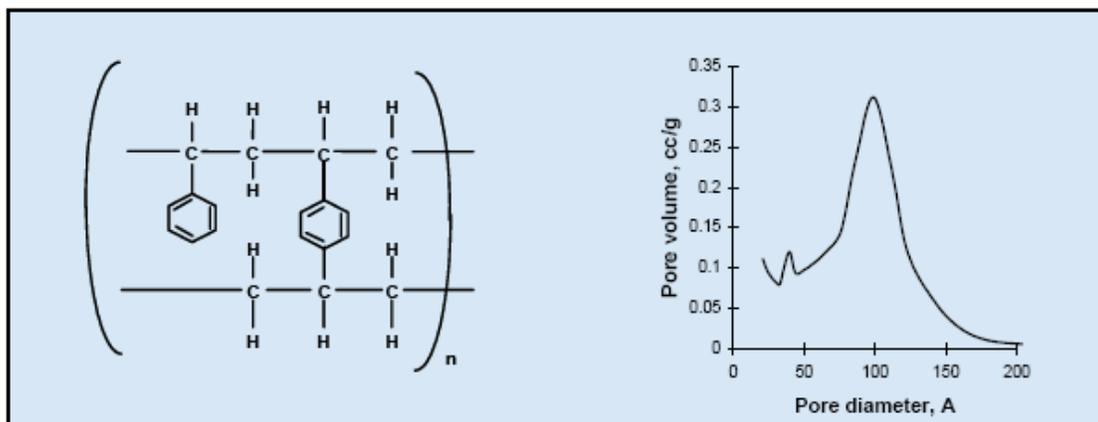


Figure 3 : Infrared Spectrum of Amberlite XAD 1600 polymeric adsorbent

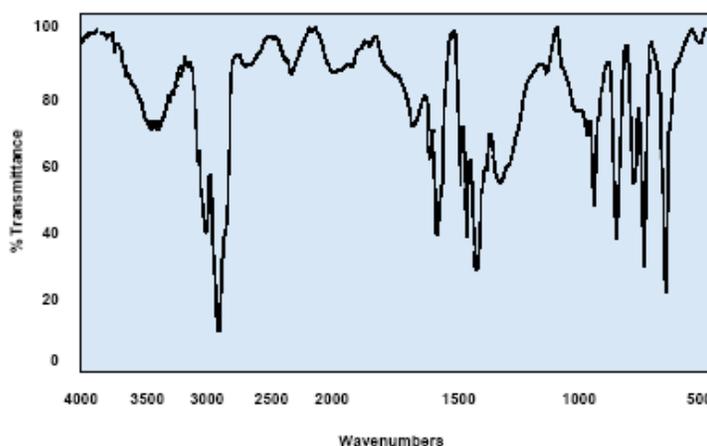


Table 1: Percent swelling of AMBERLITE XAD1600N polymeric adsorbent in various solvents (Water: Solvent)

Solvent	% increase from as-received volume
Methanol	15-20
2-propanol	15-20
Acetone	15-20

Pretreatment

AMBERLITE XAD1600N 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.



Sample preparation for testing

Samples of AMBERLITE XAD1600N polymeric adsorbent must be pre-treated prior to laboratory testing to ensure proper results. Please refer to Rohm and Haas publication IE-245 "Laboratory Column Procedures and Testing of AMBERLITE and DUOLITE Polymeric Adsorbents," section "Preparation of Resins."

Applications**Recovery and purification of antibiotics, water soluble steroids, amino acids and proteins.**

AMBERLITE XAD1600N can be considered as a chromatographic media for these types of applications requiring the separation of similar solutes by combining narrow particle distribution, good mesoporosity and 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 as 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 scale and final plant design.

Removal of non polar compounds from polar solvents.

These types of applications can be considered a simple capture step where the adsorbent resin is used to remove solutes from an aqueous process stream.

AMBERLITE XAD1600N will prove useful in this type of application where the narrow particle size distribution may give a higher operating capacity than AMBERLITE XAD16 or AMBERLITE XAD4.

Fruit juice upgrading.

For this application, AMBERLITE XAD16HP is specifically recommended.

Regenerant/ Eluting agents

- Water miscible organic solvents (methanol, ethanol, acetone, isopropanol, 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.
- Strong 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 where adsorption is from an ionic solution.
- Hot nitrogen or steam for volatile materials.

FDA clearance

AMBERLITE XAD1600N polymeric adsorbent has clearance under FDA Food Additive Regulation 21CFR173.65- Divinylbenzene Copolymer. The product may be used for the removal of organic substances from aqueous foods under the prescribed conditions outlined in 21CFR173.65.

Hydraulic Characteristics

Figure 4 shows the bed expansion of AMBERLITE XAD1600N as a function of backwash flowrate and water temperature.

Figure 5 shows the pressure drop for AMBERLITE XAD1600N, as a function of service flowrate and water temperature. Pressure drop data are valid at the start of the service run with a clear water and a correctly classified bed.



Figure 4 : Bed Expansion

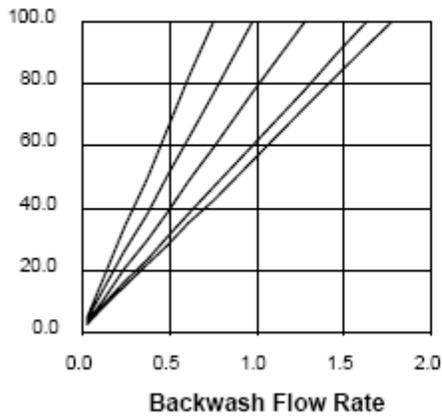
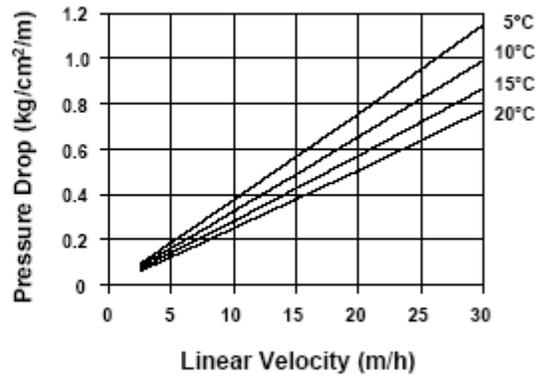


Figure 5 : Pressure Drop



Note: 1 gpm/ft² = 2.45 m/h

Material safety data sheets

Material Safety Data Sheets (MSDS) are available for all AMBERLITE polymeric adsorbents. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products.

We recommend that you obtain copies of our MSDS from your local Rohm and Haas technical representative before using our products in your facilities. We also suggest that you contact your suppliers of other materials recommended for use with our products for appropriate health and safety precautions before using them

For more information about DOW™ resins, call the Dow Water & Process Solutions business:

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