

PRODUCT DATA SHEET

AMBERLITE™ XAD™ 1600N

Industrial Grade Polymeric Adsorbent

AMBERLITE XAD1600N is a new addition to Rohm and Haas Amberlite XAD range of adsorbent resins. The product 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 tradition 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 available in the form of white insoluble beads which are supplied in a fully hydrated form. AMBERLITE XAD1600N has excellent physical and thermal stability in addition to a low swelling between solvent and aqueous media. Whilst this resin could be used in a batch operation the principal applications are anticipated to be in column operations.

PROPERTIES

Matrix _____	Macroreticular cross-linked aromatic polymer
Physical form _____	White translucent beads
Moisture holding capacity ^[1] _____	66 to 73 %
Shipping weight _____	660 g/L
Specific gravity _____	1.015 to 1.025
Particle size	
Harmonic mean size ^[1] _____	400 ± 50 µm
Uniformity coefficient ^[1] _____	≤ 1.25
Fines content ^[1] _____	< 0.212 mm : 0.5 % max
Maximum reversible swelling _____	see Table 1
Surface area ^[2] _____	≥ 800 m ² /g
Porosity ^[2] _____	≥ 0.55 ml/ml

^[1] Contractual value

^[2] Values based on statistical quality control (SQC)

Test methods are available on request

SUGGESTED OPERATING CONDITIONS

pH range _____	0 -14
Maximum temperature limit _____	150°C
Minimum bed depth _____	150 cm (Chromatography)
Flow rate	
Loading _____	1 to 10 BV*/h
Displacement _____	1 to 4 BV/h
Regeneration _____	1 to 4 BV/h
Rinse _____	1 to 4 BV/h

* BV (Bed Volume) = 1 m³ solution per m³ resin

PROPERTIES (CONTD.)

Figure 1 : Chemical structure of AMBERLITE XAD1600N polymeric adsorbent

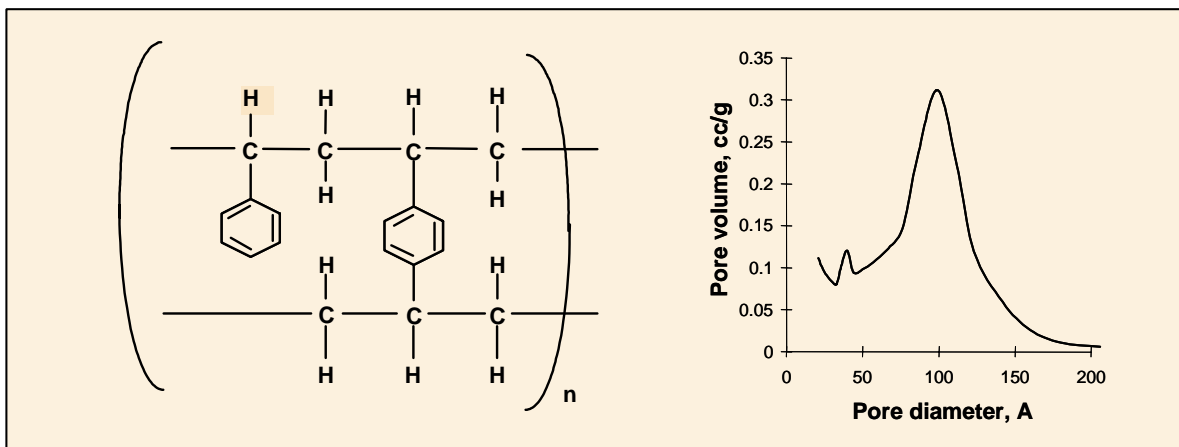


Figure 2 : Pore distribution of AMBERLITE XAD1600N polymeric adsorbent

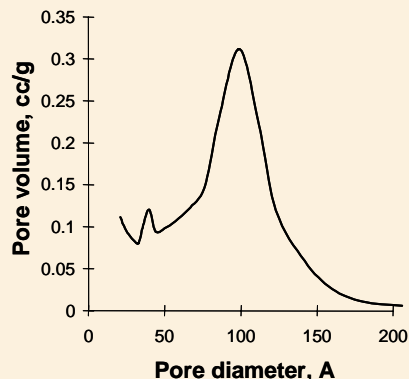


Figure 3 : Infrared Spectrum of Amberlite XAD1600N polymeric adsorbent

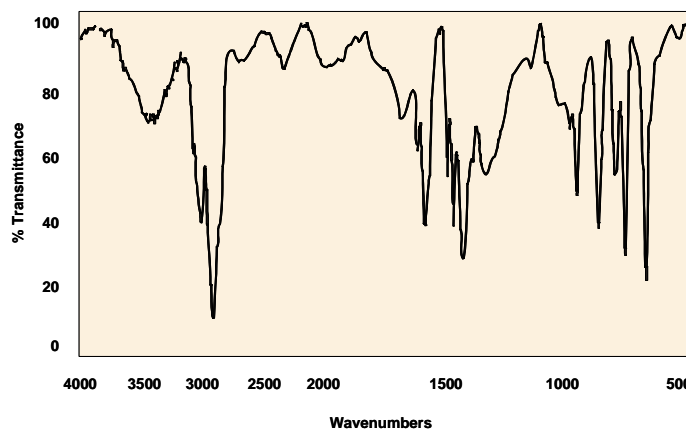


Table I: Percent swelling of Amberlite XAD1600N polymeric adsorbent in various solvents (Water: Solvent)

Solvent	% Increase from as-received volume
Methanol	15-20
2-propanol	15-20
Acetone	15-20
p-Xylene (via methanol)	20-25

PRETREATMENT

AMBERLITE XAD1600N polymeric adsorbent is shipped as a water wet product imbibed with sodium chloride (NaCl) and sodium carbonate (Na₂CO₃) salts to retard 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.

REGENERANTS / 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 oxidising 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.

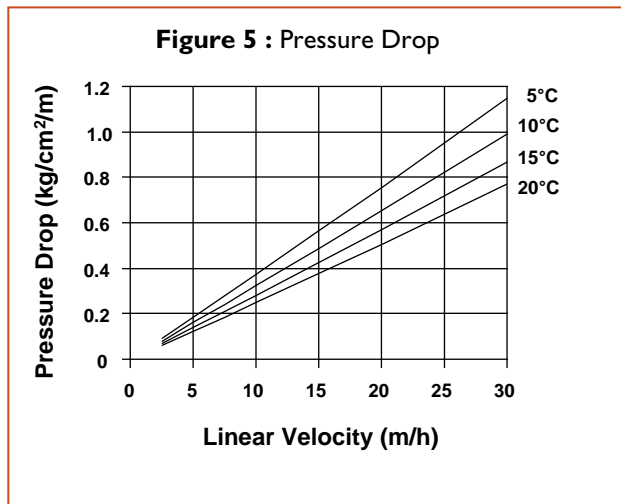
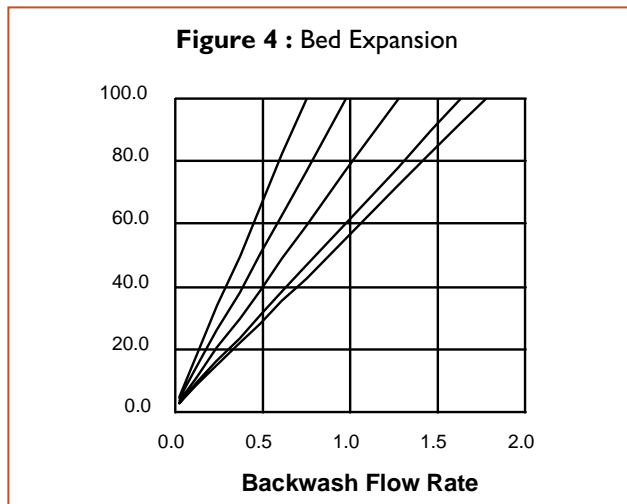
FDA CLEARANCE

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 flow rate and water temperature. Figure 5 shows the pressure drop

for AMBERLITE XAD1600N, as a function of service flow rate and water temperature. Pressure drop data are valid at the start of the service run with a clear water and a correctly classified bed.



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.

All our products are produced in ISO 9001 certified manufacturing facilities.

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Ion exchange resins and polymeric adsorbents, as produced, contain by-products resulting from the manufacturing process. The user must determine the extent to which organic by-products must be removed for any particular use and establish techniques to assure that the appropriate level of purity is achieved for that use. The user must ensure compliance with all prudent safety standards and regulatory requirements governing the application. Except where specifically otherwise stated, Rohm and Haas Company does not recommend its ion exchange resins or polymeric adsorbents, as supplied, as being suitable or appropriately pure for any particular use. Consult your Rohm and Haas technical representative for further information. Acidic and basic regenerant solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. Nitric acid and other strong oxidising agents can cause explosive type reactions when mixed with Ion Exchange resins. Proper design of process equipment to prevent rapid buildup of pressure is necessary if use of an oxidising agent such as nitric acid is contemplated. Before using strong oxidising agents in contact with Ion Exchange Resins, consult sources knowledgeable in the handling of these materials.

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