



AMBERLITE® XAD16

Industrial Grade Polymeric Adsorbent

PRODUCT DATA SHEET

AMBERLITE XAD16 is a polymeric adsorbent supplied as insoluble white beads. It is a nonionic, hydrophobic, crosslinked polymer which derives its adsorptive properties from its patented macroreticular structure (containing both a continuous polymer phase and a continuous pore phase), high surface area, and the aromatic nature of its surface (see figure 1). AMBERLITE XAD16 polymeric adsorbent issued

to adsorb hydrophobic molecules from polar solvents and volatile organic compounds from vapor streams. Its characteristic pore size distribution makes AMBERLITE XAD16 polymeric adsorbent 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.

PROPERTIES

Matrix _____	Macroreticular aliphatic crosslinked polymer
Physical form _____	White translucent beads
Moisture holding capacity ^[1] _____	62 to 70 %
Shipping weight _____	720 g/L
Specific gravity _____	1.015 to 1.025
Particle size _____	
Harmonic mean size _____	0.56 - 0.71 mm
Uniformity coefficient _____	≤ 2.0
Fines content ^[1] _____	< 0.350 mm : 2.0 % max
Coarse beads _____	> 1.18 mm : 2.0 % 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 _____	75 cm (Capture)
Flow rate _____	
Loading _____	2 to 16 BV*/h
Displacement _____	1 to 4 BV/h
Regeneration _____	1 to 4 BV/h
Rinse _____	2 to 16 BV/h

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

PROPERTIES (CONTD.)

Figure 1 : Chemical structure of
AMBERLITE XAD16 polymeric adsorbent

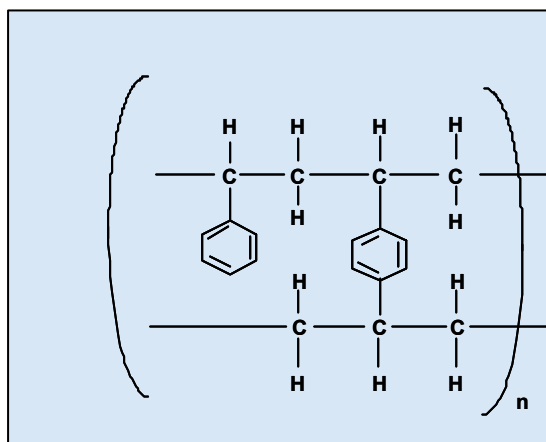


Figure 2 : Pore distribution of
AMBERLITE XAD16 polymeric adsorbent

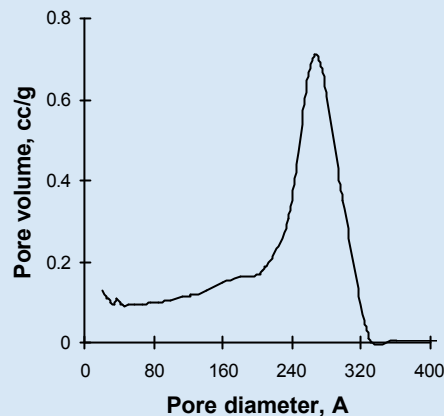


Figure 3 : Infrared Spectrum
of Amberlite XAD16
polymeric adsorbent

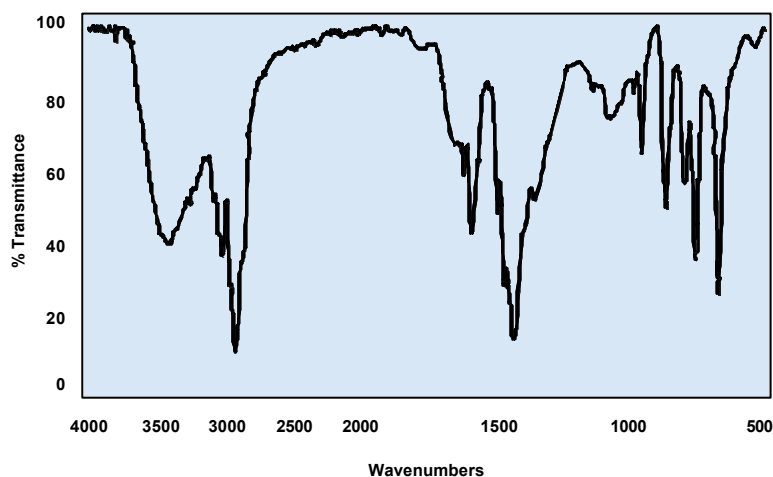


Table 1: Percent swelling of Amberlite XAD16 polymeric adsorbent in various solvents (Water: Solvent)

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

PRETREATMENT

AMBERLITE XAD16 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 XAD16 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, enzymes , amino acids and proteins.**

AMBERLITE XAD16 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 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, such as phenol, from polar solvents.**

These types of applications can be considered a simple capture step where the adsorbent resin is used to remove a small number of solutes from a process stream, often a waste stream. AMBERLITE XAD16 will prove useful in this type of application where the size of the solute is relatively large (> 200 D) and where the

operating capacity on AMBERLITE XAD4 may be lower.

- **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.
- Concentrated 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 XAD16 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 XAD16 as a function of backwash flow rate and water temperature. Figure 5 shows the pressure drop for

AMBERLITE XAD16, 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.

Figure 4 : Bed Expansion

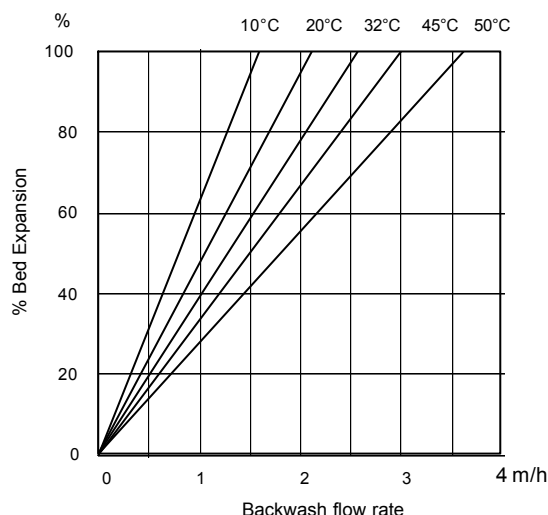
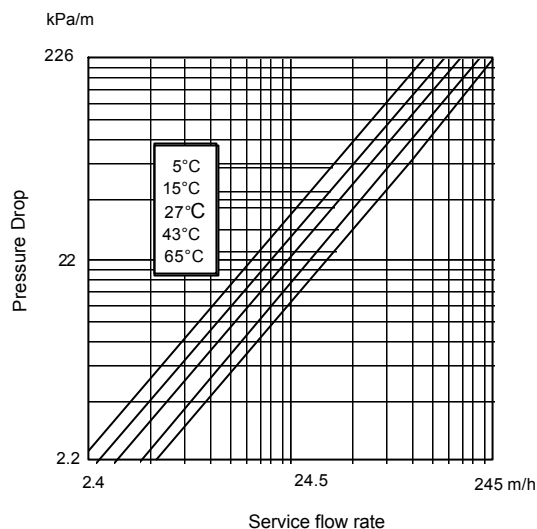


Figure 5 : Pressure Drop



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.

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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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