Product Data Sheet

AmberLite™ XAD™1180N Polymeric Adsorbent

Macroporous, Adsorbent Resin

Description

AmberLite™ XAD™1180N Polymeric Adsorbent is supplied as insoluble white beads. It is a non-ionic, hydrophobic, crosslinked polymer which derives its adsorptive properties from its patented 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). This structure also gives AmberLite™ XAD™1180N excellent physical, chemical, and thermal stability.

AmberLite™ XAD™1180N can be regenerated and used through repeated cycles, in either column or batch modes, to adsorb hydrophobic molecules from polar solvents. Its characteristic pore size distribution makes AmberLite™ XAD™1180N an excellent choice for the selective separation of a wide variety of large organic molecules from aqueous solutions or polar solvents such as plant extracts, antibiotics, and fermentation products.

Applications

- Recovery and purification of antibiotics, water-soluble steroids, enzymes and proteins
- Recovery of plant extracts
- Enzyme immobilization
- Separation of non-polar organic solutes from polar solvents
- Scavenger or pre-column

Form No. 45-D00777-en, Rev. 2
January 2020

Typical Properties

Physical Properties	
Matrix	Macroporous, crosslinked DVB
Type	Adsorbent
Functional Group	None
Physical Form	White, opaque, spherical beads
Nitrogen BET	
Surface Area	~500 m^2/g
Average Pore Diameter	~400 Å
Total Pore Volume	~1.4 mL/mL
Chemical Properties	
Ionic Form as Shipped	Not applicable
Total Exchange Capacity	Not applicable
Water Retention Capacity	61 – 67%
Particle Size [§]	
Particle Diameter	350 – 600 µm
< 250 µm	≤ 5.0%
> 850 µm	≤ 10.0%
Swelling (in solvent)	
Methanol	10%
2-Propanol	15%
Acetone	10%
p-Xylene (via methanol)	10%
Density	
Particle Density	1.015 – 1.025 g/mL
Shipping Weight	~660 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

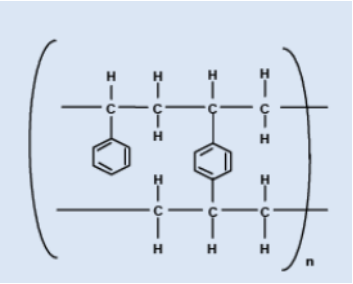


Figure 2: Pore Distribution

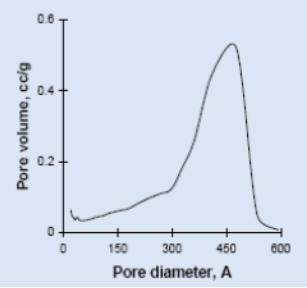
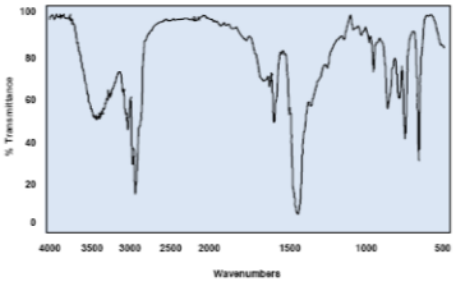


Figure 3: Infrared Spectrum



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Suggested Operating Conditions

Maximum Operating Temperature	150°C (302°F)
pH Range (Stable)	1 – 14
Bed Depth, min.	
Capture	750 mm (2.5 ft)
Chromatography	1500 mm (4.9 ft)
Flowrates	
Loading	2 – 16 BV*/h (usually)
Elution/Desorption	1 – 4 BV/h
Regeneration	1 – 4 BV/h
Rinse	1 – 8 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 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 when adsorption is from an ionic solution • Hot nitrogen or steam for volatile materials

* 1 BV (Bed Volume) = 1 m^3 solution per m^3 resin or 7.5 gal per ft^3 resin

Hydraulic Characteristics

Estimated bed expansion of AmberLite™ XAD™1180N Polymeric Adsorbent as a function of backwash flowrate and temperature is shown in Figure 4.

Estimated pressure drop for AmberLite™ XAD™1180N 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 – 60°C (50 – 140°F)

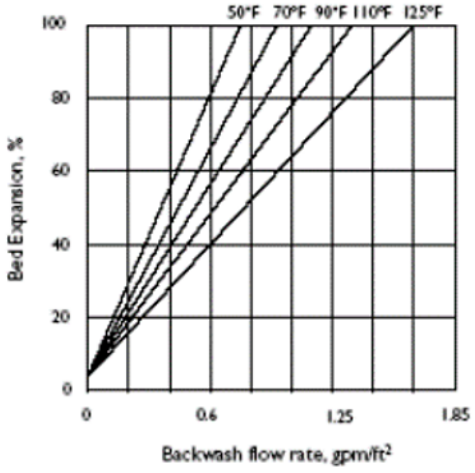
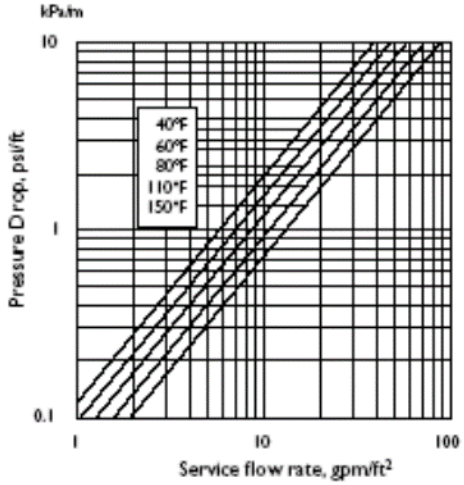


Figure 5: Pressure Drop

Temperature = 4.4 – 65.6°C (40 – 150°F)



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Application Information

Pretreatment

AmberLite™ XAD™1180N Polymeric Adsorbent is shipped as a water-wet product imbibed with sodium chloride (NaCl) and sodium carbonate (Na_2CO_3) 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, and proteins

AmberLite™ XAD™1180N Polymeric Adsorbent can be considered as a general-purpose resin for these types of applications where relatively large solutes (> 1000 Da) are to be adsorbed. In these types of applications, 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.

Recovery of plant extracts

The relatively large pores of AmberLite™ XAD™1180N Polymeric Adsorbent allow complex molecules to be adsorbed within its structure. Loading is performed at relatively low flowrates (0.5 – 2 BV/h). Elution tends to be performed with solvents at low temperatures or with steam, depending on the stability of the molecule of interest.

Enzyme immobilization

The relatively large pores of AmberLite™ XAD™1180N Polymeric Adsorbent make this resin an ideal candidate for the immobilization of enzymes.

Separation of non-polar organic solutes from polar solvents

AmberLite™ XAD™1180N Polymeric Adsorbent would be a useful candidate for study if the solutes have a large molecular weight which resulted in a low operating capacity for either AmberLite™ XAD™16N or AmberLite™ XAD™4 Polymeric Adsorbents. An example of this type of application would be the removal of high molecular weight color from a process stream.

Scavenger or pre-column

Due to the large pore and better kinetics, AmberLite™ XAD™1180N Polymeric Adsorbent has been studied as a scavenger or pre-column in front of the main adsorption column, particularly when using AmberLite™ XAD™1600N Polymeric Adsorbent.

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.

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