ROHM AND HAAS

# AMBERLITE™ XAD7HP Industrial Grade Polymeric Adsorbent

## Description

AMBERLITE XAD7HP is a polymeric adsorbent, supplied as white insoluble beads. It is a non ionic aliphatic acrylic 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 aliphatic nature of its surface (Figure 2). This macroreticular structure also gives AMBERLITE XAD7HP polymeric adsorbent excellent physical and thermal stability. Due to its aliphatic nature, AMBERLITE XAD7HP polymeric adsorbent can adsorb non polar compounds from aqueous systems, and can also adsorb polar compounds from non-polar solvents.

## Typical Properties

These properties are typical but do not constitute specifications.

| | |
|---|---|
| Matrix | Macroreticular aliphatic crosslinked polymer |
| Physical form | White translucent beads |
| Moisture holding capacity [1] | 61 to 69 % |
| Shipping weight | 655 g/L |
| Specific gravity | 1.06 to 1.08 |
| Particle size | |
| Harmonic mean size | 0.56 - 0.71 mm |
| Uniformity coefficient | ≤ 2.0 |
| Fines content [1] | < 0.300 mm : 7.0 % max. |
| Coarse beads | > 1.18 mm : 8.0 % max. |
| Maximum reversible swelling | see Table 1 |
| Surface area [2] | ≥ 380 $m^2/g$ |
| Porosity [2] | ≥ 0.50 ml/ml |

[1] *Contractual value*

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

## Suggested Operating Conditions

| | |
|---|---|
| pH range | 0 - 14 |
| Maximum temperature limit | 80 to 100°C |
| Minimum bed depth | 75 cm |
| 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 $m^3$ solution per $m^3$ resin*

Figure 1 : Chemical structure of AMBERLITE XAD7HP polymeric adsorbent

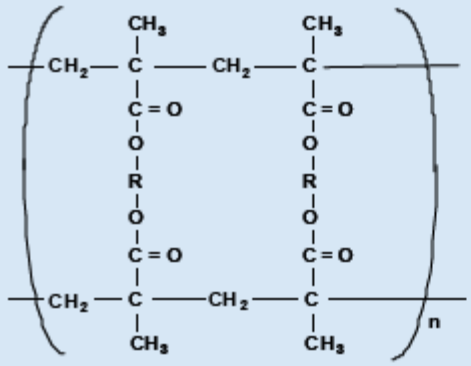



Figure 2 : Pore distribution of AMBERLITE XAD7HP polymeric adsorbent

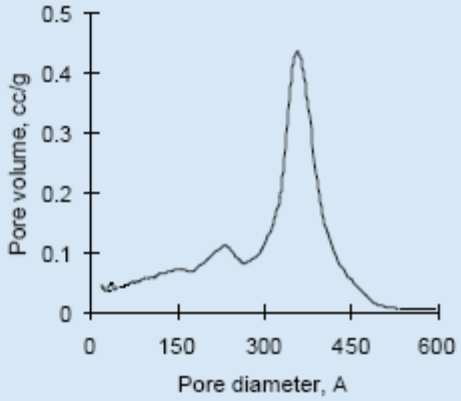



Figure 3 : Infrared Spectrum of Amberlite XAD7HP polymeric adsorbent

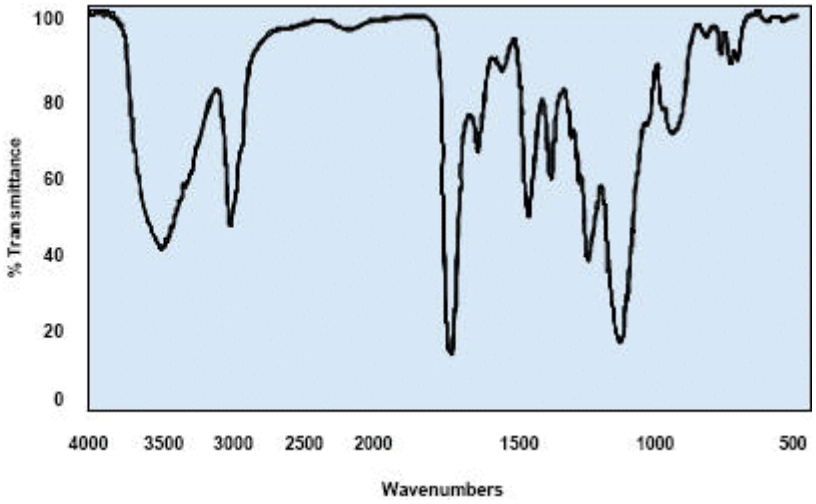



**Table 1:** Percent swelling of Amberlite XAD7HP polymeric adsorbent in various solvents (Water: Solvent)

| Solvent | % Increase from as-received volume |
|---|---|
| Methanol | < 5 |
| 2-propanol | < 5 |
| Acetone | < 5 |
| p-Xylene (via methanol) | 1 |

## Pretreatment

AMBERLITE XAD7HP polymeric adsorbent is shipped as a water wet product imbibed with sodium chloride (NaCl) and sodium carbonate ($Na_2CO_3$) 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 XAD7HP 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

- **Removal of relatively polar compounds from nonaqueous solvents.**

  Due to the chemical nature of its surface, AMBERLITE XAD7HP has proved a useful adsorbent for slightly polar compounds from nonpolar solvents such as MIBK etc. In these applications, the regeneration is efficiently performed with a NaOH solution.

- **Removal of non-aromatic compounds from polar solvents.**

  Based on the principal that “like attracts like,” AMBERLITE XAD7HP can be used to adsorb compounds which have a similar chemical structure from an aqueous solution. Proposed compounds would be ester, ketones or aliphatic molecules.

- **Recovery of plant extracts.**

  The relatively large pores of AMBERLITE XAD7HP make it an ideal candidate for the adsorption of large molecules from plant extracts or other natural sources. Elution and/or regeneration can be performed either with solvents, buffers or steam depending on the type of molecule under consideration.

- **Recovery of antibiotics, enzymes and proteins.**

  Due to the chemical nature of its surface, AMBERLITE XAD7HP is the choice for the adsorption of peptides & proteins which would otherwise be damaged by adsorption onto an aromatic adsorbent such as AMBERLITE XAD16 or AMBERLITE XAD1180. Similarly, small molecules lacking halogen atoms or many C=C bonds could be adsorbed by AMBERLITE XAD7HP.

- **Removal of organic pollutants from aqueous wastes, ground water and vapor streams.**

  AMBERLITE XAD7HP is used for decolorization of bleach plant effluents from kraft pulp mills.

- **Enzyme immobilization.**

  The relatively large pores of AMBERLITE XAD7HP make this resin a ideal candidate for the immobilization of enzymes.

## 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.

## Hydraulic Characteristics

Figure 4 shows the bed expansion of AMBERLITE XAD7HP as a function of backwash flow rate and water temperature.

Figure 5 shows the pressure drop for AMBERLITE XAD7HP 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**

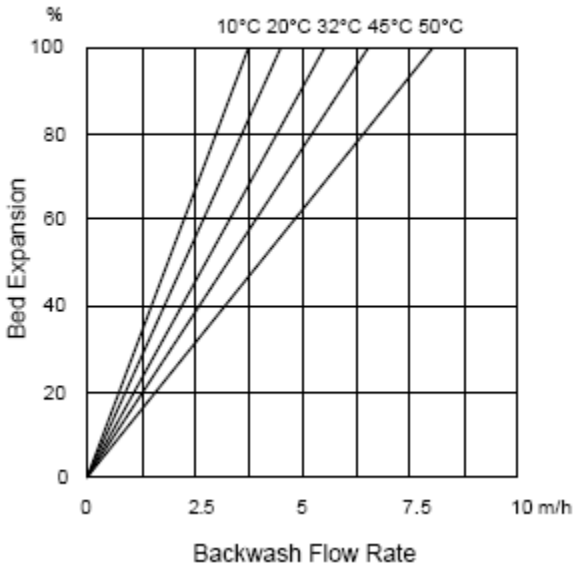
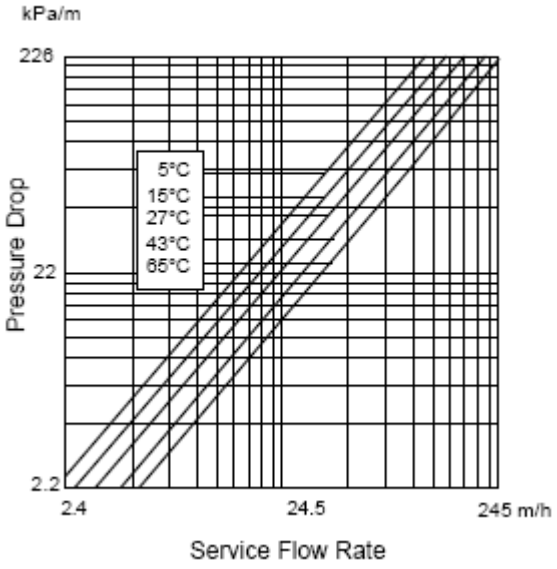



**Figure 5 : Pressure Drop**




## 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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