Amberlite XAD-2 Polymeric Adsorbent

Product Specification

Amberlite® XAD®-2 polymeric adsorbent is a hydrophobic crosslinked polystyrene copolymer resin, supplied as 20-60 mesh size white insoluble beads. The resin is widely used to adsorb soluble organic compounds from aqueous streams and organic solvents, generally in cyclic columnar operations. Amberlite XAD-2 resin is characterized by its unique macroreticular porosity, broad pore size distribution and large surface area (Table 1), and a chemically homogeneous nonionic structure that differentiates it from most other adsorbents. It has unusually good physical durability and is stable at temperatures as high as 200°C.

Table 1. Typical Physical Properties of Amberlite XAD-2 Resin

Appearance:	hard, spherical opaque beads
Solids:	55%
Porosity:	0.41mL pore/mL bead
Surface Area (Min.):	300m^2/g
Mean Pore Diameter:	90Å
True Wet Density:	1.02g/mL
Skeletal Density:	1.08g/mL
Bulk Density:	40lb/ft^3 (640g/L)

Commercial applications for Amberlite XAD-2 resin include removal of antibiotics, organic nitrogen, grease, and various aromatic compounds from aqueous streams. In addition, the resin is used to remove various organics from hydrogen peroxide and coloring compounds from alkanol amines. Specially cleaned Amberlite XAD-2 resin, commercially available as Supelpak™-2 or Supelpak-2B resin*, is used in sensitive analytical procedures to detect, identify, and measure pesticides, PAHs, and other organics in the environment. These analytical methods have led to the use of Amberlite XAD-2 for pesticides removal in plant-scale waste treatment. It also is used to detect narcotics in blood or urine, and to concentrate organics for further analysis by gas chromatography or other methods.

Adsorption Process

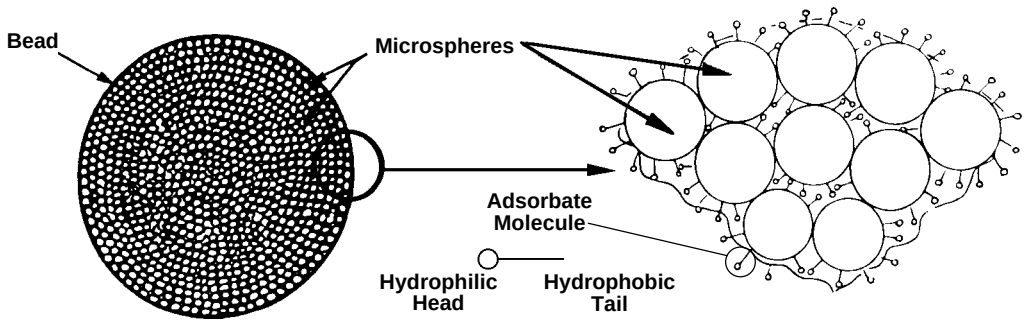
A single bead of Amberlite XAD-2 resin is shown schematically in Figure A. Each bead consists of an agglomeration of many very small microspheres, giving a continuous gel phase and a continuous pore phase. The open-cell porous structure allows water to penetrate the pores easily.

In the adsorption process, the hydrophobic portion of the adsorbate molecule is preferentially adsorbed on the hydrophobic polystyrene surface of the resin, while the hydrophilic section of the adsorbate remains oriented in the aqueous phase. Compound(s) being adsorbed ordinarily do not penetrate substantially into the microsphere phase, but remain adsorbed at the surface. Therefore, with proper elution or regeneration techniques, the adsorbed compound can be rapidly eluted, because of the high rate of diffusion of the elution mobile phase through the porous structure of each bead. Since the compound is bound to the outer and inner surfaces of the beads, penetration or solvation of the microspheres by the eluting agent is neither involved nor necessary.

The selectivity and extent of adsorption of soluble organic compounds by Amberlite XAD-2 resin increases as the hydrophobicity of the adsorbate molecule increases. The adsorption forces are primarily van der Waals type. Thus, you can change the extent of adsorption of a compound by changing its hydrophobic/hydrophilic balance. For example, weak acids are more strongly adsorbed in the acid form than in the salt form. A weak acid then can be eluted with caustic soda (sodium hydroxide). Likewise, fatty amines are strongly adsorbed in the free base form and are eluted with acid.

With other materials, such as alkylbenzene sulfonate, the resin can be regenerated with hot water. At higher temperatures alkylbenzene sulfonate is more soluble and has less affinity for the resin surface. In yet other cases, polar solvent(s)/water mixtures are very effective elution mobile phases when such solvents have greater affinity for the adsorbed compounds than does the resin.

Figure A. Structure of a Hydrophobic, Macroreticular Amberlite XAD-2 Resin Bead



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Conditioning

We recommend conditioning Amberlite XAD-2 resin prior to using it, to remove all traces of preservative agents and residual monomeric compounds. A water wash will remove the preservative agents, then methanol can be used to remove the water and light monomers. If other organic solvents will be used in the elution process, the resin also should be conditioned with these materials. For instructions on column packing, flow rates, etc., refer to the data sheet accompanying the resin.

Precautions

Acidic and basic regenerating solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. The hazards of other organic solvents should be recognized and steps taken to control exposure.

Do not use concentrated nitric acid or other strong oxidizing agents with these resins. Such reagents can readily react with polystyrene type resins, even at room temperature, causing exothermic reactions.

Swelling can occur during operations with macroreticular adsorbents, particularly when nonpolar solvents are used for conditioning and elution. The swelling that occurs with the use of polymeric adsorbents in narrow glass columns can cause laboratory accidents. Refer to the instruction sheet included with the resin, or contact our Technical Service department at 800-359-3041 or 814-359-3041 for instructions on how to pack and use a glass column with Amberlite XAD-2 resin.

*For information about Supelpak-2 resin ask for Application Note 86 (Pub. No. 395086).

Ordering Information:

Description	Cat. No.
Amberlite XAD-2 Resin▲	
100g	**20275**
500g	**10357**
Supelpak-2 Resin	
100g	**20279**
Supelpak-2B Resin	
100g	**13670**

Trademarks

Amberlite, XAD – Rohm & Haas Co.

Supelpak – Sigma-Aldrich Co.

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Contact our Technical Service Department (phone 800-359-3041 or 814-359-3041, FAX 800-359-3044 or 814-359-5468) for expert answers to your questions.

For more information, or current prices, contact your nearest Supelco subsidiary listed below. To obtain further contact information, visit our website (www.sigma-aldrich.com), see the Supelco catalog, or contact Supelco, Bellefonte, PA 16823-0048 USA.

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