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Product Information

AMBERLITE XAD POLYMERIC RESINS
Sigma Prod. Nos. XAD-4, XAD-7, XAD-16,
1-0377, 1-0393, and 1-0379

XAD-7 is a Replacement for Product Code 21,649-6

PHYSICAL DESCRIPTION:

Appearance: White translucent beads, sometimes with faint yellow cast

STORAGE / STABILITY AS SUPPLIED:

Amberlite¹ resins are stable for years stored at room temperature. They may be shipped as waterwet products with sodium chloride and sodium carbonate salts to retard bacterial growth. These salts must be washed from the adsorbent prior to use.

GENERAL REMARKS:

Three parameters affect binding capacity of a resin for a particular material. The dipole moment, the pore size and the surface area. The material to be adsorbed must be able to migrate through the pores to the adsorbing surface. For adsorbents of equal pore size, a larger surface area has higher capacity for solute. There is an inverse relationship between surface area and pore size: the smaller the pore size the greater the surface area. On the following page is a table of comparative physical data. More detailed information for each resin is available on request.

The nonpolar XAD resins are generally used for adsorption of organic substances from aqueous systems and polar solvents. For hydrophobic compounds up to MW 20,000, XAD-2 has been widely used, but it was discontinued by Rohm and Haas.²

Currently suggested:

1. for relatively low molecular weight (MW), XAD-4
2. for small to medium MW, XAD-16
3. for relatively large MW organics, X1180.

XAD-2 and XAD-16 have been used for removal of detergents from protein solutions. The capacity for XAD-2 for Triton X-100 was reported as 0.37 g per g dry resin (1.91 g of hydrated resin).^{3,4} Most XAD resins are nonpolar and may be used over a pH range of 0-14, with maximum usage temperature 480°F.

XAD-7 is the only "moderately polar" XAD resin now available. It has been used to remove relatively polar compounds from non-aqueous solvents, and to remove non-aromatic compounds from polar solvents. It has been used for removal of organic pollutants from aqueous wastes, ground water and vapor streams. The pH range is 0-14, with maximum usage temperature 300°F. A similar product is Diaion HP2MG, having larger pore diameter, but very similar in surface area.

An extensive literature survey from 1987 to 1991 is available from Supelco as product number T412139. They are available from Supelco's Order Entry (800-247-6628-) or Technical Service (800-359-3041).

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REGENERATING AND ELUTING AGENTS:

These resins are usually regenerated using methanol or other water-miscible organic solvents (acetone, isopropanol, etc.) If weak acids have been adsorbed, dilute base (0.1-0.5% NaOH) is effective; conversely, if bases have been absorbed, dilute acid (0.1-0.5% HCl) is suggested. Water can be used after adsorption is from an ionic solution. Hot water or steam is often helpful for volatile materials.⁵

Resins should be thoroughly washed before first use.

REFERENCES:

1. Amberlite is a trade name of Rohm and Haas Company.
2. XAD-2 is still available in research quantities from Supelco as # 2-2075 and #2-0279 (environmental testing grade).
3. *Anal. Biochem.*, 53, 304 (1973).
4. Supplier information for XAD-2.
5. Supplier information sheets.

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RESIN	CAS NUMBER	CHEMICAL NATURE	DRY DENSITY (vs. wet) (g/mL)	SURF. AREA (sq. m/g)	PORE DIAM, AVE (Angstroms).	WEST MESH SIZE (nomimal)	PORE VOL. (mL/g)
XAD-2	9060-05-3	Hydrophobic polyaromatic (dipole moment 0.3) Used to remove hydrophobic compounds up to 20,000 MW	1.07 (1.02)	330	90	20 to 60	0.65
XAD-4	37380-42-0	Hydrophobic polyaromatic (dipole moment 0.3) Used to remove small hydrophobic compounds, surfactants; widely used in pharmaceutical manufacturing; used to remove chlorinated organics, pesticides, etc.	1.08 (1.02)	725	50	20 to 60	0.98
XAD-16	104219-63-8	hydrophobic polyaromatic (dipole moment 0.3) Used to remove hydrophobic compounds up to 40,000 MW; separation of large organic molecules, especially proteins. More efficient than XAD-2 (higher surface area).	1.08 (1.02)	900	100	20 to 60	1.82
XAD-1180 1-0377	9003-69-4	hydrophobic polyaromatic (less polar than XAD-4) Similar in application to XAD-4 in purification of enzymes, antibiotics, etc.	1.04 (N/A)	600	300	20 to 60	1.68
XAD-200 1-0393	N/A	hydrophobic polyaromatic Has been used in pharmaceutical manufacturing to adsorb steroids, amino acids, polypeptides, antibiotics from process streams	1.09 (N/A)	580	42	20 to 60	0.64
XAD-2010 1-0379	N/A	hydrophobic polyaromatic Formerly called AXT-204 Broad spectrum molecular weight range; used with biomolecules and pharmaceuticals	1.09 (N/A)	660	280	20 to 60	1.80
XAD-7	37380-43-1	Acrylic ester (dipole moment 1.8) Used to adsorb molecules up to MW 60,000; insulin recovery, metal ions, dry waste, organic removal and recovery; antibiotic recovery	1.24 (1.05)	450	90	20 to 60	1.14