ROHM AND HAAS

AMBERLITE™ FPC3500

Synthetic Cation Exchange Resin

Description

AMBERLITE FPC3500 is a synthetic cation exchange resin produced in the form of spherical, white, opaque beads. The unusually high exchange capacity is derived from carboxylic acid groups.

Supplied in the hydrogen or “free-acid” form, AMBERLITE FPC3500 can be converted readily to the sodium form by treatment with a solution of sodium hydroxide. In the sodium form, the resin undergoes reactions typical of the salt of a weak acid and strong base.

Because of its selectivity for the hydrogen ion, any adsorbed cation can be desorbed easily with a regeneration efficiency approaching 100% by treatment with dilute mineral acid.

The carboxylic functionality and exchange selectivities of AMBERLITE FPC3500 lead to immediate consideration of this ion exchange resin in a variety of applications such as the neutralisation of strong bases, the recovery of metallic ions, the isolation and concentration of antibiotics, basic amino acids, enzymes and peptides.

Typical Physical Properties

These properties are typical but do not constitute specifications.

Physical form	White spherical opaque beads
Ionic form as shipped	H^+
Total exchange capacity	≥2.6 meq/ml (H^+ form)
Moisture holding capacity	60 to 70% (H^+ form)
Harmonic mean size	0.45 - 0.65 mm
Uniformity coefficient	≤2.0
Fines content	<0.300 mm : 8.0% max
Coarse beads	>1.180 mm : 5.0% max
Maximum reversible swelling	$H^+ \rightarrow Na^+$: ~ 110%

Suggested Operating Conditions

Typical pH conditions	2 to 12	
Typical loading flowrate	1 to 2 BV*/h	
Typical operating temperature	20 to 40°C	
Minimum bed depth	750 mm	
Backwash flow rate	5 to 7.5 BV*/h	
Regenerants (100% basis)	HCl or	H_2SO_4
Concentration (%)	2 to 5	0.5 to 0.7
Flow rate (BV/h)	0.25 to 1.0	1.9 to 5.0
Rinse water requirements	4 to 7 BV	
Service flow rate	8 to 16 BV*/h	
Maximum operating temperature	80°C	

** BV (Bed Volume) = 1 m^3 solution per m^3 resin*

Physical Stability

Effect of Temperature

The rate of exchange and the affinity for hydrogen (H^+) increase as operating temperatures are elevated. The maximum recommended operating temperature is 80°C.

Attrition

Extended laboratory and field experience has shown that AMBERLITE FPC3500 has excellent attrition resistance. In standard acid/base microcycling testing, there is effectively no physical breakdown after 90 cycles.

Chemical Stability

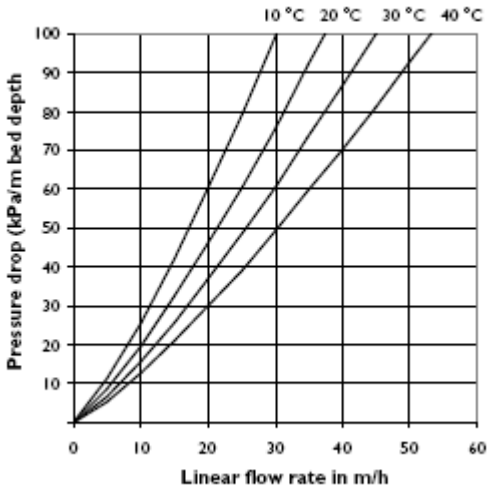
AMBERLITE FPC3500 is stable in the presence of strong alkalis and acids, aliphatic and aromatic solvents. On prolonged contact with certain organic solvents, the resin swells to some extent, but no disintegration of the exchanger beads has been observed.

Operational Characteristics

Pressure Drop

The approximate drop in pressure to be expected for each meter of bed depth of AMBERLITE FPC3500 in normal downflow operation at various rates and temperatures is indicated by the data in figure 1.

Figure 1: Pressure drop



Hydraulic Expansion

To ensure proper cleaning and hydraulic classification of AMBERLITE FPC3500 after each operational cycle, the bed of resin should be backwashed with water for about 10 minutes at a flow rate sufficient to effect a minimum of 50% expansion in bed volume.

The hydraulic expansion of the bed during backwashing operations is reported as a function of the flow rate at various temperatures in the following figures. Values for the hydrogen and sodium forms are used in the example.

Figure 2: Bed Expansion (Na^+ form)

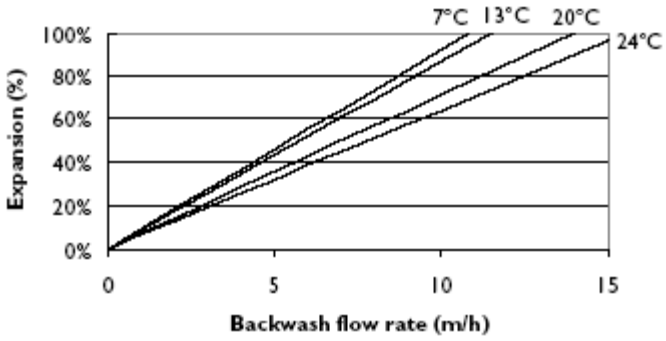
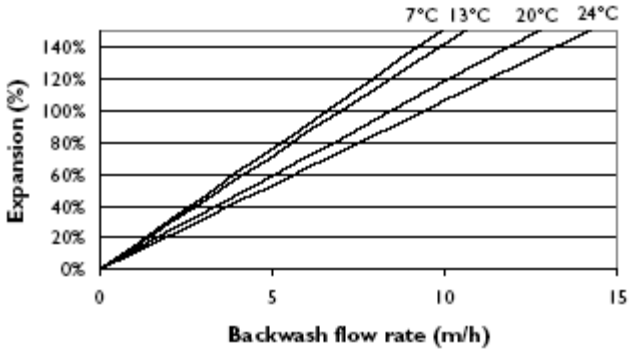


Figure 3: Bed Expansion (H^+ form)



Exchange Capacity

The total exchange capacity of AMBERLITE FPC3500 is attainable only at pH values that are greater than 7. In strongly alkaline media, it is possible to utilize all of the carboxylic acid groups calculated to be present in the resin matrix.

Limits of Use

Rohm and Haas manufactures special resins for food processing and potable water applications. As governmental regulations vary from country to country, it is recommended that potential users seek advice from their AMBERLITE representative in order to determine the best resin choice and optimum operating conditions.

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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