

Bench Testing Ion Exchange Resins

This technical data sheet offers a brief description and general directions for bench scale applications testing of ion exchange resins. This simple approach is excellent for wastewater and process applications. The goal of setting up any bench scale test is to simulate the actual system. The results obtained should be used as a guideline for further testing or a pilot study.

Apparatus Set-up: Any number of “columns” can be used to bench test ion exchange resin. The goal is to set it up in a way to:

- Prevent resin from leaving the column
- Control flow through the column
- Vertically affix for ease of testing
- Easily get the resin in and out of the column

A burette, plastic pipe, or a resin cartridge are all acceptable ways to bench test resin. Glass wool or some sort of screen will be necessary to prevent the resin from flowing out of the bottom of the column. Use flexible tubing with a clamp or small ball valve to control the flow through the bottom of the column. A funnel is recommended for pouring water through the column.

Testing Parameters: Every ion exchange resin specification sheet contains a recommended flow rate for optimum performance. This is expressed in gallons per minute per cubic foot (gpm/cu.ft.). For bench scale tests, it is better to use smaller units of measure, such as milliliters per minute (mL/min).

Depending on the column size, use 25 to 100 mL of resin. The column should have a bed depth of 2” to 3”. For example, if the column has an inner diameter of 1”, to achieve 2” of bed depth, 25.73 mL resin is needed.

It is necessary to convert from gpm/cu.ft. to Bed Volumes/minute (BV/min) to mL/min for the desired volume of resin. For example, most anion resins have a flow recommendation of 2 to 4 gpm/cu.ft. Selecting 3 gpm/cu.ft., this is equal to 0.4 cu.ft./min./cu.ft. (7.48 gals./cu.ft.) or 0.4 BV/min. So, 0.4 BV/min * 25.73 ml

resin bed equals 10.29 mL/min to achieve the recommended flow rate.

Certain applications can and have been designed outside of the recommended flow rates for certain resins. Consult ResinTech’s Technical Service Department for assistance in determining the best flow rate to use.

Preparing The Column: Rinse the column with deionized water to prevent any contamination that can skew test results. This is also an opportunity to get a feel for how open the clamp or valve will need to be to achieve the proper flow rate for the resin bed and column size.

Use a graduated cylinder, preferably plastic, to measure the amount of resin needed. Use deionized water to submerge the resin in the cylinder. Tap the cylinder to settle all of the resin to the bottom. This is called the “Tapped Volume” and is a quick and easy way to determine the amount of resin in the cylinder.

Use liberal amounts of deionized water to transfer the resin from the graduated cylinder to the test column. This is the best way to move the resin from one container to another without affecting the resins capacity or quality.

Testing the Resin: Rinse the column with 5 to 10 BV of the water to be tested prior to sampling. This will remove any deionized water left in the system that could skew the test results. Once this is done, begin the test at the appropriate flow rates and take effluent samples as necessary.

Summary: The procedure outlined above is to act as a guide to perform a successful bench scale test of ion exchange resin. It can be used for a variety of medias and scenarios.

