



DOWEX* Ion Exchange Resins

Available Testing Services For Ion Exchange Resins for the Sweetener Industry

The Dow Chemical Company offers ion exchange resin analysis services for a nominal fee. The following analyses are available for the sweetener industry.

Water Retention Capacity (WRC)

Measurement of the inherent moisture content of the ion exchange resin. A fully hydrated resin sample is centrifuged to remove free water, and the resulting sample is weighed before and after drying to calculate the water content as a percent of the original hydrated resin weight. Elevated water content indicates degradation of the polymer chain, while depressed water content typically results from accumulation of foulants on the resin beads. This test is performed on cation resins while in the H⁺ form, strong base anion resins while in the Cl⁻ form, and weak base anion resins while in the free base form.

Total Exchange Capacity (TEC)

Measurement of the total number of ion exchange sites per volume of resin. Fully regenerated resin is titrated to obtain milliequivalents of capacity per milliliter of resin. For cation resins, this property is reported in the H⁺ form. For strong base anion resins, it is reported in the Cl⁻ form. Weak base anion resin TEC results are reported in the free base form.

Weak Base Capacity (WBC)

Measurement of the number of weak base (tertiary amine) sites available on an anion resin. For weak base anion resins, the WBC is the critical parameter indicating the ability of the resin to remove acids. For strong base anion resins, the WBC is negligible initially but may increase as the salt splitting sites are converted to weak base sites during use. This property is reported for weak base anion resins in the free base form and for strong base anion resins in the Cl⁻ form.

Salt-Splitting Capacity (SSC)

Measurement of the strong base (quaternary amine) sites on the resin. For weak base anion resins, the SSC is a minor component of the capacity; with time SSC is lost due to fouling of the strong base sites. It is important for controlling the swell of the resin, but a SSC that is too high can cause syrup degradation products. For strong base anion resins, the SSC is the major component of the resin capacity. It is these sites which act in concert with the strong acid sites of the cation resin to perform mixed bed polishing. This property is reported for strong base anion resins in the Cl⁻ form and for weak base anion resins in the free base form.

Weak Base Dynamic Test (Op-Cap)

This test is used to measure organic fouling of weak base anion resins by examining resin kinetic performance. It yields two numbers, rinse volume and operating capacity. The test can be critical to understanding resin performance since the resins are used dynamically in the plant. The results can be independent from results under static conditions and are important to a total understanding of resin state. Rinse volume is the amount of water required to rinse the resin down to a conductivity of 50 µS/cm after caustic regeneration. Operating capacity (op-cap) is an indication of the level of organic fouling of the resin. It measures the ion exchange sites used under dynamic conditions that, in our test, stress the kinetics beyond normal operating conditions.

Microscopic Bead Examination

A sample of the resin is placed under the microscope for determination of the physical integrity of the resin and contamination of the bed. Photomicrographs are taken and included with the report.

Testing Available For Additional Fee

Water Retention Capacity as received (WRC as received)

A measurement of the water content of the resin before laboratory regeneration. The weight of the resin is measured before and after drying to calculate the internal water content of the resin. This can be compared against a laboratory regenerated resin.

Total Exchange Capacity as received (TEC as received)

A measurement of the number of ion exchange sites in the regenerated (H⁺ or OH⁻) form as regenerated in your process. This result can be compared against the total exchange capacity after laboratory regeneration to determine the efficiency of regeneration.

Particle Size Distribution

A sample of the resin is tested with a light blocking device which has been calibrated to determine the particle size distribution of ion exchange resins. The particle size distribution is reported along with a number of particle size distribution parameters.

Percent Capacity in Ionic Form

This test can be performed on any cation resin, but is primarily useful for chromatographic separation resins. A separation resin must be in the desired ionic form for maximum performance. This test analyzes the amount of specific ions on the resin by stripping the metals from the regeneration with acid followed by atomic absorption of the stripped solution and reports the percentage of the sites in the ionic forms. Metal analyses available include: Ca⁺², Mg⁺², K⁺, Na⁺, and Fe⁺² or Fe⁺³.

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DOWEX

Ion Exchange Resins

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Warning: Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.

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