REV 0421

Interpreting Resin Results

This technical data sheet offers brief descriptions and general guidelines for interpreting laboratory resin test results.

CAPACITY TESTS

Resin capacity is reported in milliequivalents per milliliter (meq/mL) or equivalents per liter (eq/L) or milliequivalents per dry gram (meq/G).

The tests results are only an indication of the static capacity of the resin. The actual field operating capacity of the resin is dependent upon the water analysis and the regeneration levels. ResinTech can help determine what the operating capacity of a used resin is once we determine the laboratory capacity and are able to obtain information such as the water analysis and regeneration levels.

Cation resin should be considered for replacement if it has lost more than 15% of its total capacity as measured in the laboratory, and strong base anion resin should be considered for replacement if the laboratory tests show it has lost 50% or more of its salt splitting capacity.

MOISTURE RETENTION

The percent moisture of a resin sample that is measured in the lab can be compared with typical values for new resins of that type to provide a good indication of the chemical changes in the resin structure. Also, in the case of standard cation resins it gives a good indication of the remaining life and physical strength. Most resins are made from styrene and divinylbenzene copolymers. For a standard cation resin the moisture retention number will give an idea of how much divinylbenzene is left in the bead. As the cation resin bead deteriorates with age and oxidation, the divinylbenzene is consumed, the bead will actually swell with water and the percent moisture will increase. In strong acid cation resins there is a fairly direct relationship between operating capacity and moisture retention, as the percent moisture increases, the total capacity decreases.

In the anion resins, especially strong base, oxidation usually degrades the capacity first so that water retention will actually decrease (due to oxidation) before it increases.

When laboratory tests show the percent moisture content of the resin to be above 10% or more of new specifications values, it may soon be time to replace the resin.

WHOLE BEAD COUNT

The whole bead count (WBC) results show the percent of the resin sample that is whole perfect beads, the percent that is whole cracked beads, and the percent that are resin bead fragments.

The WBC is performed microscopically and a representative field of about 100 beads are counted. This information gives an indication of the expected hydraulic properties of the resin. A resin sample that is high in whole perfect beads will exhibit good hydraulics with a corresponding low pressure drop when in service.

Resin samples that have high percentages of cracked and broken beads may not perform well hydraulically and can cause a high pressure drop by impeding the flow of liquid.

When the WBC is 20% or higher broken beads, remedial action may be necessary, such as a thorough backwash and skimming off the top portion of the bed and then topping off the bed with new resin or, in more severe cases, a complete bed replacement.

ORGANIC FOULING

Anion capacity tests are performed before and after an organic foulant cleaning of the resin. If the capacity test results increase significantly after the cleaning (usually a caustic brine solution) then it is probably time to perform the same brine caustic cleaning on the entire resin bed in the field. A similar procedure is used for the detection of iron fouling on a cation resin sample. The comments appearing on the test report form are purely qualitative.

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RECOMMENDATIONS

Before implementing remedial procedures, it is important to analyze the information relevant to the problem that was experienced. For example, if an ion exchange vessel is experiencing high pressure drop and the whole bead count shows only a moderate amount of broken and cracked beads there's a good possibility that the problem is mechanical and not the resin. Many times the operating problems that are experienced are a combination of operating conditions and resin properties (at times synergistic). It is essential that before conclusions are drawn, that the operating conditions, nature of the problem, bed height, and volume of the resin be observed and reported, and that all laboratory tests results are considered together as a whole.

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