LG QuantumPure™ IX Resins

Technical Service Bulletin 913

Troubleshooting Mixed Bed Column

Performance problems in ion exchange systems are usually characterized by shortened useful operating cycles and/or a significant drop in water quality produced by the unit. These conditions usually show up when conductivity or analytical tests indicate the system is failing to meet effluent purity standards or is exhausting before the normal water throughput is reached. Some of the more common reasons for ion exchange performance issues are listed below.

1. Reduced Production Capacity

No.	Possible Cause	Corrective Measure
1	Increase in Raw Water TDS	For short-term increases, increase the regeneration level to boost operating exchange capacity; for long-term increases, consider equipment re-design.
2	Poor Separation of Cation and Anion Exchange Resins	Check the backwash flow rate and temperature. Clumping due to high molecular weight electrolytes in cation and anion exchange resins can be separated by NaOH injection.
3	Poor Mixing After Regeneration	Adjust mixing conditions (mixing time, Air flow rate and pressure) appropriately and check the equipment.
4	Improper Level of Cation and Anion Exchange Resins	Maintain the appropriate resin level with reference to the middle collector.
5	Increase in Rinse Time	Conduct analysis as contamination of the ion exchange resin is suspected.
6	Poor Regeneration	1) Check for equipment failure - Check for leaks in the chemical injection valve- Inspect the inside of the resin column (lower strainer plate, middle collector, etc. 2) Check the quantity and flow rate of the regenerant - Operate with the appropriate regeneration level and flow rate 3) Check regenerant concentration & injection/displacement time.
7	Degradation of Ion Exchange Resin Performance	Analyze the ion exchange resin and consider replacement.
8	Increase in pH (above pH 8) with Cation Leakage	This may result from NaOH contaminating the cation exchange resin during regeneration Increase the flow rate of Blocking Water during anion exchange resin regeneration.
9	Decrease in pH (below pH 6) with Anion Leakage	This may result from HCl or H_2SO_4 contaminating the anion exchange resin during regeneration. Increase the flow rate of Blocking Water during cation exchange resin regeneration, or supplementation of the cation exchange resin level may be necessary.
10	Increase in Silica Leakage	Increase the amount of NaOH injected and check the regeneration temperature.
11	Change in Water Temperature	Ion exchange reactions generally proceed better at higher temperatures, so a decrease in water production can occur with cold feed water temperature.
12	Performance Degradation of Ion Exchange Resins Due to the Influx of Contaminants	If contamination is related to particulate matter, clean the ion exchange resins by extended Backwash & Air scour. For other types of contamination, refer to TSB 909.

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2. Decreased Purity of Produced Water

No.	Possible Cause	Corrective Measure
1	Equipment Failure	Check for faults in conductivity, silica, pH meters, leaks in the chemical injection valves, and inspect inside the resin column (lower strainer, middle collector, etc.) for damage.
2	Poor Mixing After Regeneration	Adjust mixing conditions (mixing time and pressure) appropriately and check the equipment.
3	Improper Level of Cation and Anion Exchange Resins.	Maintain the appropriate resin level with reference to the middle collector.
4	Increase in Rinse Time	Conduct Resin analysis as contamination of the ion exchange resin is suspected.
5	Poor Regeneration	1) Check equipment failure - Inspect the inside of the resin column (lower strainer, middle collector, etc.) for damage. 2) Check the quantity and flow rate of the regenerant - Operate with the appropriate regeneration level and flow rate 3) Check concentration & timing of the regenerant Injection & displacement
6	Degradation of Ion Exchange Resin Performance	Analyze the ion exchange resin and consider replacement. • Perform visual inspection for color changes or broken beads. • Conduct laboratory analysis for exchange capacity and fouling.
7	Increase in pH (above pH 8)	This may result from NaOH contaminating the cation exchange resin during regeneration, increase the flow rate of Blocking Water during anion exchange resin regeneration.
8	Decrease in pH (below pH 6)	1) his may result from HCl or H_2SO_4 contaminating the anion exchange resin during regeneration, increase the flow rate of Blocking Water during cation exchange resin regeneration. 2) Insufficient amount of cation exchange resin - If there is a structural issue due to insufficient design quantity of cation exchange resin, raise the middle collector to increase the amount of cation exchange resin.
9	Increase in Silica Leakage	Increase the amount of NaOH injected and check the regeneration temperature.

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3. Pressure Drop Increase

No.	Possible Cause	Corrective Measure
1	Particle Accumulation in the Resin Bed	Perform extended backwash, typically 30 to 60 minutes.
2	Resin Degradation	Check for resin breakage and replace if necessary. If the resins are soft and mushy like used coffee grounds, the resin may require changing
3	Improper Backwash	Verify and adjust backwash flow rates