

Technical Service Bulletin 912

Troubleshooting of Anion 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 anion ion exchange performance issues are listed below.

1. Reduced Production Capacity

No.	Possible Cause	Corrective Measure
1	Leaking Valves	Leaking backwash inlet valve can affect the outlet quality, misleading one to believe that bed has exhausted. Check all valves for tightness, replace/repair as the case may be.
2	Instrumentation	Check if flow meter & totalizer is working properly. Rectify/Calibrate if found faulty.
3	Regenerant	Check if Alkali quantity, concentration and quality is as specified.
4	Regenerant	Check regenerant flow and timing is maintained during the regeneration cycle. Slow rinse cycle should not be cut short to save time, slow rinse time should be as long as injection time as a minimum.
5	Change in Feed Analysis	Simultaneously check the feed water quality if there is increase in TDS, Chloride or Silica levels. In such case increase the regeneration level.
6	Resin Fouling	Take sample of the Resin for testing. Check for any fouling & carry out de-fouling as per TSB 909
7	Resin Quantity	Please check the resin quantity is as per design or not. The resin level should be visible at the lower glass of the resin column. If level is less, top up with new resin.

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2. High Silica Leakage (Decreased Purity of Produced Water)

No.	Possible Cause	Corrective Measure
1	Leaking Valves	Leaking backwash inlet valve can affect the outlet quality, resulting in Increased silica leakage. Check all valves for tightness, replace/repair as the case may be.
2	Regenerant	Check if caustic quantity, concentration and quality is as specified. Check regenerant flow and timing is maintained during the regeneration cycle. Slow rinse cycle should not be cut short to save time, slow rinse time should be as long as injection time as a minimum.
3	Change in Feed Analysis	Simultaneously check the feed water quality if there is increase in TDS, Chloride or Silica levels. In such case increase the regeneration level.
4	Resin Fouling	Take sample of the Resin for testing. Check for any fouling & carry out de-fouling as per TSB 909
5	Resin Quantity	Please check the resin quantity is as per design or not. The resin level should be visible at the lower glass of the resin column. If level is less, top up with new resin.
6	Na Leakage	Na leakage from SAC column will result in Silica slippage. Double regenerate the SAC column immediately.
7	WBA Underperformance	When WBA -SBA combination is used, it is expected that main load on the SBA column will be CO ₂ and Silica. But if there is SO ₄ or Cl slippage the SBA will be additionally loaded resulting in Silica slippage. Care must be taken while regenerating the WBA resin either in layered bed or separate column.

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3. High Conductivity (Decreased purity of produced water)

No.	Possible Cause	Corrective Measure
1	Inadequate Regeneration	Check if caustic quantity, concentration and quality is as specified. Check regenerant flow and timing is maintained during the regeneration cycle. Slow rinse cycle should not be cut short to save time, slow rinse time should be as much as injection time as minimum.
2	Internals Blocked	Check in all the internals like Inlet distributor, Caustic distributor & bottom collector are distributing/collecting in uniform fashion. Many a times resin fines tend to block the slits.
3	Low Service Flow Rate	Lower than design flow may cause channeling in the resin bed resulting in poor exchange.
4	CO ₂ Leakage from Degasser Tower	Check the degasser blowers are working properly. A well designed/good working Degasser will have only 6 – 10 ppm of CO ₂ . Check free CO ₂ in degassed water. If it is greater than 10 ppm Degasser Tower operations need to be investigated. Normally the PG should show 100mm wc which is indicative of good resistance to Air flow. If pressure is not being maintained, check Degasser tower Raschig/Pall ring column is not disturbed.

4. High pH (Decreased purity of produced water)

No.	Possible Cause	Corrective Measure
1	Short Rinse Time/Caustic Over-injection	Check the slow rinse timing. Correct if less than design. Caustic solution is sticky and it takes time to wash off the excess Caustic from resin beads.
2	Possible Na Leakage from SAC	In case of leakage, double regenerate Cation Bed.

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5. Pressure Drop Increase

No.	Possible Cause	Corrective Measure
1	Faulty Valves	Check if Valves are stuck in the partially closed position. In corrosive environment valves may get stuck.
2	High Flow Rate	Check the flow in flow meter, correct flow to design value.
3	Bottom Collector Choked	Strainer buttons get choked due to resin fines. An extended backwash might help in removing the fines stuck in the strainer button slits. In case it doesn't work, open top manhole & observe the Backwash distribution pattern. It should reveal if bed is choked. If bed is choked, remove the resin, clean strainer buttons/bottom collector screens & reload resin.
4	Organic Fouling	Analyze feed water for Organic matter (OM). In case Organic Matter is present, carry out Caustic Brine wash as per TSB 909.
5	Compacted Bed	If in previous cycles backwash is not properly carried out in case of co-current vessels or more than 7-8 cycles are run without backwash in case of counter current regeneration, bed would get compacted, especially in second scenario. Carry out extended backwash to de-compact the resin bed.
6	Resin Fines	Excessive resin fines will lead to increased pressure drop. Carryout extended backwash & scrape off the top layer of fines & replace with fresh resin.
7	Excessive Resin	Ensure only required volume is filled in the column. Remove excess resin.

6. High Wastewater Generation

No.	Possible Cause	Corrective Measure
1	Organic Matter Influx	Check for Organic Matter (OM) in feed water. Organic fouling leads to longer rinse time. Do alkaline – brine treatment of SBA resin as detailed in TSB 909.
		Caustic-brine (Alkaline brine) treatment is temporary remedy is not to be repeatedly carried out. The resin bead is subjected to physical shock due to continuous and sudden shrinking & expansion leading to premature fines formation. User is advised to address the presence of OM in feed water.

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