



## Recovery of IEx Resins from Plant Upsets

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## **Introduction**

The presentation covers clean up of resin fouled due to the following contaminants:

- Suspended Solids
- Pretreatment Chemicals
- Biological Fouling (Resin Sterilisation)
- Iron Fouling (Cation resins)
- Organic Fouling
- Chemical Precipitation

**OUTLINE PROCEDURES AVAILABLE**  
**FROM ALL LEADING RESIN SUPPLIERS**



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## Suspended Solids – No pretreatment Chemicals

- Source Normal Mains:
1. Crud storm (mains repair)
  2. Inadequate Filtration

Remedy:

Where backwash space / facilities are available i.e. Co-flow regen / Counter flow with full bed backwash facility or external backwash tower.

Extensive backwash - 1 to 2 hours (for gross contamination on large vessels consider backwashing through man way in top dished end!

No backwash facility - Remove resin into skip for clean up!

## Suspended Solids – Pretreatment Chemicals

Source:

1. Pretreatment plant carryover (sludge blanket)
2. Post precipitation after filters

Forms mat on surface – polyelectrolyte can be + charged

Remedy:

Bad contamination – drain bed, get inside and cut up into chunks and physically remove. Try chemical treatment to redissolve solids.  
(Conc. NaOH successfully used on one site) – suggest lab test.

Remove top portion of bed – replace with new resin.

## Biological Fouling / Resin Sterilisation

Biological fouling is not a big issue – biggest problem is incorrect sterilisation procedure – resin damage due to oxidative attack.

Biological fouling not usually an issue on plant which is in regular use and sees regenerant on a regular basis every few hours.

First – find source – sterilise pipework / tanks etc. with aggressive treatment – then turn your attention to resin – If major contamination then replace resin having carried out same aggressive treatment of unit / pipework and valves once removed and before replacing resin.

Sterilisation - Best peracetic acid (low Hydrogen Peroxide content)  
- Suitable for all types of resin.

## Iron Fouling

Usually a problem on plants treating ground waters.

Serious problems on softening resins because 10% brine is not good at achieving reversible removal.

Affects demin plant cations employing low acid regeneration levels and low acid concentrations – so more prone to sulphuric acid regenerated plants than hydrochloric regenerated plants.

Remedy – HCl wash – air agitation helps.

Check internals construction before HCl wash! – Can be an issue.

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## Organic Fouling

Source: Main source of problem, surface waters with high TOC (Total organic carbon) levels and low TDS content.

Also a long term problem on higher TDS waters.

Some basic formulas exist to predict the fouling factors of some waters!

Natural organics – converted to organic acids bind to anion resin which develops long rinse times and reduced capacity!

Caustic Brine is best treatment but really only works if carried out regularly from when the resin is new every 3 to 4 months. Some sites every 6 months.

Some sites historically warm the caustic brine and some add air agitation!

## Organic Fouling

Brine Wash: 160 g/l NaCl with 32 g/l NaOH applied as a 10% brine solution.

Sometimes organics are complexed with iron then:

HCl wash first and then standard caustic brine treatment

All treatments need to be followed with double regeneration to convert anion back to OH form.

Treatment only when long rinse and loss of capacity has become a major issue is rarely cost effective.

## Chemical Precipitation

Chemical precipitation of  $\text{CaSO}_4$  and  $\text{BaSO}_4$  etc. can only be addressed if the precipitation is not significant – surface precipitation.

Precipitation within the beads can rarely be successfully treated and usually means resin replacement.

Acid treatment is usually employed and it is best to try in the lab first.

Sometimes only a portion of the bed is badly affected and so if identified quickly it has occasionally been possible to carry out a partial replacement.



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