ION EXCHANGE RESINS AND ACTIVATED CARBON

RESINTECH

Practical Considerations in the Storage, Use, and Operation of Ion Exchange Resins

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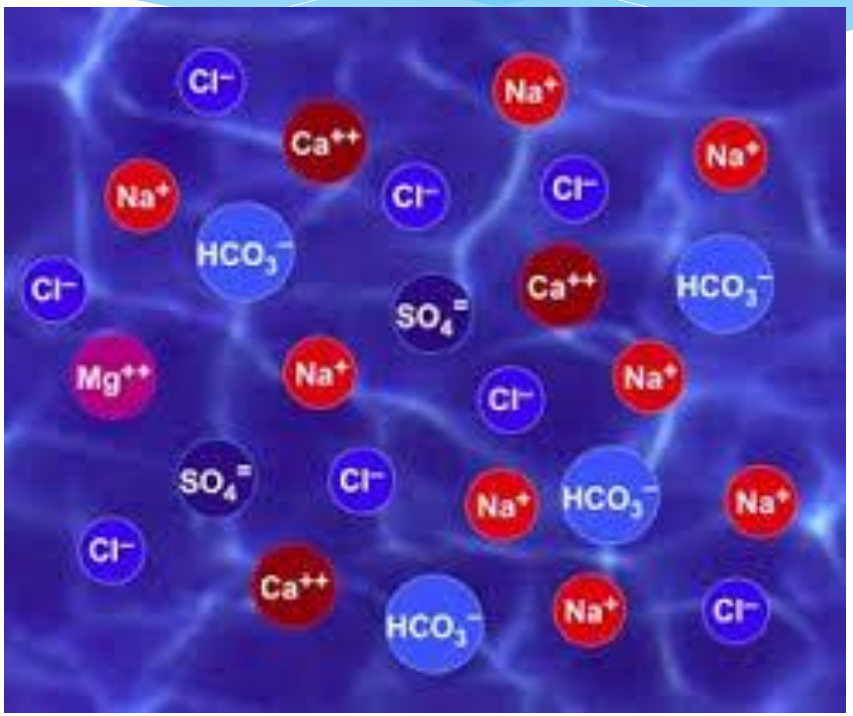
W.R.B.A.
Western Regional Boiler Association

LOPREST
WATER TREATMENT CO.

Terra Blanca Winery

Ion Exchange

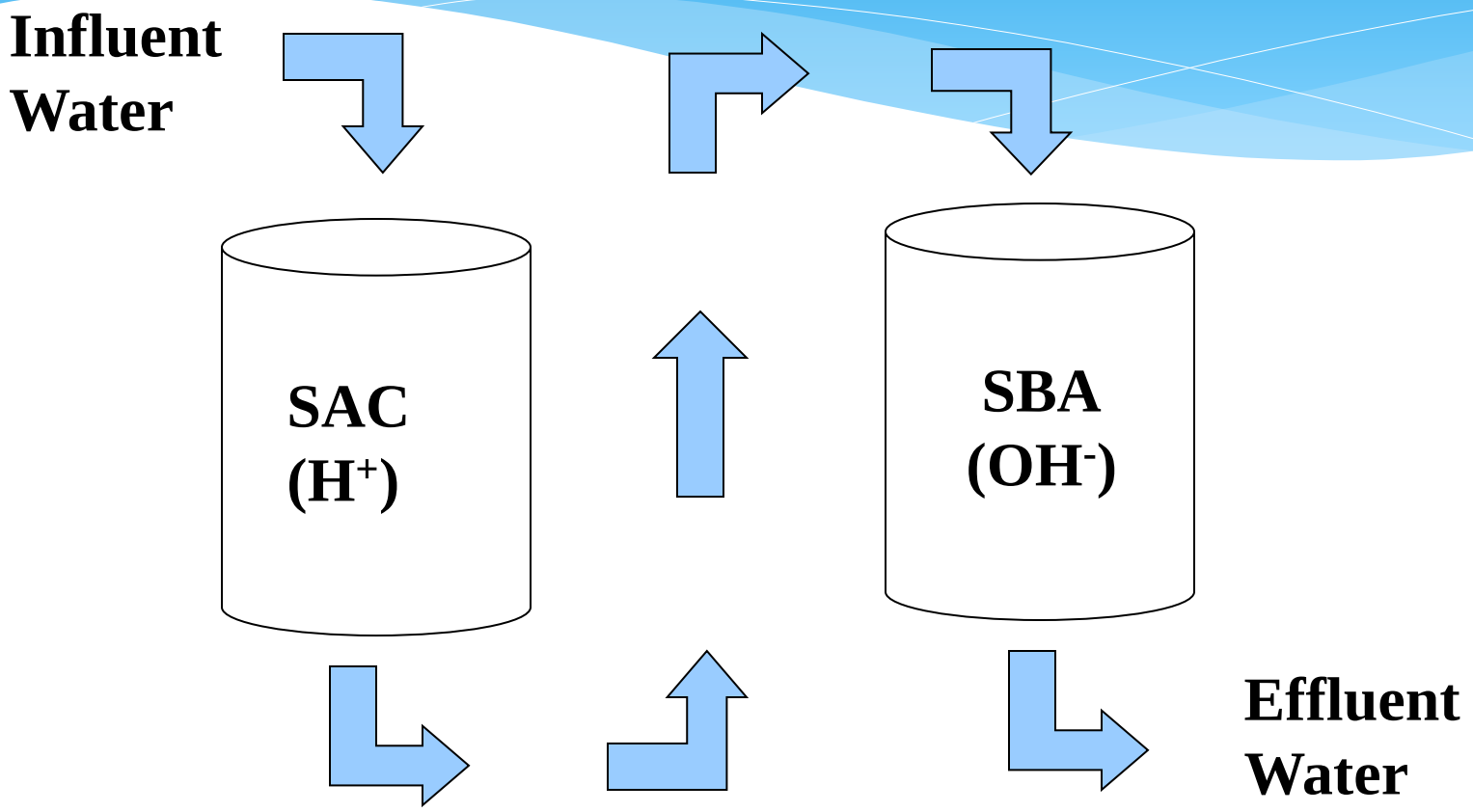
* The function of an ion exchange system is to remove dissolved ions present in water.



Two Common Types of IX Systems

* Softeners Remove
  * Calcium
  * Magnesium
* Demineralizers Remove
  * Calcium, magnesium, sodium
  * Sulfate, chloride, alkalinity, silica

Two Bed Demineralizer



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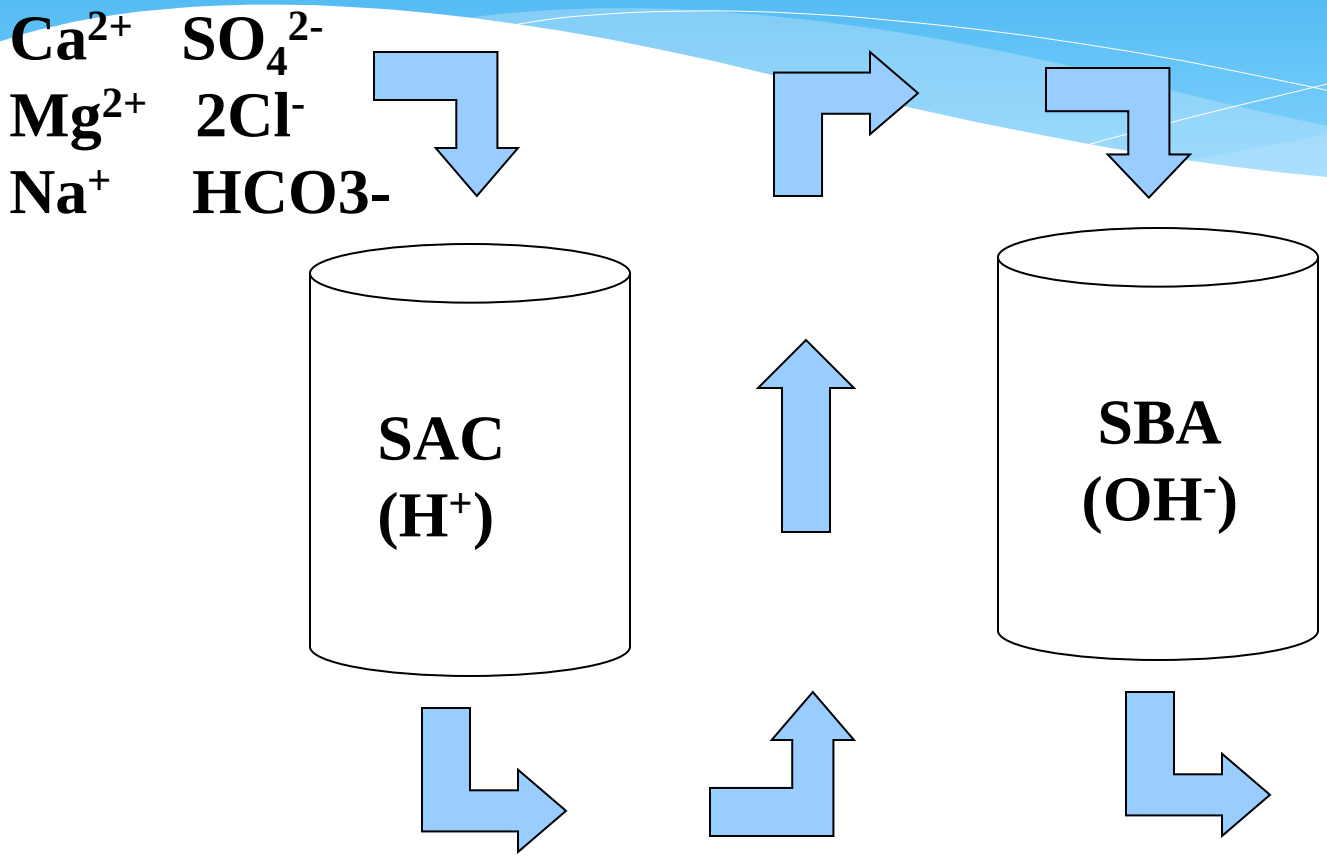

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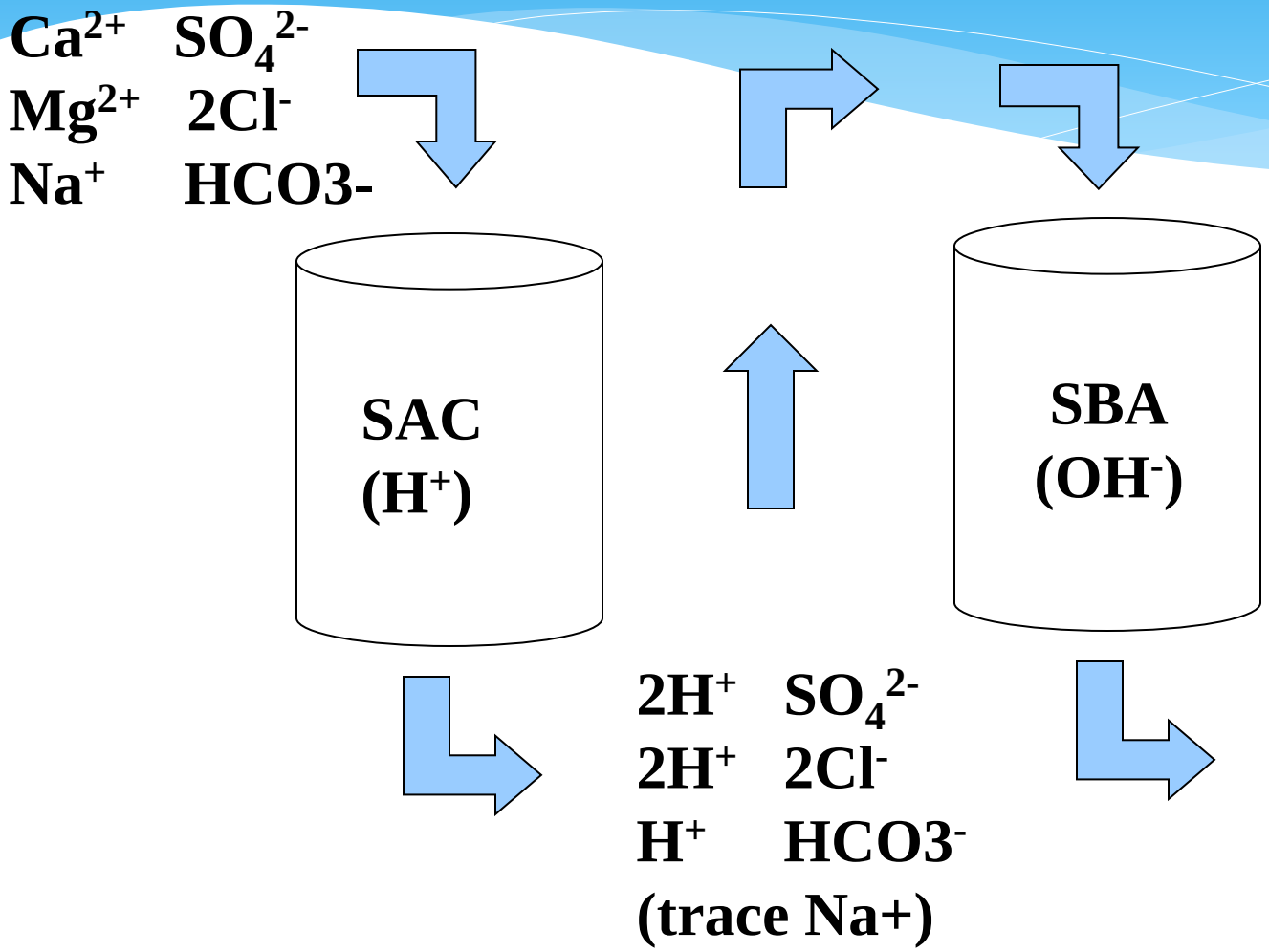

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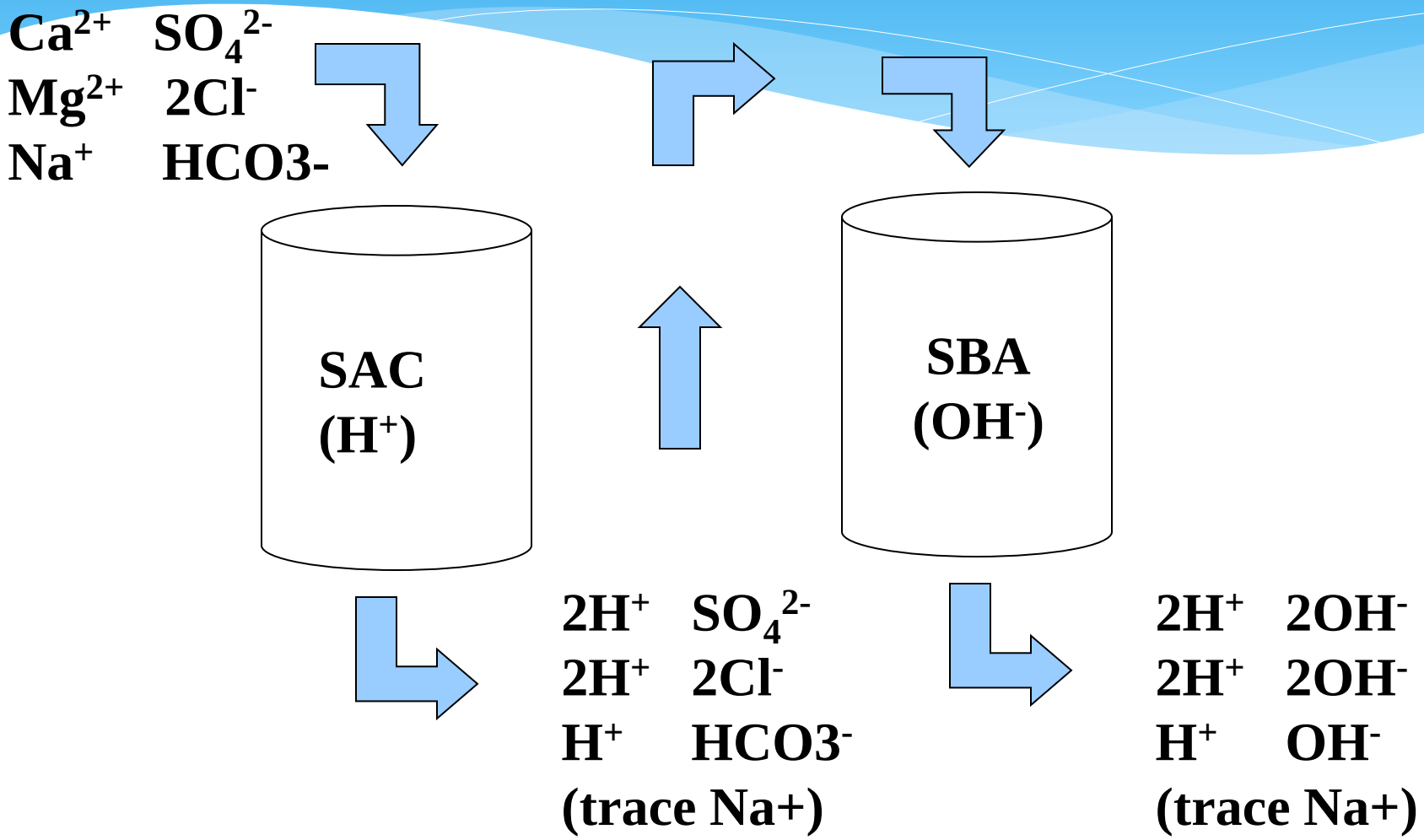

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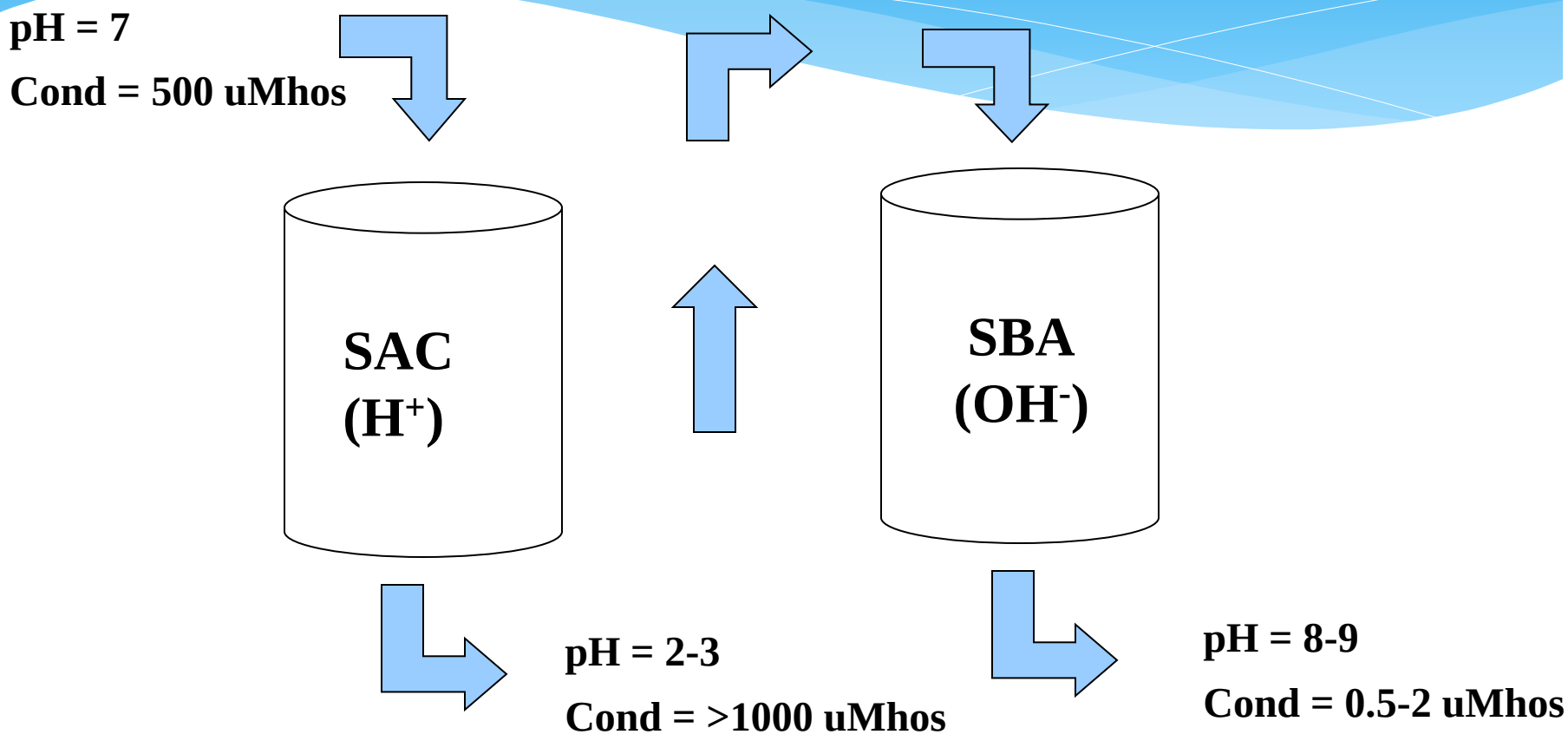


Receiving Resin

* Inspect for damage
* Integrity of containers
* Loss of resin
* Unit count

7 cubic foot Drums

4 drums per pallet

Recent Shipment

* What caused these drums to deform?

Damage from Tie-Down

Storage Conditions

* Original, unopened containers
* Cool, dry area
* Out of direct sunlight
* Indoor storage best
* 32° to 90° F

Storage of IX Resin

* Is this the recommended method of storage?
  * A. Yes
  * B. No

Storage Conditions

* Ionic forms
* Salt forms
  * Sodium (Na)
  * Chloride (Cl)
* Regenerated forms
  * Hydrogen (H)
  * Hydroxide (OH)

Storage Conditions

- Temperatures above 90˚
  - Loss of capacity
  - Especially anion resin
    - Hydroxide form
      - Exchanges CO_2 from air
      - Carbonate ion
      - Capacity reduced

Storage Conditions

* Temperatures below 32°
  * Resin can freeze
  * Repeated freeze/thaw can be damaging
  * If frozen, allow to thaw at room temperature

Storage Conditions

* Exposure to air
* Resin can dry out
  * Shrinks in size
* Rehydrate carefully
  * Saturated brine

Storage Limits

* Best to use salt form resins within 5 years
* Regenerated resins within 1 year

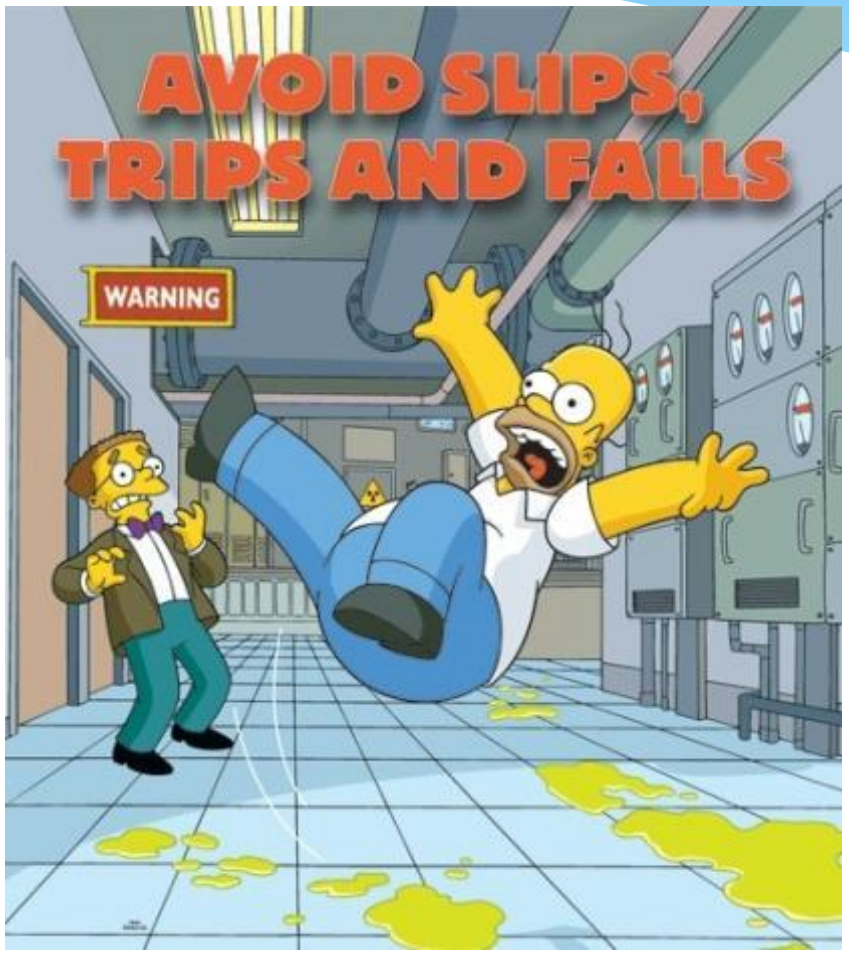
Storing Used Resins

* Exhaust and thoroughly backwash prior to storage
* Store in saturated brine
  * Biostatic solution
* Double regenerate before using again

Safety Considerations

* Classified as non-hazardous
  * Regenerated forms can be irritants
  * Wear eye protection

Safety Considerations



* Slippery when spilled
* Can spurt out of pressurized vessels

Kiona Winery

"This just might be a pretty darned good place to grow wine grapes."

- John Williams, Founder

Before Getting Loaded

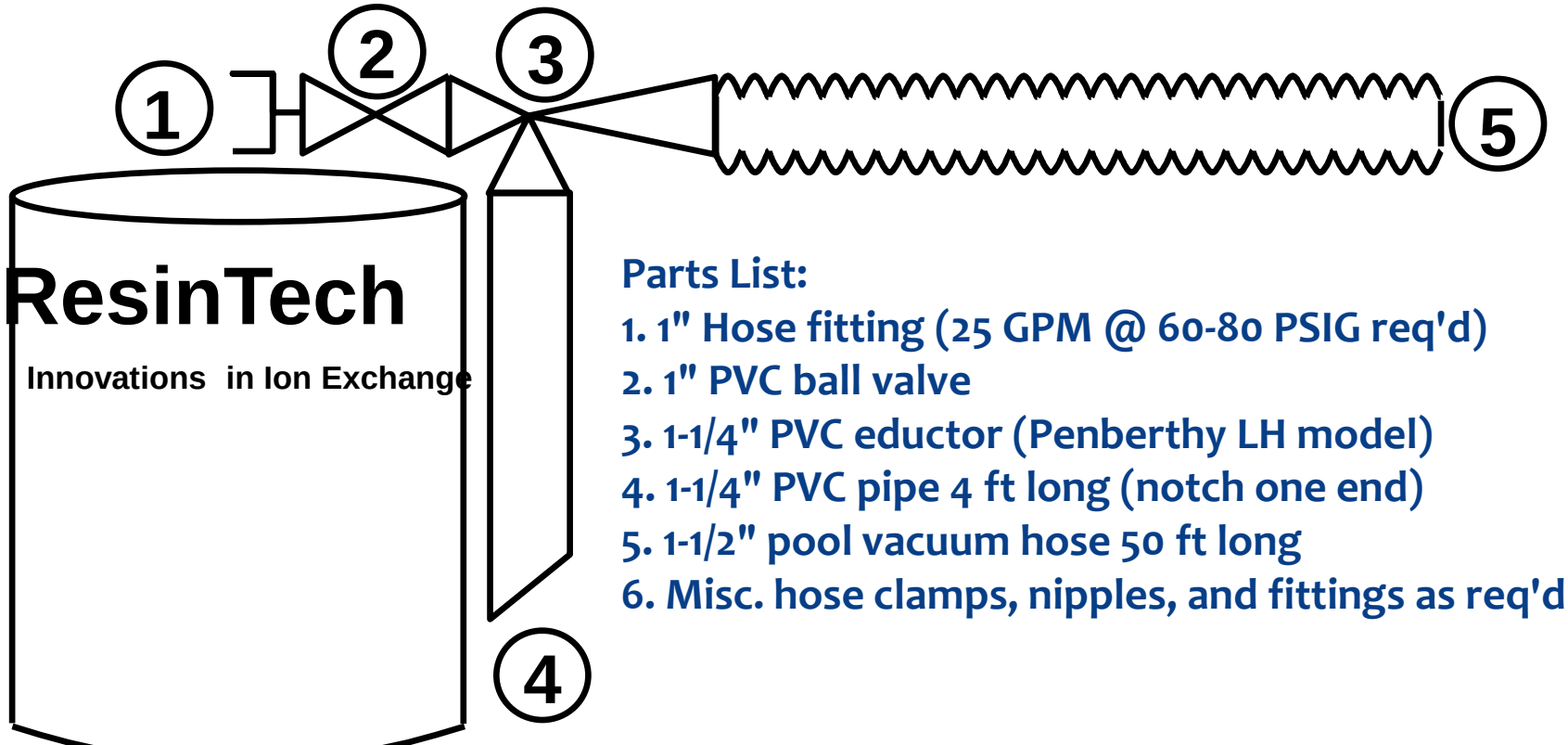
* After thoroughly emptying the vessel of old resin and dirt
  * Rinse inside of vessel
  * Inspect internals
  * Inspect flow pattern from internals
  * If possible, determine pressure drop of empty vessel

Loading

* Fill empty vessel halfway with softened water
  * Slowly introduce resin through the top manway
  * Don’t damage internals!

Loading with an Eductor

1. Move resin drums into position and fill with water
2. Insert eductor suction pipe into drum.
3. Connect and secure the discharge hose to the exchange tank.
4. Turn on supply water. Keep water level in the drum just above resin.
5. A 1-1/4" eductor with 80 PSIG supply pressure will transfer about 1 cu.ft/min.

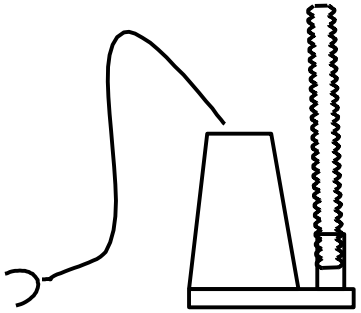


Parts List:

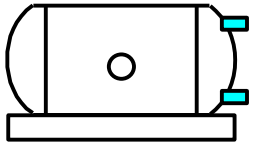
1. 1" Hose fitting (25 GPM @ 60-80 PSIG req'd)
2. 1" PVC ball valve
3. 1-1/4" PVC eductor (Penberthy LH model)
4. 1-1/4" PVC pipe 4 ft long (notch one end)
5. 1-1/2" pool vacuum hose 50 ft long
6. Misc. hose clamps, nipples, and fittings as req'd

Loading with Drums and a Pump

1. Move resin drums into position and fill with water. Remove about 1 cu.ft. of resin to allow room for the pump
2. Insert pump (or suction hose) into drum. Keep pump above the resin, in the free water to start. This will keep the pump from clogging.
3. Connect and secure the discharge hose to the exchange tank.
4. Turn on the pump. Keep water level in the drum just above resin. If the pump clogs, turn the pump off for 10 seconds, then start over.
5. A 3/4 HP sump pump will transfer about 5 cu.ft./min. A 1 inch air diaphragm pump will transfer about 3 cu.ft./min.
6. For really big tanks, it is easier to preload the drums into a large box, for transfer.



Submersible Sump Pump

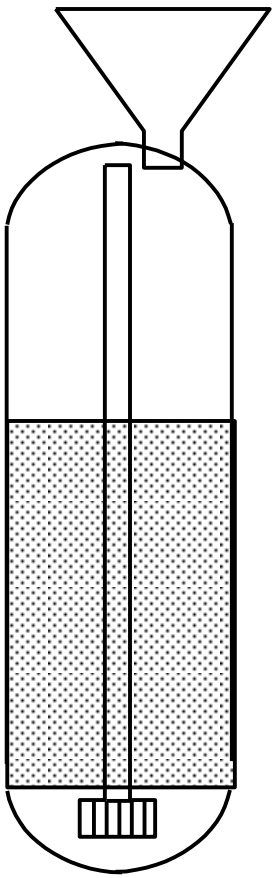


Air Driven Double Diaphragm Pump

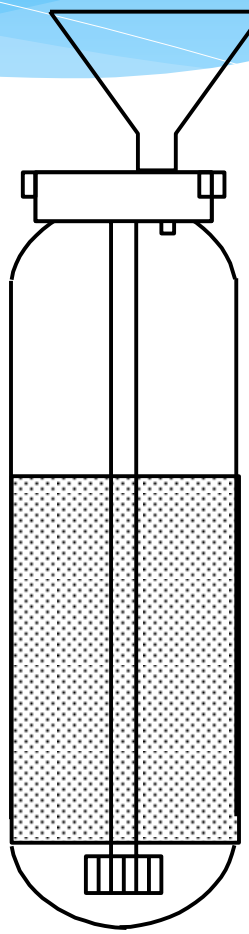
Vacuum Truck

Vacuum Truck

Loading Small Tanks



Small tanks are conveniently loaded by using a funnel. It is probably not worth the hassle of setting up a pump for less than 5-10 cubic feet.

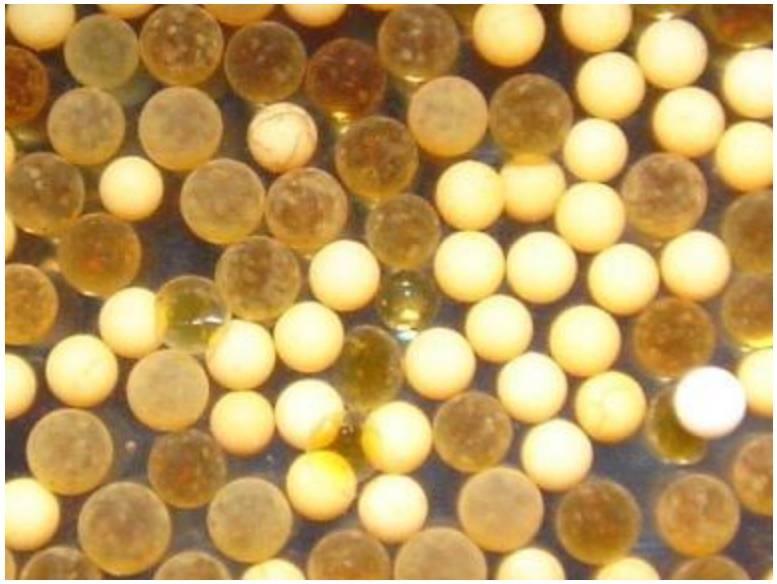


Testing

* Continue with no changes
* Modify the regeneration
* Adjust the run length
* Clean the resin
* Pretreat the raw water
* Replace the resin

Clean the Resin

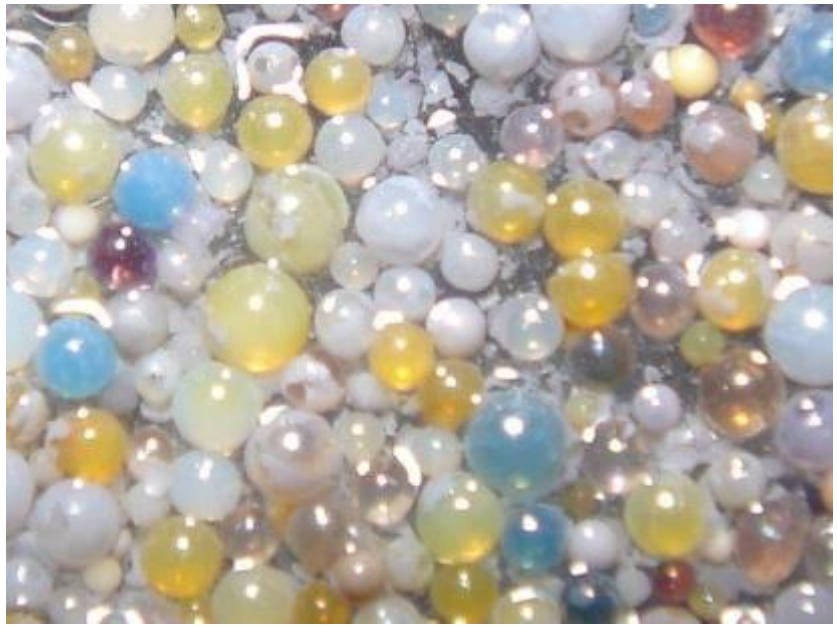
* Before



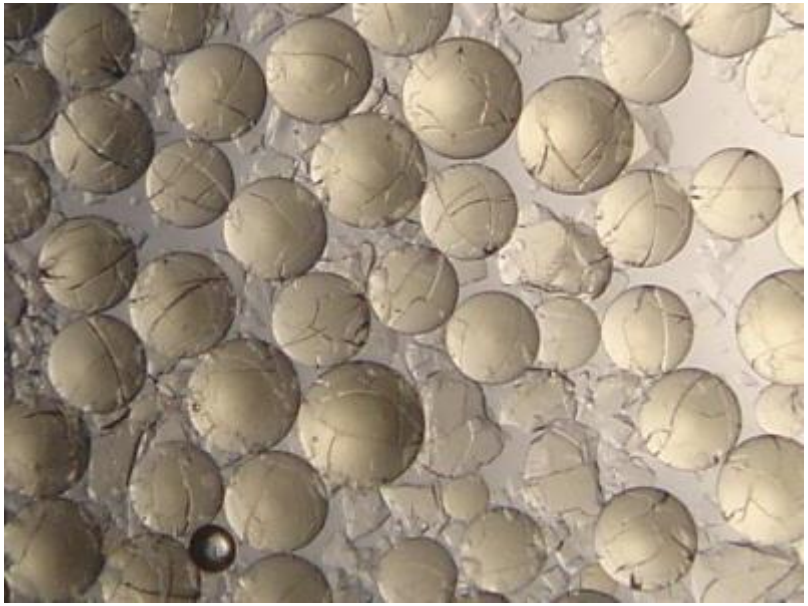
* After

Replace the Resin

* Calcium sulfate fouling
* Metals contamination



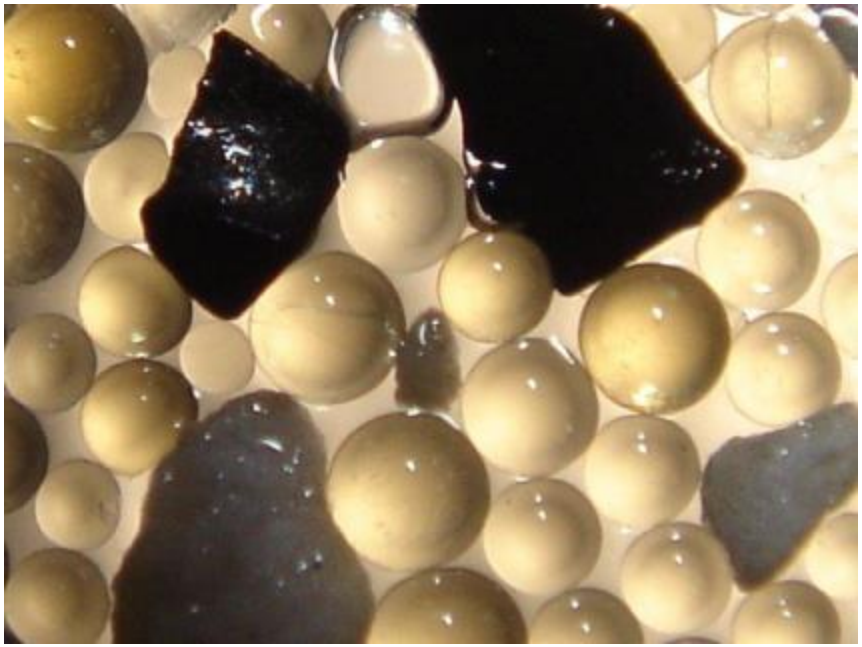
Replace the Resin



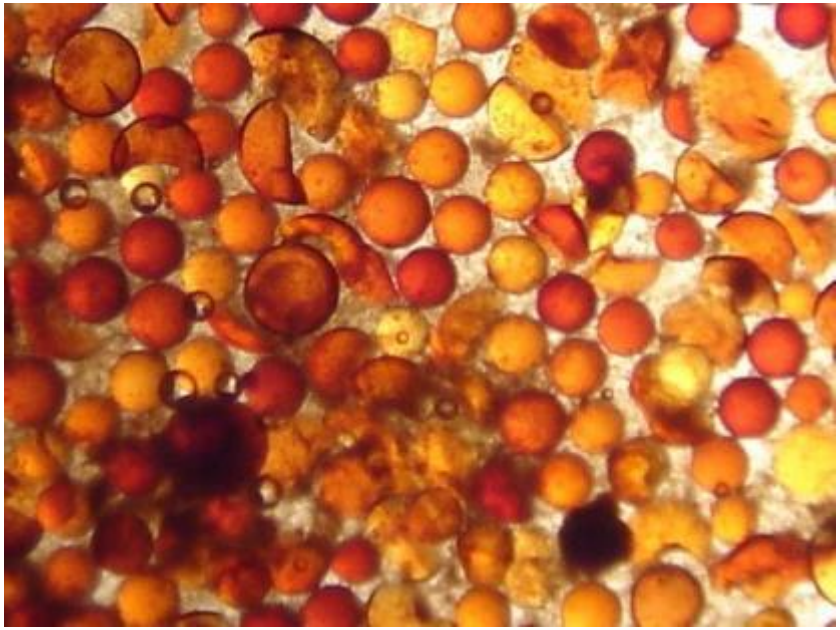
* Cracked and broken
* Caused by oxidation

Replace the Resin

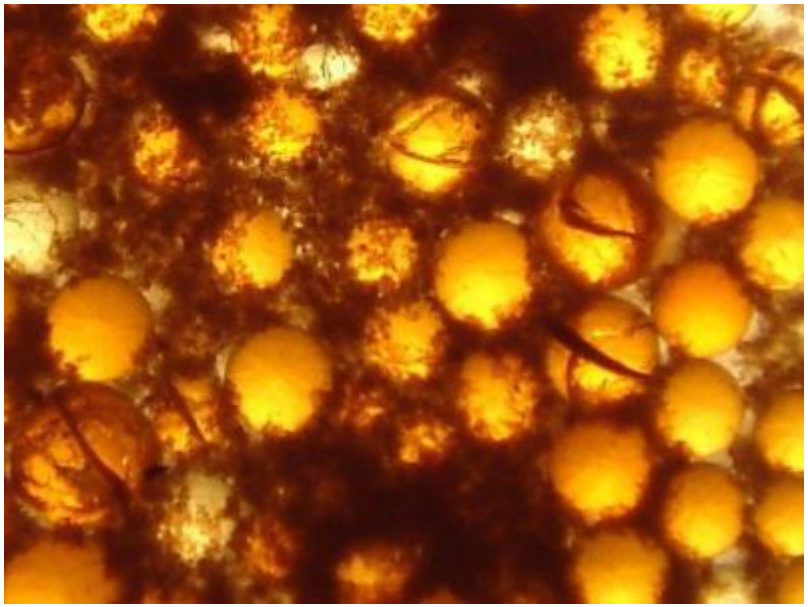
* Debris in the bed
  * GAC
* Can cause long rinses and pressure drop



Replace the Resin



* Dirt
* Accumulation of suspended solids



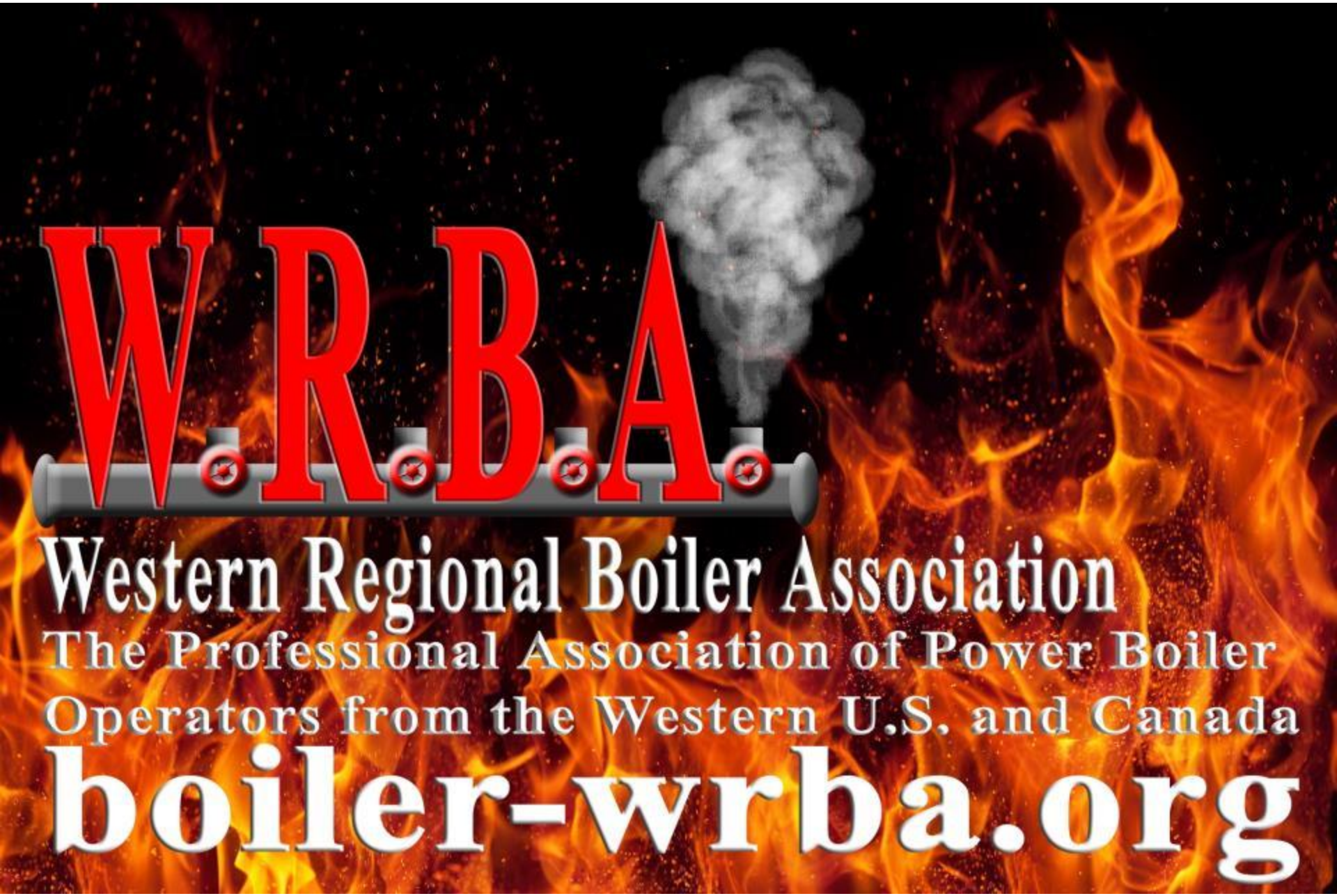
Just like New

Tasting

* Evaluate its appearance
  * Legs
* Check the bouquet
  * Swirl and sniff
* Pay attention to the taste
  * Don’t slurp!
* Evaluate the finish
  * Longer finish is better

Disposal

* Spent resin suitable for disposal
* DI Resins Must be neutralized first
  * Brine exhaust
* Must not have been used for metals or contaminant removal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Discussion & Questions

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