

Regeneration Description

EXHAUSTION/REGENERATION

An ion exchanger trades ions dissolved in the influent water with the active ions in its resin. A strong acid cation unit exchanges calcium, magnesium and sodium, etc., with its active ions, hydrogen. This slowly reduces the concentration of available active ions. The resin is termed as exhausted when the active ion concentration reaches a low level and effluent has a pre-selected high leakage of unexchanged ions, known as end point leakage. Using appropriate chemicals, the exhausted resin is regenerated, bringing back the level of active ion concentration. For example, strong acid cation exchanger resin is regenerated with sulphuric or hydrochloric acid which effectively strips off the calcium, magnesium and sodium from the resin, substituting hydrogen.

BACKWASH

During the service cycle, the resin bed may collect some suspended impurities from water. Some of the resin beads break up into fines and the bed becomes somewhat compacted. Introducing water at calculated flowrates in the opposite direction to the service flow lifts the bed which loosens up and expands. This forces the suspended particles and the media fines out of the unit. At the same time, the bed loses its compaction, reducing the chances of channeling which could cause water to bypass some of the effective media bed. Compaction and fines also cause excessive pressure drop. Water of the same quality as the influent is introduced from the bottom of the vessel and is collected at the top and then is directed to the drain. Proper backwash rate is of great importance since higher than the suggested rate may cause media loss and the lower rate may not be sufficient to do the proper backwash. Any sudden flow rate shock in the backwash should be avoided, since this may cause media loss.

REGENERATE INTRODUCTION

Regenerants of proper concentration are introduced in the tanks to reactivate the resin. The strength of dilute regenerant and its flowrate are important. Any change in these values compared to the ones specifically suggested may cause resin fouling, capacity loss and quality deterioration. In some cases, the regenerant has to be heated to a specific temperature to do a proper elution. (Elution is stripping off of exchanged ions).

DISPLACEMENT (SLOW) RINSE

The process of displacement of regenerants and the eluted ions from the resin is started at a slow pace, normally at the same regenerant flowrate.

FAST RINSE

After the slow rinse, the resin is rinsed further at a higher flowrate. Rinsing removes any excess regenerant from the resin, bringing the bed back to active condition, ready to be put into service.

