In-Situ

ChemScan® APPLICATION SUMMARY

ION EXCHANGE BREAKTHROUGH

STATEMENT OF THE PROBLEM

Ion exchange processes are frequently used to remove unwanted ions from water. Typical ions removed include calcium and magnesium (hardness), dissolved iron and manganese, nitrate, or certain organics including Natural Organic Matter (NOM). The ion exchange media is typically a polymer which contains numerous locations for attachment of a benign ion which is exchanged for the unwanted ion in the water upon contact with the polymer. NOM is removed with either weak anion resin (WAR) or strong acid resin (SAR). In all ion exchange processes the exchangeable ions eventually become depleted and the resin must be regenerated with a fresh supply.

CONTROL STRATEGY

Regeneration can be initiated based on time of day, time intervals or total flow through the exchange tank. In some applications, especially when there is a variable concentration of ions to be removed, time or flow based intervals may not be satisfactory. Under these conditions, either regeneration may not occur until after the tank has been exhausted or energy and resources may be wasted by regenerating too soon or too often.

If an ion-specific resin is used, regeneration based on measurement of any parameter other than that specific ion to be removed may be inappropriate. An alternative is to base regeneration on a drop in the specific ion removal efficiency, as measured by the detection of some minimum concentration of the removed ion in the exchange tank effluent. This is defined as "breakthrough."

APPARATUS

ChemScan process analyzers can be used to detect ion exchange breakthrough in one or more exchange tank effluents. This information can be used to initiate backwash, initiate alarms and/or divert flow to alternate exchange tanks. The ChemScan mini analyzers can be used to monitor NOMuv, TOCuv, iron or manganese removal at one sample point. Other ChemScan analyzers can be used to detect specific ions such as NOMuv or TOCuv and nitrate at multiple sample points.

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