

Nitrogen Purge of PEDI Tanks

Portable exchange deionization (PEDI) tanks must sometimes be kept in standby for periods of time awaiting their use in service. A potential problem with resins that are kept in storage, especially mixed bed resins which have a relatively neutral pH, is the formation or growth of microbes. The presence of these microorganisms are detrimental for Ultrapure applications such as hemodialysis, microelectronics, and medical applications.

To minimize the formation of microbial activity, several procedures should be followed. Some PEDI plants rinse all portable tank parts (tanks, heads, connectors, etc) in a dilute chlorine solution each time a regeneration is performed. All personnel that handle these items must also be careful not to contaminate the equipment with dirty hands or other equipment. The ion exchange resin itself undergoes an effective "bio-kill" every time a regeneration is performed by being exposed to the acid or caustic pH extremes. Of course, the PEDI plant must be properly maintained and kept as clean as possible. There are some plants that periodically clean the regeneration tanks and piping with a dilute chlorine solution to minimize sources of microcontamination.

Assuming that the regeneration practices are sufficient to produce a resin that is relatively free of microbial activity, how is it possible to keep it in that state? One method that can prove effective is the use of a nitrogen gas purge. The nitrogen gas is inert, oxygen-free, and relatively easy to handle.*

Ultrapure water systems commonly use a nitrogen overlie blanket to protect ultrapure water storage tanks from contamination from the air in the form of carbon dioxide, micro-organisms, hydrocarbons and other contaminants commonly present in air.

PEDI tanks are usually purged of water before leaving the PEDI plant by the use of compressed air. Substituting the compressed air with nitrogen gas will purge the tanks of water and most of the oxygen, leaving a low oxygen environment in the tank. This will inhibit the growth of aerobic bacteria in the resin bed. The resin should be able to be kept in standby mode for longer periods compared to an air-purged tank.

Care should be taken when using compressed nitrogen to purge the tanks. A pressure regulator needs to be used so that the PEDI tanks are not exposed to the full pressure of the nitrogen storage tank (which can sometimes be as high as 2000 psi.)

*Nitrogen and other inert gases are not normally dangerous but when used in confined spaces they can quickly create oxygen deficient atmospheres that can be deadly. Workers must remain aware of nitrogen purge operations that may affect their work environment and use caution when such purges are in use.

