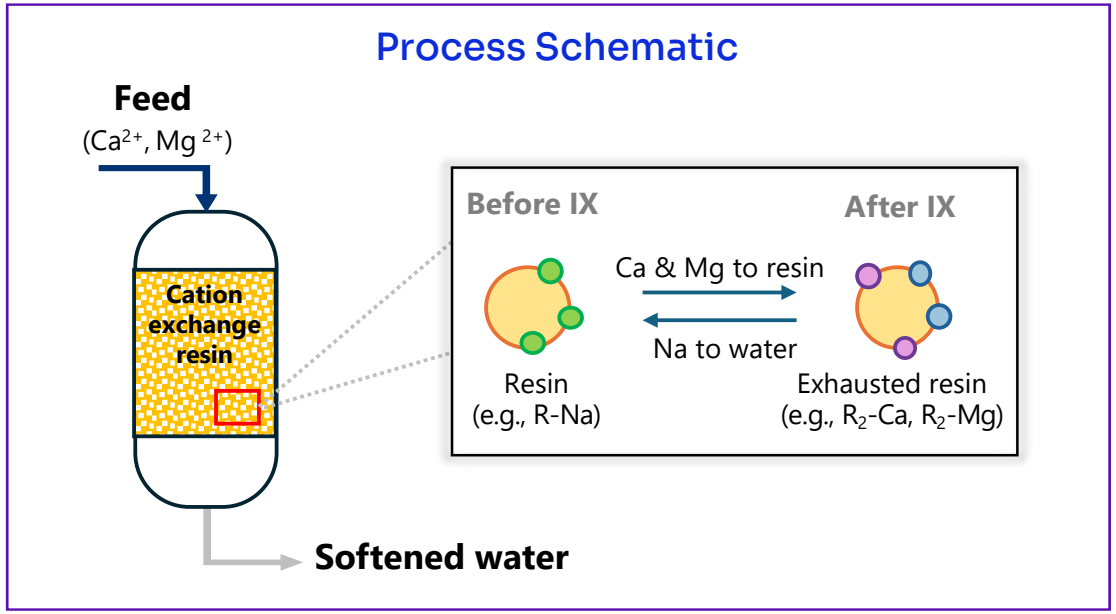
Ion Exchange (IX) for Softening

Process Description

IX is a reversible chemical process in which dissolved ions in the feedwater are selectively exchanged with ions attached to an ion exchange resin. During operation, target ions are preferentially sorbed onto the resin while equivalent ions are released back into solution to maintain charge balance.

In IX water softening, calcium and magnesium ions are exchanged with sodium or hydrogen ions using weak-acid cation exchange resins. Once the resin becomes exhausted, it is regenerated using a concentrated salt (NaCl) or acid solution to restore its ion exchange capacity for repeated use. Compared with conventional precipitation-based processes, IX systems generally offer lower capital costs, produce less sludge, and require a smaller footprint, making them well suited for water polishing and reuse applications.

Commercial ion exchange resins are widely available from suppliers such as DuPont™, Ecolab Purolite™, LANXESS (Lewatit®), and ResinTech®.



Publications

Evaluation of new ion exchange resins for hardness removal from boiler feedwater (Link)

For further information, please contact us at email: GWSC@conocophillips.com