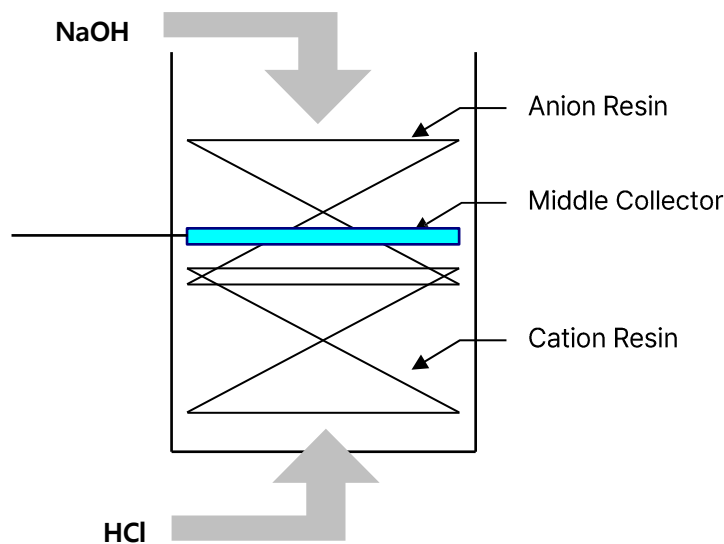


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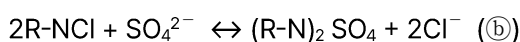
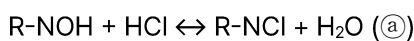
Improper Level of Mixed Bed Column

During service operation, the mixed-bed column uses air-mixing to mix the cation and anion exchange resins, but during regeneration, the resins are separated after backwashing, due to the apparent density differences, and then regenerated. Separation of the cation and anion exchange resins above and below the middle collector during regeneration of the mixed-bed column is very important for proper operation. Accurately matching the levels of the cation and anion exchange resins at the initial charge is a shortcut to improving the purity of the treated water from the mixed-bed column. The main cause of the decline in purity of the treated water from the mixed-bed column is the imbalance of the cation and anion exchange resins above and below the middle collector, with the next cause being the failure of the resins to mix properly. Before use, the cation and anion exchange resins can be distinguished by color (the cation resin is a light brown transparent sphere, and the anion resin is a light-yellow transparent sphere), making it easy to check the separation state and level. However, as time passes with usage, the colors gradually become similar (brown transparent spheres), making it difficult to distinguish with the naked eye.

1. Problems When the Cation Exchange Resin Is Undercharged in the Mixed-bed Column



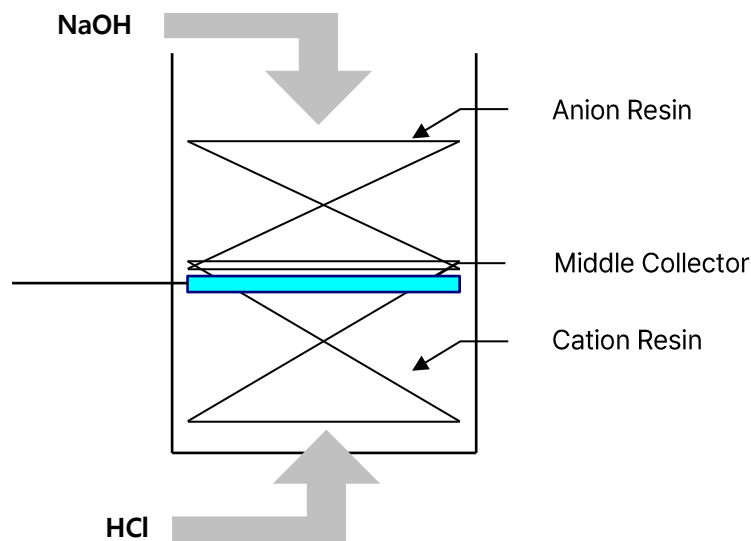
If cation resin is under-charged, there will likely be some anion resin below the middle collector level. During the regeneration process, the anion exchange resin below the middle collector comes into contact with HCl and converts to the Cl⁻ form (a), which leads to a deterioration in water quality, during the service operation, due to the leakage of Cl⁻ ions (b).



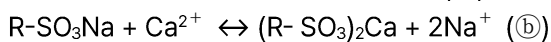
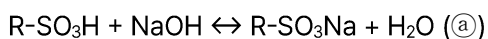
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Improper Level of Mixed Bed Column

2. Problems When the Cation Exchange Resin Is Overcharged in the Mixed-bed Column



If cation resin is over-charged, there will likely be some cation resin above the middle collector level. During the regeneration process, the cation exchange resin above the middle collector comes into contact with NaOH and converts to the Na-form (a), which leads to a deterioration in water quality during the service operation due to the leakage of Na⁺ ions (b).



Due to the risks mentioned above, it is advisable not to perform partial replacement of the mixed-bed column but to do a full replacement or continue using it as is.

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