Omya Advanced Remineralization Process

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OMYA ADVANCED REMINERALIZATION PROCESS

Properties of Desalination Permeate

- 85 – 99 % of dissolved ions rejected
- Low pH (pH 4-6.5)
- Lacking in Alkalinity – minimal buffer capacity
- Low in mineral content (Ca$^{2+}$ and Mg$^{2+}$)
- Acidic and aggressive
Need for Remineralization

- Corrosion of water infrastructure:
  - $500 billion over 25 years (AWWA 2012)

- Release of toxic ions
  - Heavy metals (Cu$^{2+}$, Pb$^{2+}$, Cd$^{2+}$, Cr$^{2+}$)
  - ‘Red water’ incidents (Fe$^{3+}$)
  - Flint, Michigan – Lead poisoning

- Health
  - Consumption leads to elimination of important ions
  - Dental
  - Reduction in intake of essential minerals (Ca$^{2+}$, Mg$^{2+}$)
# Drawbacks of Current Processes

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### Direct Chemical Dosing

- **Calcium Chloride (CaCl₂):**
  - High operating cost
  - Unwanted counter ions
  - Focused on LSI
  - Difficult to maintain stability

- **Sodium Bicarbonate (NaHCO₃):**
  - High operating cost
  - Unwanted counter ions
  - Focused on LSI
  - Difficult to maintain stability

### Lime Dosing

- **Lime (Ca(OH₂)):**
  - High cost
  - Waste by-product
  - No Carbonate
  - Difficult to maintain stability

### Calcite Contactors

- **Calcium carbonate chips (CaCO₃):**
  - Slow reaction kinetics
  - Poor CO₂ efficiency
  - Large plant footprint
OMYA ADVANCED REMINERALIZATION PROCESS

Remineralization Process Development

- World leader in industrial minerals
- Providing (re)mineralization products and solutions for over 40 years
- Supply granular calcium carbonate and dolomite products in Middle East, North America.
- Process development driven by product and engineering expertise
- Solution = Omya Advanced Remineralization Process
OMYA ADVANCED REMINERALIZATION PROCESS

Innovative New Remineralization Process

OMYAqua

Desalinated Water Permeate / Distillate

Omya Advanced Remineralization Process

Membrane Calcite Reactor

Ca\((\text{HCO}_3^-)\)_2 solution

Omyalime pH adjustment

\[ \text{CaCO}_3 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{Ca}^{2+} + 2 \text{HCO}_3^- \]
Advantages of OARP

- Reduced plant footprint
- Reduced CAPEX
- Reduced OPEX
- Modular design
- High CO₂ efficiency
- Turbidity free water