SURTREAT® Ion-Exchange Densification™
### Substrate-Level Transformation

BEFORE TREATMENT — LARGE CONNECTED PORES — $Ca(OH)_2$
- High Permeability
- Calcium Hydroxide
- Corrosion Risk

ION-EXCHANGE REACTION

AFTER TREATMENT — DENSE, DISCONNECTED PORES — NEW C–S–H
- Reduced Permeability
- Calcium Silicate Hydrate
- Increased Durability

DENSER CONCRETE · SLOWER CORROSION · LONGER SERVICE LIFE

What Is Ion-Exchange Densification?

Hardened concrete contains calcium hydroxide—a weak, soluble byproduct of cement hydration that contributes little to strength and a great deal to permeability and chemical vulnerability.

SURTREAT introduces a penetrating sodium silicate chemistry that initiates a controlled **ion-exchange reaction inside the cement matrix**:

$$Na_2SiO_3 + Ca(OH)_2 \rightarrow \text{Calcium Silicate Hydrate (C–S–H)}$$
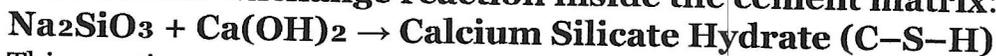
This reaction:

- Consumes calcium hydroxide
- Forms new calcium silicate hydrate *in place*
- Occurs within the pore structure of the concrete
- Creates no surface film or interface

The concrete itself becomes denser, stronger, and more durable.

What Changes Inside the Concrete

Ion-exchange densification produces measurable microstructural improvements:

- Capillary pores are reduced in size
- Pore connectivity is disrupted
- Transport pathways become more tortuous
- Permeability to water and chlorides is reduced
- Electrical resistivity increases

These changes are **internal and permanent**—they do not rely on adhesion, thickness, or surface continuity.

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SURTREAT®

Ion-Exchange Densification

The chemistry that changes what concrete is— not just how it's protected

Ionic Densification White Paper (here)

Most concrete repair strategies focus on **what is applied to the surface**. SURTREAT focuses on **what happens inside the concrete**.
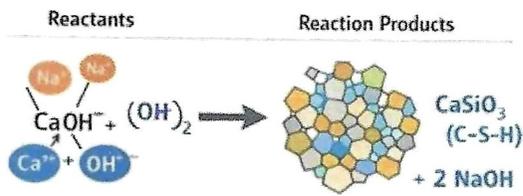
At the heart of SURTREAT technology is the process of **ion-exchange densification**—a substrate-level chemical transformation that permanently improves concrete by changing its internal chemistry and microstructure.
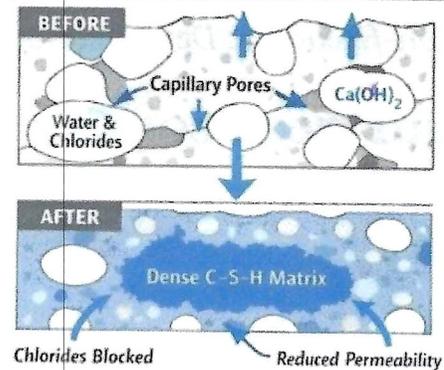
This is not a coating.

This is not a sealer.

This is **concrete re-engineering**.

Ion-Exchange Reaction

Pore Structure Transformation

Reactants

Reaction Products

$CaOH^- + (OH)_2 \rightarrow$ $CaSiO_3$ (C-S-H) + 2 NaOH

$Ca^{++} + OH^-$

Na⁺ Na⁺

BEFORE

Capillary Pores

Water & Chlorides

$Ca(OH)_2$

AFTER

Dense C-S-H Matrix

Chlorides Blocked

Reduced Permeability

Why Ion-Exchange Matters for Corrosion

Reinforcing steel corrosion is governed by:

- Moisture transport
- Oxygen availability
- Ionic conductivity
- Chloride ingress

Ion-exchange densification addresses all four by **restricting movement through the concrete itself**, weakening corrosion cells at their source. That's why SURTREAT functions as a **corrosion-rate reduction technology**, not merely a protective finish.

Not a Coating—A Substrate Upgrade

Because ion-exchange densification modifies the cement matrix:

- Nothing can delaminate
- Nothing can peel or crack
- Surface profile and geometry are unchanged

And everything that follows performs better:

- Repairs bond to higher-quality concrete
- Coatings last longer
- FRP and overlays adhere more reliably

Ion-exchange densification acts as a **durability multiplier** for conventional repair systems.

Built for Long-Term Asset Stewardship

By extending the service life of existing concrete, ion-exchange densification:

- Reduces repair frequency
- Lowers lifecycle cost
- Minimizes demolition and replacement
- Preserves embodied carbon and materials

It supports a shift from **reactive repair** to **engineered longevity**.

The Bottom Line

Concrete doesn't fail because it lacks a coating.
It fails because **its internal chemistry was never addressed**.
Ion-exchange densification changes that chemistry.

SURTREAT doesn't just protect concrete.
It **re-engineers it—permanently, from the inside out**.
—

SURTREAT Technologies

Ion-Exchange Densification for Stronger, More Durable Concrete

surtreat.com

Call for Certified Applicators

Are you a contractor interested in joining our network of certified applicators? Reach out to us today! We are seeking skilled applicators nationwide to introduce and install our cutting-edge technologies.

Learn more

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