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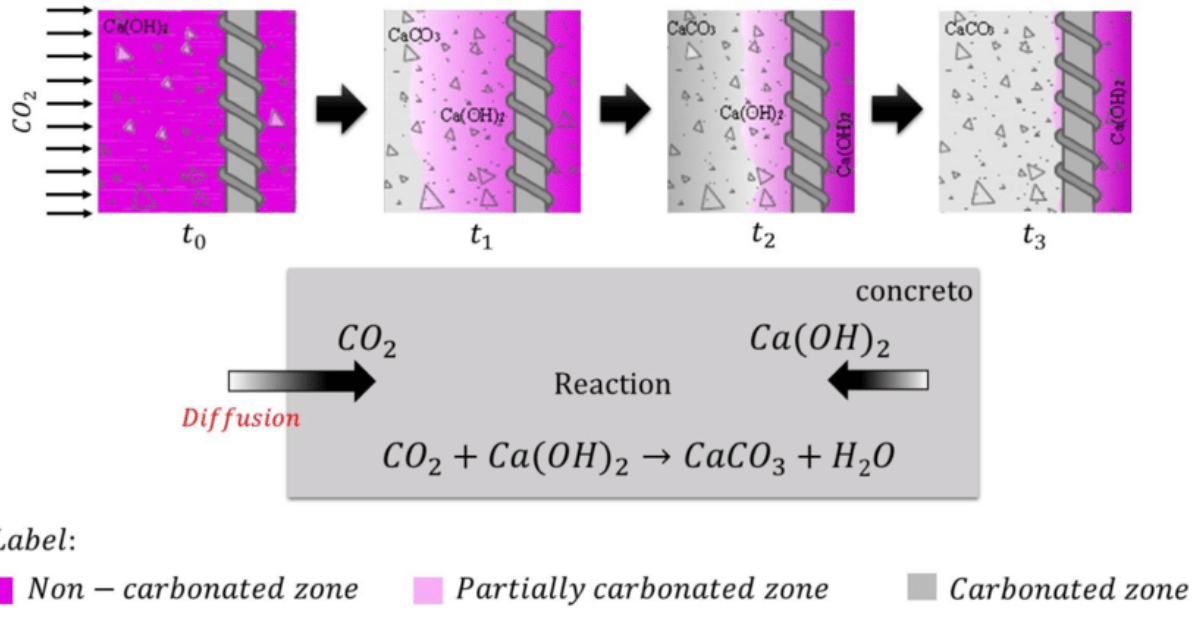
Climate Change and Concrete Carbonation

It is well known in concrete remediation that the pH levels of concrete can play a significant role in causing and mitigating deterioration. Freshly poured concrete has relatively high pH levels and reduces while the chemical process of curing progresses and eventually to a point of relative equilibrium once the curing process has largely completed. However, continued reduction in pH levels in concrete occurs over time when exposed to high levels carbon dioxide. Carbon dioxide reacts with calcium hydroxide in hydrated Portland cement to generate acidic carbonates, which erode the passive chemical barrier on steel reinforcement to promote corrosion. This process is called “carbonation” of concrete.

However, there is a double-edged sword to the carbonation of concrete. The most recent 4,000-page global climate change report issued by the Intergovernmental Panel on Climate Change (IPCC) has acknowledged the role of carbonation as a significant absorption process that offsets direct carbon dioxide emissions from the manufacturing of Portland cement and other cement products. From page 5-20 of the IPCC report, "The uptake of CO2 in cement infrastructure (carbonation) offsets about one half of the carbonate emissions from current cement production." Although carbonates are not the only emissions generated from cement production, the reduction is significant and represents a unique ability to act as a carbon sink that other building materials do not have. In combination with newly emerging environmentally friendlier cement technologies, MC sees a bright future for concrete construction.



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