

# Alkali Silica Reactivity



Alkali Silica Reactivity requires certain active ingredients to occur:

Reactive Silica particles from aggregate

- Opal
- Chert
- Chalcedony
- Micro-Crystalline Quartz
- High-temperature Quartz

Alkali metal (sodium or potassium) from cement or outside source.

Moisture.

As in other aspects of concrete chemistry, temperature and time play a role, as well. It is important to note that ASR requires reactive aggregate and the presence of calcium hydroxide to occur.

During the hydration of cement, large quantities of calcium silicate hydrate (CSH) are formed as concrete paste, along with a significant pool of calcium hydroxide (CaOH) that remains in concrete.

This hydroxide not only boosts and maintains the high pH of concrete, it is soluble and can dissolve reactive silica. This dissolved gel material can easily absorb alkali metals such as sodium and potassium in solution and become alkali calcium silicate hydrate – ASR gel – that absorbs moisture and expands, causing concrete to lose durability.

In a manner of speaking, ASR gel can be considered to be CSH gone bad. If any of the key ingredients is missing or is removed, ASR gel will not form or will stop forming.