



Thermodynamic and kinetic stability of dawsonite (NaAl(OH)₂CO₃) – Will it act as a storage host during CO₂ capture?

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Increasing atmospheric concentrations of greenhouse gases are suspected of causing a gradual warming of the Earth's surface and potentially disastrous changes to global climate. Because carbon dioxide (CO₂) is a major greenhouse gas, capture and storage of CO₂ in saline aquifers is being explored as one possible approach to limit the accumulation of greenhouse gases in the atmosphere.

Injection of CO₂ leads to increased activity of the carbonate ion, which may provoke formation of solid carbonates during injection. Carbonates like calcite, magnesite and siderite require Ca²⁺, Mg²⁺, and Fe²⁺ ions to form. Studies of off-shore formation waters (e.g. Egeberg and Aagaard, 1989; Bjørlykke et al., 1995) and mineralogies however suggest that formation of these carbonates may be of limited extent. An alternative carbonate that shows thermodynamic stability during injection of CO₂ is Dawsonite (NaAl(OH)₂CO₃). It requires Na⁺ and Al³⁺ that is highly abundant in most formation waters and formation mineralogies respectively. The aim of this study is to better define what role dawsonite may play in geological storage of CO₂. We present experimental work on dawsonite dissolution and precipitation, as well as kinetic data on reactivity in acid to basic solutions.

References

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