

CERE – SEMINAR

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09:00 to 10:00 a.m.

“CO₂ impact on FeCO₃ solubility”

By

Randi Neerup, CERE-Chemical Engineering

Abstract

FeCO₃ is a natural occurring mineral. However, it is highly associated with CO₂ corrosion in industrial processes, which leads to production losses and shutdowns due to maintenance. Besides being associated with corrosion issues FeCO₃ is also related to CO₂ storage.

The CO₂ corrosion initiates as gaseous CO₂ dissolves in aqueous solutions and diffuses to the steel surface. Here it reacts electrochemically with iron. Fe²⁺ is released and reacts with the carbonates in the aqueous solutions to form FeCO₃. Under the right conditions, FeCO₃ precipitates on the steel surface and creates a protective barrier for further corrosion.

Carbonate mineralization occur when CO₂-charged water is injected into basaltic rock here it promote the dissolution of basalt liberating Ca²⁺, Mg²⁺, and Fe²⁺ and precipitation of e.g. FeCO₃ occurs.

Detailed information on the impact of CO₂ on the FeCO₃ solubility and the solubility of FeCO₃ in aqueous solutions containing salts is needed to better predict the CO₂ corrosion and understanding of carbonate mineralization. In this study, the solubility of FeCO₃ is measured as a function of temperature, CO₂ pressure, and salts (NaCl, KCl, CaSO₄, HCl). Preliminary results show that the temperature has little to no impact on the solubility. The FeCO₃ solubility is influenced by CO₂. Results shows that the solubility increases up to CO₂ pressure of approximately 1.5 bar where a maximum is reached.