High Pressure MAS-NMR

Distinguishing CO_2 Interactions

Carbonation in wet $scCO_2$

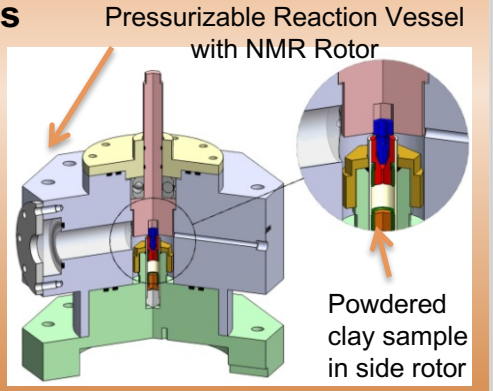
- Controlling factors
- Modeling parameters

➢ Carbonation Products

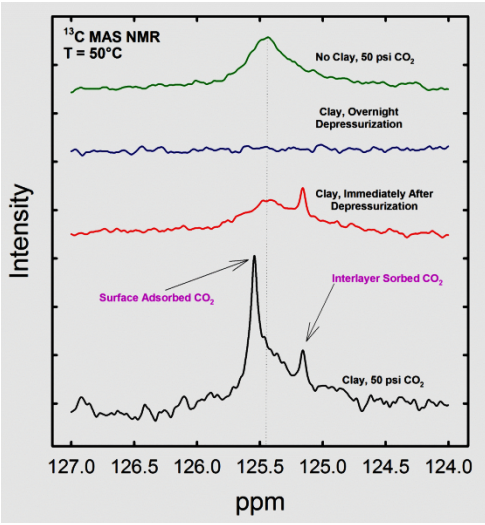
- Nucleation sites
- Growth habits and morphologies

➢ Intrinsic Rate Constants

- Water concentrations in $scCO_2$
- Variability in water film thickness



Distinguishing CO_2 Interactions : Exposing montmorillonites to $^{13}CO_2$ to study sorbed CO_2 species .

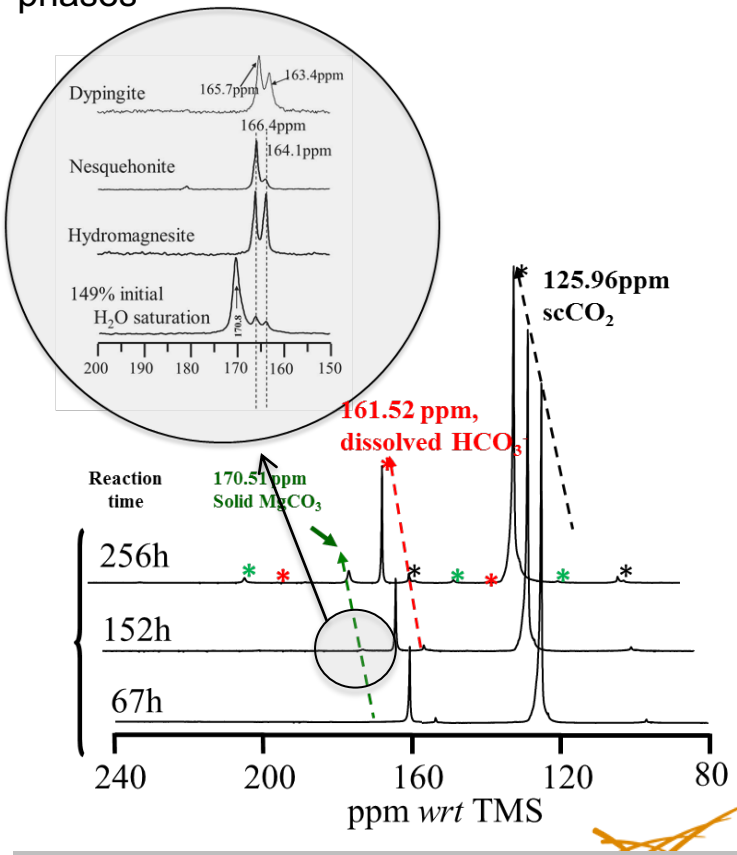


Key Findings

- Bulk CO_2 (no clay): single resonance at 125.4 ppm
- Exposure to clay (50 psi): two new resonances are observed, indicating two different types of CO_2
- Depressurization: a single resonance remains and is attributed to intercalated CO_2

Silicate Carbonation in wet $scCO_2$:

Capturing variable aspects of silicate carbonate processes including water recycling, aqueous dissolved species, and crystalline phases



Kwak J.H., Hu J.Z., Turcu R.V.F., Rosso K.M., Ilton E.S., Wang C.M., Sears J.A., Engelhard M.H., Felmy A.R., and Hoyt D.W. (2011) The role of H2O in the carbonation of forsterite in supercritical CO_2. IJGGC, 5(4) 1081-1092.