

# CO<sub>2</sub> SOLUBILITY IN SIMPLE AND COMPLEX BRINES CONTAINING Na<sup>+</sup>, Ca<sup>2+</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, and HCO<sub>3</sub><sup>-</sup>

## Presenter (Theme Affiliation), Research Team

Kim Gilbert (Theme 2) and Phil Bennett

## Objectives of Research

Understand the influence different salts on CO<sub>2</sub> dissolution

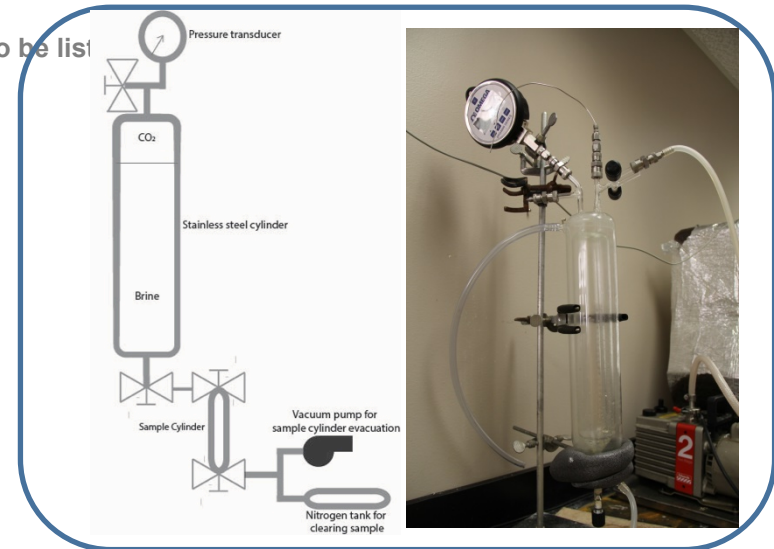
## Conclusions

CO<sub>2</sub> dissolution in simple brines is not controlled by solution ionic strength.

CO<sub>2</sub> solubility is more accurately predicted with adjusted ion hydration number.

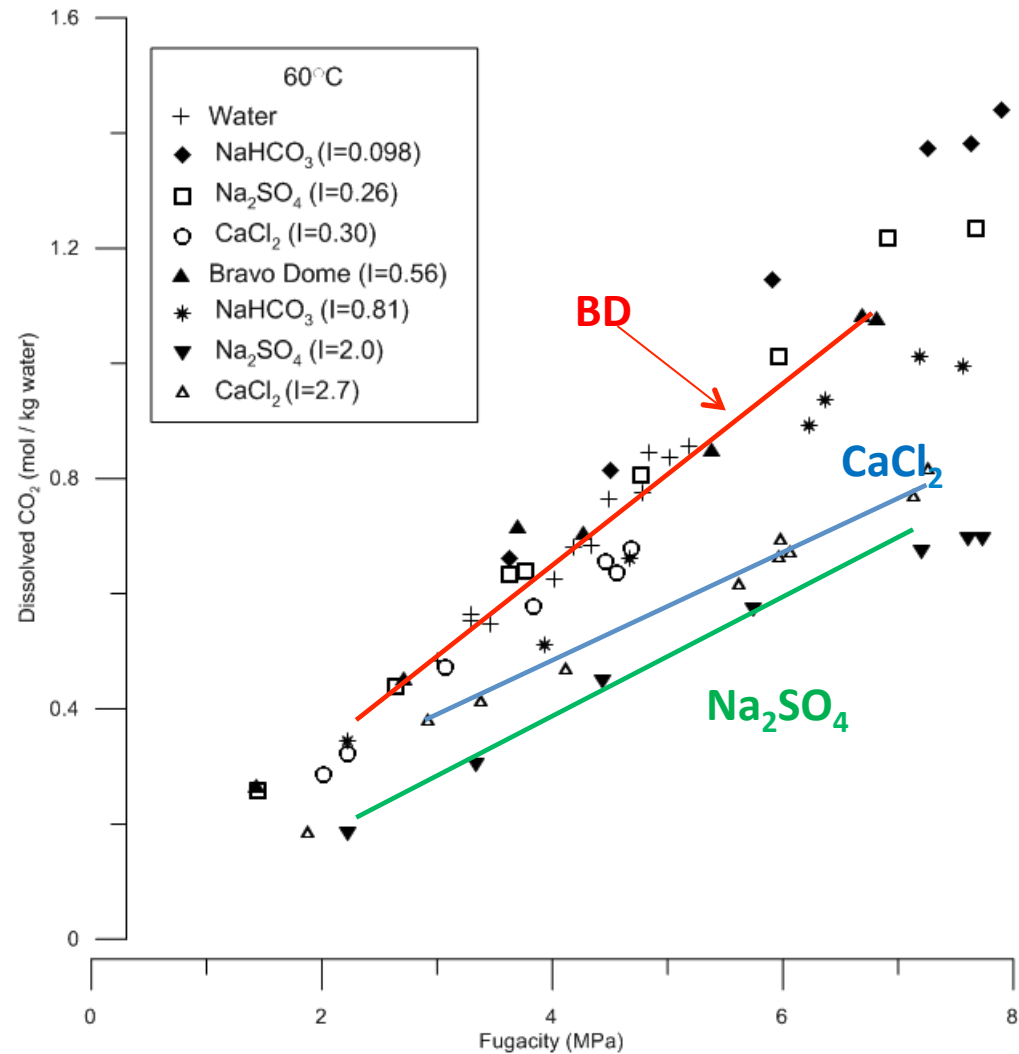
## Impact on Specific Challenges (not every challenge needs to be listed)

**Challenge 2: Providing data and models for understanding the fundamental relationships between dissolved CO<sub>2</sub> and dissolved salts.**



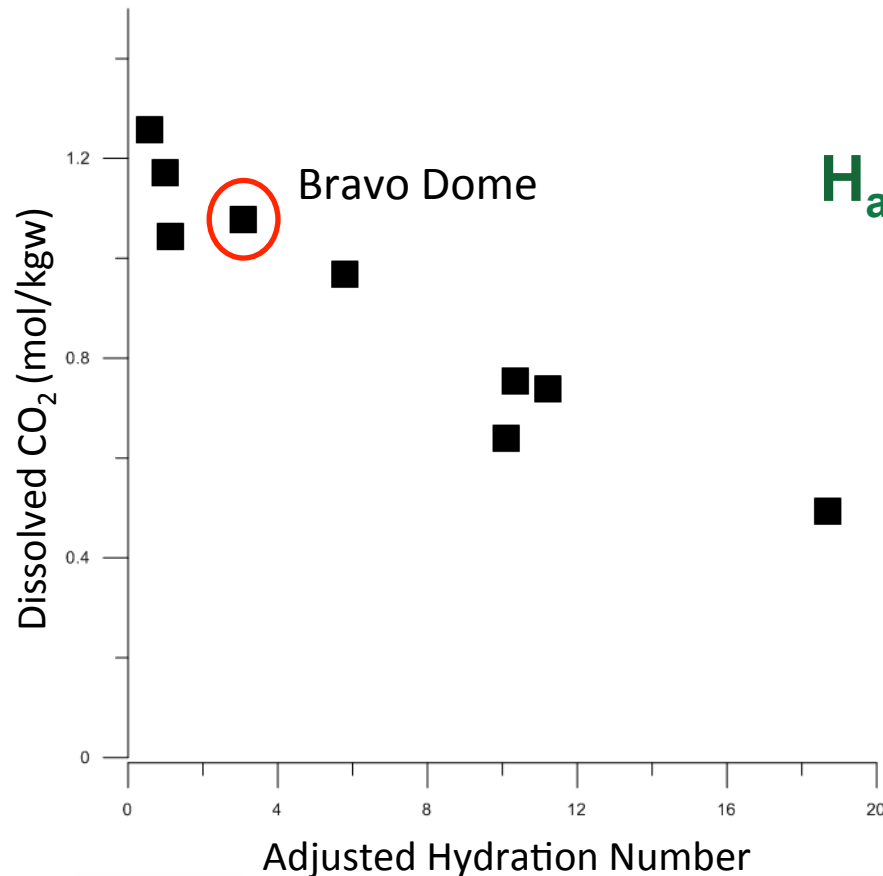
# CO<sub>2</sub> SOLUBILITY IN SIMPLE AND COMPLEX BRINES CONTAINING Na<sup>+</sup>, Ca<sup>2+</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, and HCO<sub>3</sub><sup>-</sup>

- Measured dissolved CO<sub>2</sub>
- Ionic strength bad predictor of dissolved CO<sub>2</sub>
- CaCl<sub>2</sub> (I=2.7) dissolved more than Na<sub>2</sub>SO<sub>4</sub> (I=2.0)
- BD behaved like water but I = 0.56
- LLNL, PhreeqC and Pitzer >10% error for BD predictions



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- Dissolved CO<sub>2</sub> vs adjusted hydration number (H<sub>a</sub>) a strong correlation (R<sup>2</sup> = 0.92)
- Dissolved CO<sub>2</sub> in Bravo Dome brine predicted within <2%



Hydration # (H)  
([Marcus, 1997](#))

Na<sup>+</sup> 3.5

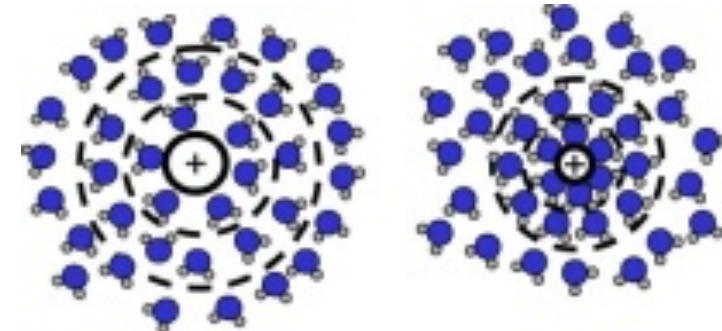
Ca<sup>2+</sup> 7.2

Mg<sup>2+</sup> 10

Cl<sup>-</sup> 2.0

SO<sub>4</sub><sup>2-</sup> 3.1

HCO<sub>3</sub><sup>-</sup> 2.3



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