DE-FE0031705: Synthetic Calcium Carbonate Production by Carbon Dioxide (CO_2) Mineralization of Industrial Waste Brines

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2/15/2019-2/14/2022, DOE share: $799,995, cost share: $199,998

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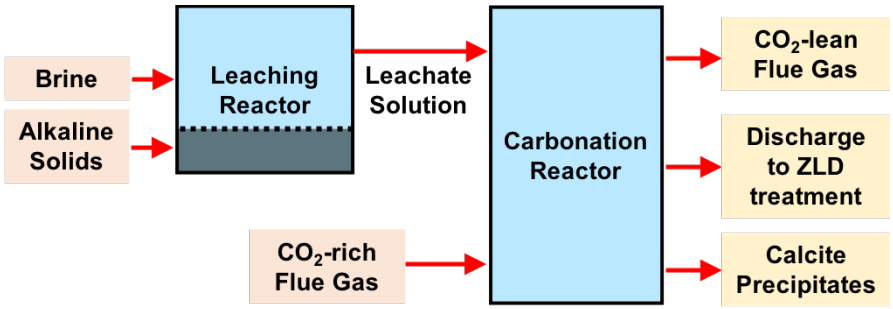
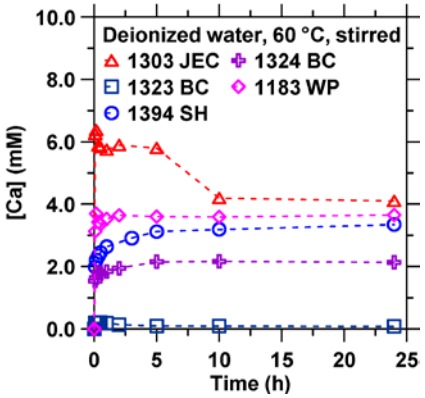
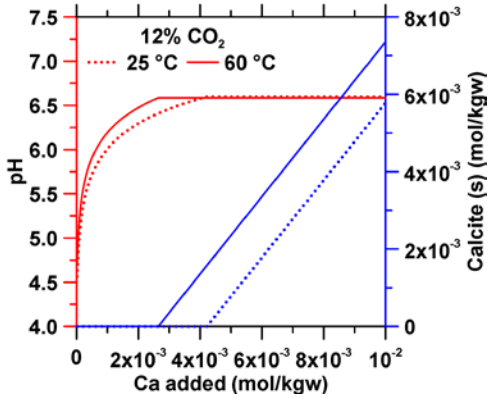
Develop and evaluate the proposed methods for production of precipitated calcium carbonate (PCC) while simultaneously utilizing CO_2 and industrial solid and liquid wastes

Process A: Coal ash carbonation

Ca and alkalinity source: coal ashes non-compliant with ASTM C618, including bottom ash, high sulfur fly ash, FDG waste, and ponded ash





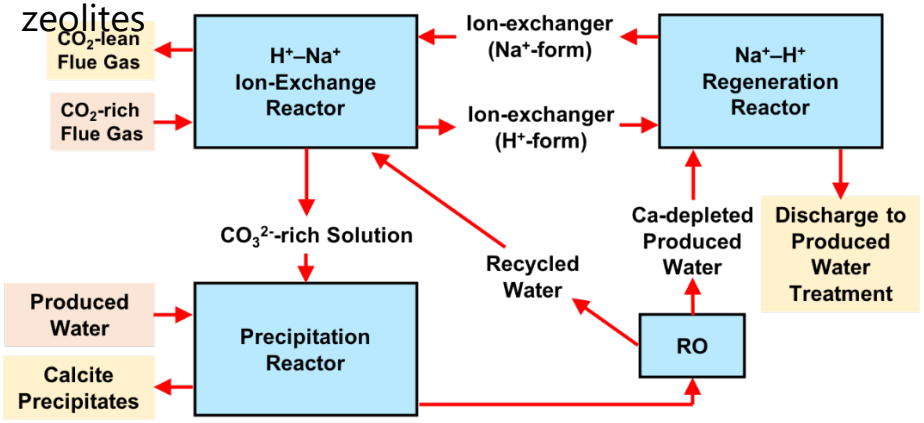


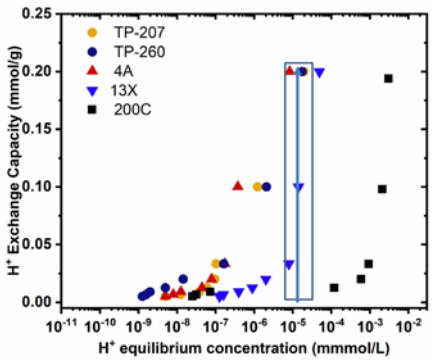
Ca leaching and precipitation

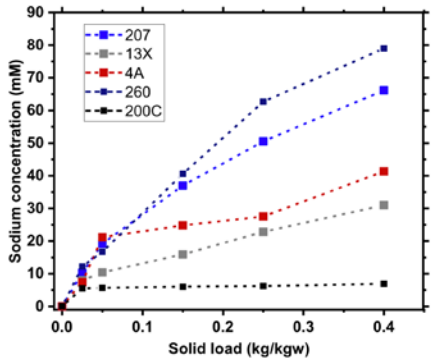
Process B: Produced water carbonation

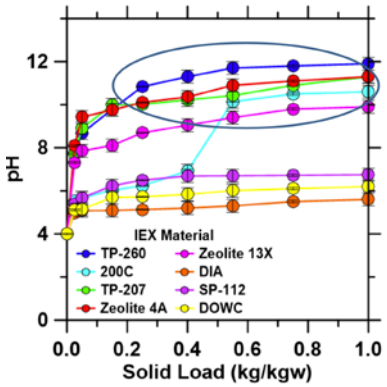
Ca source: produced water from oil and gas operations;

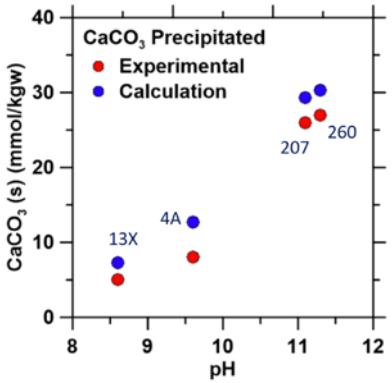
Alkalinity source: ion-exchange using resins and zeolites











Na^+/H^+ ion-exchange capacity and kinetics

Work plan

Obtain characteristics of materials, physical and chemical processes

- Feedstock characterizations: coal ashes, wastewater and ion-exchanger
- Capacity and kinetics measurement: leaching, precipitation and ion-exchange

Milestone:
- Obtain feedstock characteristics (8/14/2019)
- Establish kinetic characteristics of the physical and chemical processes (8/14/2020)

PCC production process design

- Aqueous coal ash carbonation
- Produced water carbonation by ion-exchange
- LCA & TEA

Milestone:
- Establish process designs, parameters, and performance/ROI (8/14/2021)

Laboratory-scale demonstration of PCC production (2/14/2022)

Acknowledgment

This material is based upon work supported by the Department of Energy under Award Number DE-FE0031705.

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