



## Effect of iron cation on geochemical trapping of CO<sub>2</sub> in brine

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Carbon dioxide sequestration using brines has emerged as a promising technology to mitigate the adverse impacts of climate change due to its large storage capacity and favorable chemistries. However, the permanent storage (mineral trapping) of CO<sub>2</sub> in brines takes significantly long periods of time as the formation and precipitation of carbonates is very slow. [1]. The main parameters reported to effect on mineral trapping of CO<sub>2</sub> sequestration in brines are brine composition, brine pH, system temperature and pressure. [2, 3]. It is suggested that the precipitation of mineral carbonates is mostly dependent on brine pH. Previous studies by the authors concluded that iron in natural brines causes pH instability, but it was not ascertained whether ferric iron or ferrous iron caused pH instability. [4]. Accordingly, the aim of this project is to study synthetic brines mimicking the major ions found in natural brines and including different concentrations of ferric and ferrous iron. Three brines were prepared, as follows: Brine 1 was prepared with ferric Fe<sup>3+</sup> iron, Brine 2 prepared with ferrous Fe<sup>2+</sup> iron and Brine 3 prepared with no iron. A series of pH stability studies and carbonation reactions were conducted using the above three brines. It is concluded that the ferrous iron causes pH instability, while ferric iron might promote carbonate precipitation.

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3. Liu, Q. and M.M. Maroto-Valer, *Parameters affecting mineral trapping of CO<sub>2</sub> sequestration in brines*. Greenhouse Gases: Science and Technology, 2011. **1**(3): p. 211-222.
4. Druckenmiller, M.L. and M.M. Maroto-Valer, *Carbon sequestration using brine of adjusted pH to form mineral carbonates*. Fuel Processing Technology, 2005. **86**(14): p. 1599-1614.