CARBON SEQUESTRATION POTENTIAL IN SIMULATED SALINE LAKE WATERS

- Four simulated saline lakes were created by mixing deionized water and a combination of different salts. Two sets of experiments were conducted by diffusing CO_{2(g)} through each simulated lake over 30 days. The first set tested the carbonate system response to elevated CO_{2(g)}. The second set of experiments replicated the same process but used ammonium hydroxide 96% water) to elevate pH; optimum range 8.5 - 9.5. Water samples were collected daily to test for cation loss via mineralization. - Each simulated saline lake was created to equal approximately 1000 mL of solution in a 2000 mL glass beaker. - An atomic 55 mm CO₂ diffuser was placed in the bottom of the glass beaker. Plastic tubing was used to attach the diffuser to a 50 lb steel CO₂ tank. A pressure of 30 psi was used on each experimental lake throughout both the first and second rounds. - Lake samples were collected through a disposable polyethylene pipette and then transferred to a 5 mL plastic vial. A Perkin Elmer Atomic Absorption Spectrometer 3110 was used to analyze all samples collected. Ca and Mg were the two cations that were to be analyzed. Parameters of pH, temp °C, date and time were recorded with each sample. Analyses are now underway using X-ray diffraction and scanning electron microscopy to characterize the newly precipitated carbonate minerals.

THE FOUR SIMULATED SALINE LAKES & RELATED EXAMPLES

Lake 1 – Na-Mg-Cl-SO₄ (Great Salt Lake, Utah, USA)

Lake 2 – Mg-Na-Ca-Cl (Dead Sea, Israel)

Lake 3 – Mg-Na-K-Cl (Dabusun Lake, Qaidam Basin, China)

Lake 4 – Ca-Mg-Cl (Donglin Lake, Qaidam Basin, China)

HYDROCHEMISTRY OF LAKES – MAJOR ION CONCENTRATIONS

All Results in mg L

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Lake Type	Na	K	Ca	Mg	SO4	Cl	HCO3+CO3
Lake 1	85,700	4,550	319	8,050	17,400	147,000	327
Lake 2	39,330	6,500	17,750	40,450	760	212,600	290
Lake 3	20,300	18,063	882	79,161	5,764	264,869	2,502
Lake 4	1,890	23	60,518	110,101	19	426,145	0

SIMULATED LAKE RECIPES

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Lake Type	NaCl	KC1	$CaCl_2$	MgCl ₂	Na_2SO_4	Na ₂ CO ₃
Lake 1	196,940	8,950	890	31,440	25,570	320
Lake 2	99,350	12,670	48,830	158,140	1,140	210
Lake 3	39,800	17,300	2,440	310,280	8,520	4,350
Lake 4	4,790	40	167,590	431,550	28	0

All results in mg L^{-1}

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METHODS



Experimental Lakes