Deposition of Trona[1]

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ABSTRACT

The deposition of trona from sodium carbonate-sodium bicarbonate brines is governed principally by temperature, pressure and the activities of CO_2, H_2O and Na^+. Measurements of $^aCO_2$ and ^aH_2O between 20° C and 60° C have been carried out for a number of brines saturated with respect to trona and trona + halite. Maximum values for $^aCO_2$ and ^aH_2O are represented by the assemblage nahcolite + trona + solution and minimum values by thermonatrite + trona + solution. The following CO_2 contents (in volume %) were determined in a gas phase equilibrated with brines saturated with respect to a number of solids:

T, °C	*20*	*30*	*40*	*50*	*60*
trona+nahcolite +solution	*0.148*	*0.2890*	*0.518*	*0.995*	*2.030*
trona+nahcolite +halite+solution	*0.113*	*0.215*	*0.434*	*0.878*	*1.630*
trona+thermonatrite+solution	.....	.....	*0.002*	*0.006*	*0.016*

Present day atmosphere contains between 0.030 and 0.040% CO_2. At normal temperatures of natural brines, therefore, trona will precipitate, if such brines are in equilibrium with the atmosphere.

The sodium contents of the saturated solutions, in gNa/100g solution, are as follows

T, °C	*20*	*30*	*40*	*50*
trona+nahcoline +solution	*9.6*	*9.7*	*9.8*	*10.0*
trona+natron +solution	*7.8*	*12.2*	....	....
trona+thermonatrite+solution	....	....	*14.2*	*13.9*
trona+nahcolite +halite+solution	*11.0*	*11.2*	*11.5*	*11.7*

An undersaturated sodium bicarbonate-sodium carbonate brine can become saturated with respect to trona in one of three ways: (1) evaporation, (2) addition of CO_2, (3) decrease of temperature. Presumably (1) leads to the bedded trona deposits, and (2) to the bladed trona crystallizing from interstitial brines. It is now possible to predict quantitative pathways for brines under given sets of conditions.

[1] No paper available for publication.