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AN: **PP13B-1392**TI: **Concentration And $\delta^{13}\text{C}$ Values Of Occluded CO_2 In Coexisting Gibbsite And Goethite Of A Cenomanian Paleosol**AU: **FENG, W**EM: *weimin.feng@gmail.com*AF: *Huffington Department of Earth Sciences, Southern Methodist University, Dallas, TX, United States*AU: **Yapp, C J**EM: *cjyapp@mail.smu.edu*AF: *Huffington Department of Earth Sciences, Southern Methodist University, Dallas, TX, United States*

AB: The concentrations and $\delta^{13}\text{C}$ values of CO_2 occluded in coexisting gibbsite and goethite from a Cenomanian paleosol in southwestern Minnesota were measured for eight samples collected from different depths in the paleosol. Each sample was split into two aliquots--one of which underwent a 5M NaOH treatment to dissolve gibbsite, while the other was treated with citrate-dithionite (CD) to selectively dissolve goethite. CO_2 was extracted from the treated samples using a stepwise vacuum dehydration method. In a plot of $\delta^{13}\text{C}$ against $1/F$ (where $F = n\text{CO}_2/n\text{H}_2\text{O}$), the pattern of values for increments of evolved CO_2 suggests the presence of two generations of goethite. In contrast, there appears to be only one recognizable gibbsite generation, whose samples exhibit well-defined sets of plateau $\delta^{13}\text{C}$ and F values during incremental dehydration. The gibbsite plateau $\delta^{13}\text{C}$ values range from -12.8‰ to -9.6‰ among the samples, while the F values range from 0.0009 to 0.0046. A plot of gibbsite plateau $\delta^{13}\text{C}$ values against $1/F$ suggests that for all but one sample, there is some correlation with a negative slope ($\delta^{13}\text{C} = -0.023/F - 5.1$; $r^2 = 0.53$). The negative slope is consistent with crystallization of the gibbsite in the presence of a mixture of three isotopic endmembers of CO_2 (CO_2 from oxidizing organic matter, CO_2 from Earth's atmosphere, and CO_2 from dissolution of a carbonate mineral--e.g. siderite). The three-component mixing environment inferred for the gibbsite is similar to that deduced for the younger generation of goethite (generation 2). Moreover, if gibbsite and goethite formed at the same time at their various depths in this paleosol, they would be expected to show essentially the same pattern of variation of $\delta^{13}\text{C}$ with depth. This expectation is more nearly realized in a comparison of gibbsite $\delta^{13}\text{C}$ values with the $\delta^{13}\text{C}$ values of generation-2 goethite than in a comparison with the robust two-component data from the older generation-1 goethite. If the implications of this comparison are valid, they suggest that CO_2 from gibbsite and goethite coexisting in paleosols might be used to unravel otherwise cryptic aspects of the history of such ancient systems and could provide additional constraints on interpretations made from the data.

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