NOTES AND COMMENTS

LETTER TO THE EDITOR

The paper by Pachiaudi *et al*, "Isotopic Fractionation of Carbon During CO_2 Absorption by Mortar," (Radiocarbon, v 28, no. 2A, p 691–697) interprets (p 696) the very low $\delta^{13}C$ (= $-21‰$) of calcium carbonate resulting from the reaction of atmospheric CO_2 with CaO, as the combination of the original $\delta^{13}C$ of air CO_2 (= $-8.2‰$) and the fractionation factor between CO_2 and $CaCO_3$. Unfortunately, the fractionation factor they quoted (Craig, 1953) is taken with the wrong algebraic sign. Everybody knows that ^{13}C of carbonate more or less in equilibrium with atmospheric CO_2 is around zero.

$\delta^{13}C$ of carbonates lower than equilibrium values with CO_2, in such cases, are found when sursaturation is very high (for instance, when a mineral carbon solution finds a high pH barrier, which is the case in their experiments). Turner (1982, p 1183) has explained this effect up to pH = 9. Much higher kinetics effects are observed, and therefore very low $\delta^{13}C$, are found for a heterogeneous system (gas-liquid-solid), and $-21‰$/PDB is therefore an out-of equilibrium value easily explained by a pure diffusion fractionation effect between $^{13}CO_2$ and $^{12}CO_2$ at the interface air-liquid phase, when the concentration of dissolved CO_2 is forced down to zero.

René Letolle
Department of Dynamic Geology
University Pierre and Marie Curie
Paris, France

REFERENCES

Craig, H, 1953, The geochemistry of the stable carbon isotopes: Geochim et Cosmochim Acta, v 3, p 53.
Turner, J V, 1982, Kinetic fractionation of carbon-13 during calcium carbonate precipitation: Geochim et Cosmochim Acta, v 46, p 1183–1191.

129