Downloaded from rsta.royalsocietypublishing.org

PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A MATHEMATICAL, PHYSICAL & ENGINEERING SCIENCES

Final Discussion

D. P. McKenzie, M. L. Coleman, I. Hutcheon, C. D. Curtis, R. Petrovich, J. Small, A. C. Aplin, P. Ortoleva and D. R. Lovley

Phil. Trans. R. Soc. Lond. A 1993 **344**, 181
doi: 10.1098/rsta.1993.0086

Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right-hand corner of the article or click **here**

To subscribe to *Phil. Trans. R. Soc. Lond. A* go to:
http://rsta.royalsocietypublishing.org/subscriptions

This journal is © 1993 The Royal Society

Downloaded from rsta.royalsocietypublishing.org

Final discussion

D. P. McKenzie. From the last two days' presentations, it is clear that we need to include microbiology in all considerations of chemical composition/reactions of water during diagenesis.

M. L. Coleman. It is also apparent that we need to know much more about Si and Al in deeper sediment pore water, but it really is extremely difficult to get samples which are free from contamination.

I. Hutcheon. L. Walter and I analysed formation waters. Determination of Al is certainly very difficult: concentrations obtained depend largely on the filter size used! Si analysis is more straightforward but care is still needed. Free energy calculations provide useful checks.

M. L. Coleman. Dr Hutcheon mentions that filter size strongly influences the Al content of analysed formation waters. Is there a similar influence on silica content?

I. Hutcheon. The concentrations are higher, therefore errors are lower. Temperature certainly influences silica in solution. Amorphous silica is present at low temperatures but quartz precipitates at high temperature.

C. D. Curtis. I agree with Max Coleman that we urgently need better quality data from deep formation waters. It is also true that the complexing of Si and Al in solution is not well understood.

R. Petrovich. Enhanced silica levels in formation waters downstream from an oil lens have been documented: this is indirect evidence for organo-silica complexing.

J. Small. There are experimental data for simple systems. Al solubility is enhanced by an oxalate complex at high temperatures, but no equivalent increase in silica solubility has been noted.

R. Petrovich. Do we know if the silica complexes are unstable at high temperature?

A. C. Aplin. Organic complexes of Al are only important at micromolar levels. Na may compete with Al and Si. Organic acids themselves are only present at very low concentrations. One problem is that the formation water at the time of mineral precipitation may be very different from that of present-day formation water.

M. L. Coleman. In this context, tracing fluid sources and pathways at present is at least helpful for (1) fluid flow direction, (2) quantification of movement patterns, (3) assessing the timing of fluid transport. Fluid inclusions give information about palaeo-systems.

C. D. Curtis. Some higher plants incorporate substantial amounts of silica. Have these mechanisms been studied? Such information might throw useful light on low-temperature organic complexes.

P. Ortoleva. What about chemotaxis: can microbes work against the gradient of what they are looking for?

D. R. Lovley. It is probably unimportant. Bacteria are driven by prevailing environmental conditions. There is a potential for microbes living on silica surfaces to produce organic acids which might then influence solubility.

© 1993 The Royal Society

The Royal Society is collaborating with JSTOR to digitize, preserve, and extend access to *Philosophical Transactions: Physical Sciences and Engineering.* www.jstor.org