Geophysical Research Abstracts, Vol. 9, 06319, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06319


# Capturing spatial trends in an 1D packed bed experiment for the validation of reaction-transport code predictions

G. Battaia (1), D. Garcia (1), A. Lallemand (1), J. Moutte, A. Michel (2) and E. Brosse (2).

(1) Centre SPIN, Ecole Nationale Supérieure des Mines de St. Etienne, France (battaia@emse.fr, garcia@emse.fr, lallemand@emse.fr, moutte@emse.fr) (2) Institut Français du Pétrole, France (anthony.michel@ifp.fr, Etienne.BROSSE@ifp.fr)

In $CO_2$ storage projects, performance assessment and the evaluation of mid to long term risk needs some reaction-transport modelling. An increasing number of codes having the relevant capability are being developed, but their predictions remains difficult to validate due to monitoring limitations in pilot scale experiments and the complexity of natural porous media. Furthermore, the results of most laboratory experiments can hardly be predicted using these codes, because of the homogenisation assumptions (and parameter fitting) they need.

We report here on an attempt to design a 1D experiment whose behaviour could be predicted with the current capabilities of a reaction-transport code (COORES, IFP). The reactor is a 6 m long tube (volume 0.7 l, inner diam. 12 mm ) where water flows (0.5 to 5 ml/min) through packed beds, at T, P up to 150˚C, 20 bar. Owing to the segmentation of the reactor, the water flux may be redirected to a small volume sampler at any of 7 fixed positions along the flow. This design allows capturing both the spatial profile of the reacting fluid chemistry at a given time down flow, and the temporal change in fluid composition at any fixed position, with minimum impact on the reaction itself by virtue of the small dead volume of the sampling derivation. It is hoped that this design will allow capturing non-linear chemical profiles such as numerically predicted for the migration of a dissolution front (decarbonatation) or during the dissolution of a primary solid coupled with the precipitation of secondary carbonates (carbonatation).

*Acknowledgements*

*"This research work has been made possible thanks to the support from the French ANR program Geocarbone Carbonatation."*