A selection of thermodynamic properties for zeolites: application to the cement/clay interactions

Philippe Blanc, Philippe Vieillard, Stéphane Gaboreau, Hélène Gailhanou, Francis Claret, Benoit Madé, Eric Giffaut

▶ **To cite this version:**

Philippe Blanc, Philippe Vieillard, Stéphane Gaboreau, Hélène Gailhanou, Francis Claret, et al.. A selection of thermodynamic properties for zeolites: application to the cement/clay interactions. Goldschmidt Conference 2014, Jun 2014, Sacramento, United States. hal-00990787

HAL Id: hal-00990787
https://brgm.hal.science/hal-00990787

Submitted on 14 May 2014

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

A selection of thermodynamic properties for zeolites: application to the cement/clay interactions

P. BLANC[1]*, P. VIEILLARD[2], S. GABOREAU[1], H. GAILHANOU[1], F. CLARET[1], B. MADE[3] AND E. GIFFAUT[3]

[1]BRGM, BP36009, 45060, Orléans, France (*correspondence : p.blanc@brgm.fr)
[2]Hydrasa, 5 Av. Albert Turpain, 86022 Poitiers-Cedex, France
[3]Andra, F-92298 Châtenay-Malabry Cedex, France

Deep disposal concepts are usually based on a multibarrier concept that may involve a physical contact between clayey and cementitious materials. In such context, zeolites are a group of important phases, which group most of the transition phases between cement and the clayey barrier since zeolites have been shown to form readily after the weathering of clays in a hyperalkaline environment [1]. Thermodynamic properties can be found in the literature for some of the zeolites of interest in deep disposal contexts. However, there is still a lack of consistency among the available thermodynamics datasets. A first task realized in the present work consists in a critical selection of the thermodynamic datasets published so far. The selection could be achieved with some confidence for a rather large list of minerals. Some questions and uncertainties still remain for phases like phillipsite, chabazite or gismondine.

Cases from the previous critical selection indicate the role of kinetics in the precipitation of zeolites, which can help in moderating the phase relations indicated by thermodynamics and can be related to field observations or experimental results. In addition, the concept of rock acidity can applied with success in order to investigate the phase relations between cements, zeolites and clayey materials.

[1] Gaucher and Blanc (2006) Waste Management **26**, 776-788