

Dissolution of portlandite

¹Galan I^{1*}

¹Eduardo Torroja Institute IETcc-CSIC, Madrid, Spain

²Glasser FP

²University of Aberdeen, Chemistry Department, Aberdeen, United Kingdom.

¹Andrade C, ¹Baza D

Abstract

Portlandite, one of the main products of cement hydration and which normally comprises about 25% of the paste, is a principal buffer responsible for maintaining the high pH in response to interactions between the paste and its service environment. The kinetics of these environmentally - conditioned reactions are often important. However the present approach to kinetics is handicapped by lack of fundamental data.

For example, we lack data on the kinetics of dissolution of portlandite. Portlandite is congruently soluble and its dissolution rate and mechanism are reported. Single crystals of portlandite have been grown and their effective surface area measured. Dissolution rates are reported into initially pure water as functions of calcium hydroxide concentration. The impacts of low concentration of other ions, e.g., chloride, on congruent dissolution kinetics are reported.

Originality

The complex events occurring in the course of cement hydration and service have inhibited their quantification. Elsewhere in this meeting Matschei and Glasser (2011) describe the between kinetics and thermodynamic equilibrium approaches to cement hydration: to relate engineering properties to chemistry and mineralogy, we must characterize the initial and final states as well as the reaction pathways. This is the province of kinetics. By making a fresh start, and by transferring methodologies from other disciplines, we seek to establish that (i) kinetic processes can be isolated for separate study and (ii) the results can be linked to equilibrium studies.

Chief contributions

Developing a quantitative foundation for the kinetics of cement hydration linked to equilibrium and, in due course, integrated with computer-based models.

Keywords: Portlandite, dissolution, kinetics

¹ Corresponding author: Email isabelgalan@ietcc.csic.es Tel +34913020440, Fax +34913020700