

**EXPERIMENTAL
RESEARCHES ON THE
CONSTITUTION OF
HYDRAULIC MORTARS**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649517770

Experimental Researches on the Constitution of Hydraulic Mortars by Henri Le Chatelier

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HENRI LE CHATELIER

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TRANSLATED FROM THE ORIGINAL

BY

JOSEPH LATHROP MACK



NEW YORK
MCGRAW PUBLISHING COMPANY
114 LIBERTY STREET
1905

AUTHOR'S PREFACE TO THE ENGLISH EDITION.

My thesis for the degree of Doctor of Science, upon the *Experimental Study of the Constitution of Hydraulic Mortars*, has been, for fifteen years, the starting point of numerous studies; some of these, and especially those of Mr. Newberry, have notably confirmed my first results in regard to the action of supersaturated solutions; to the composition of the calcium silicate, which is the active element in cements; and to its manner of reacting in contact with water. These have been completed in other points, as by the studies of M. Candlot, to whom is due the discovery of two extremely important compounds which relate to the behavior of cements in the sea; the calcium chloro— and sulpho-aluminates. Lastly, my results have been corrected in certain points of detail, as, for example, the formula for hydrated calcium aluminate.

When Mr. J. L. Mack offered to translate my memoir into English, I hesitated a little before accepting. Do studies so old as these possess still sufficient interest to merit reprinting? It would have been necessary to completely recast this work in order to incorporate into it the most recent researches. But I have not the time to do this, and I have taken a middle course. I have indicated in notes the most important advances in our theoretical knowledge of cements and have given the references to the papers in which these studies are recorded.

I apologize for allowing so incomplete a work to be reprinted and I thank Mr. Mack for wishing to take the trouble to translate it. It is nevertheless a great satisfaction to me to think that in a country where such great advances have been realized in the cement industry, my researches still seem to have interest.

H. LE CHATELIER.

Villers sur mer, August 1, 1903.

TRANSLATOR'S PREFACE.

Although this thesis of Monsieur Le Chatelier appeared in 1887, it was ten years before any new work of importance was published on the subject of the *Constitution of Cements*. In 1897 the matter again received attention, and the discussion and investigations started at that time have continued up to the present time, and have amplified and confirmed the results obtained by Monsieur Le Chatelier. His classic work therefore stands to-day as the first, the most complete and beautiful piece of work done upon the chemistry of Portland cement, and since the original is not easily obtained and all later work on this subject goes back to and rests upon this thesis, I have thought that it ought to be available to all who are interested in the manufacture and use of Portland cement.

In representing the chemical formulas, the rational form used by the author has been retained because of certain advantages which it possesses over the empirical form, although in some cases the latter might be preferable. But it has been necessary to change some of the formulas slightly to make them conform to the atomic weights which are at present used, for example, "HO" becomes H_2O and "CaCl" becomes $CaCl_2$.

In an appendix has been added some formulas for converting metric into English units. The table which appears on page 122 has been calculated into percentages.

The author has very kindly read the corrected proof, and it is a pleasure to record my appreciation of the kindness and interest shown by him and others during the progress of the translation. Nor should I fail to mention the courtesy and patience of the publishers during preparation of this book.

J. L. M.

FORDWICK, January, 1905.

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