

Book reviews

Alkali-activated cements and concretes.

C. Shi, P. V. Krivenko and D. Roy.

Taylor and Francis, London, 2006, 376 pp. ISBN 0-4157-0004-3, £95

In recent decades, alkali-activated cements and concretes have attracted worldwide interest because of their low energy requirements, their high strength and their good durability, as compared to Portland cements. A further incentive for their development stems from the enormous annual output of fly ash, metallurgical slags and other industrial waste products. Thus alkali activated cements hold out the promise of truly 'green' cement. However, many of the primary sources of research literature, as well as the descriptions of their practical use, are written in Chinese and Russian, which makes them less accessible to Anglophone scientists.

While similar binders were first reported in the 1930s, it was Glukhovsky's discovery, in the 1950s, that binders could be produced by directly mixing alkaline activators and ground metallurgical slags, fly ash and other pozzolanas that started his 30 year career of research and development, and facilitated commercial production and the development of a host of specifications and standards for materials and products in the former Soviet Union, where the materials may be considered mature. Of the authors of this book, Krivenko hosted two conferences in Kiev in the 1990s and now directs the Glukhovsky Research Institute, while Shi was co-author of a seminal review article on Chinese research published in this journal in 1993. Both have published widely and, combined with Roy's experience as former editor of a major journal, this book therefore promises much as a critical compilation of the current state of the art in alkali-activated materials. The authors are to be congratulated on

bringing together published information from all over the world into the first English language textbook on the subject.

The book opens with a fascinating compilation of the properties of the six groups of alkaline activators—caustic alkalis like NaOH, non-silicate weak acid salts like Na_2CO_3 , silicates, aluminates, alumino-silicates and non-silicate strong acid salts like Na_2SO_4 —touching on their manufacture and sources. This is followed by a description of the most common cementing components—slags, ashes, pozzolanas, metakaolin and silica fume. In both cases, potential users are reminded of the variation between the properties of the constituents according to their chemical constitution and source. Reflecting the preponderance of slags as cementing components, much of the rest of the book deals with hydration, fresh properties, hardened properties and durability of alkali-activated slag cements and concretes, with only three chapters on all of the other types of binder. There is a useful chapter on the mix design of these concretes, which confirms how 'normal' they are, although I did notice that the tables extend to much lower workabilities than are currently favoured and assume the use of intensive mechanical compaction.

A chapter describes a number of case studies of the use of the materials in construction projects of various kinds. These are illustrated and some technical investigations of the properties of the concrete after service are briefly described, with the general message confirming that alkali-activated cement concrete can be

highly durable. The final chapter summarises more than 60 technical standards and specifications that were developed over 40 years in the former Soviet Union, and which are mostly still in force. They deal with all aspects from raw materials to finished products and the processes for making them. While the details are scant, some hints at the difficulties of concrete production in Russia can be gleaned, low ambient temperatures for example, and the comprehensive listings will be a useful resource to save workers in other countries significant time and effort.

The book is well produced overall, although stricter copy-editing could have eliminated some of the cumbersome English phrasing. Some of the nearly 200

diagrams are too small for clarity, and occasionally I wished that an electron microscope image were brighter to show more detail. However, this is amply compensated for by the upwards of 700 references that are cited. This is truly a guidebook to a treasure house of information. However, I would criticise one omission. Nothing is said about the safety-related challenges of using highly alkaline activators in concrete construction; I would have been fascinated to discover how the multi-storey residential buildings described were safely cast in situ using a concentrated caustic alkali activator. In conclusion, this book should be on the shelf of everyone with an interest in these materials.

P. F. G. BANFILL

Concrete: Neville's insights and issues.

A. Neville.

Thomas Telford Publishing, London, 2006, 314 pp. ISBN 0-7277-3468-7, £65

This book, by one of the most noted civil engineers of his generation, contains a series of essays, consisting mainly of previously published papers and articles, together with original bridging and explanatory material. Topics dealt with include the significance of the water: cement ratio, high alumina cement, durability (mainly related to sulphate attack), cracking of concrete and a number of miscellaneous topics such as workmanship and quality issues, as well as speculations on the past, present and future of concrete.

Neville has a way of revisiting topics often in a way uncomfortable to present practice by highlighting areas where present knowledge is limited or where conventional wisdom is inadequate. This is valuable. Unfortunately the general tone he takes towards attempts to improve quantitative knowledge of cement performance by the application of fundamental science is negative. Many of the current efforts to inject a science and knowledge base into cement engineering are either not cited or are rejected out of hand, mainly as the work of well-meaning but inadequate and bumbling scientists,

otherwise known as chemists and materials scientists. Indeed it would appear from a series of asides that the world of cement science is also populated by a group of lawyers bent on twisting and distorting to their own pecuniary advantage (as well as that of their clients) the truths propagated by honest and ethical engineers. While Neville's own experiences of the law may not be favourable I see no reason why they should be inflicted on the purchaser.

This book will undoubtedly sell well and it is refreshing to know that the art of polemic writing is still alive and well: in truth, I enjoyed these bits the best. But I cannot recommend this book except to professionals who are capable of separating truth from supposition. It would retard seriously the professional development of students were it to be placed in their hands without a 'health warning' suitably adapted from those required to be placed on, for example, potentially harmful and intoxicating substances.

F. P. GLASSER