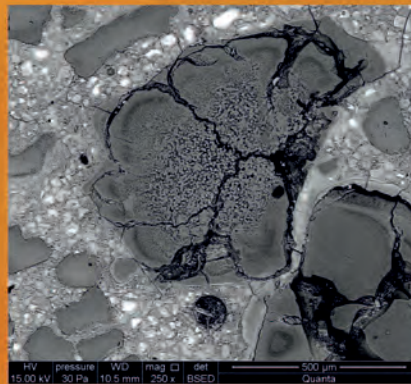
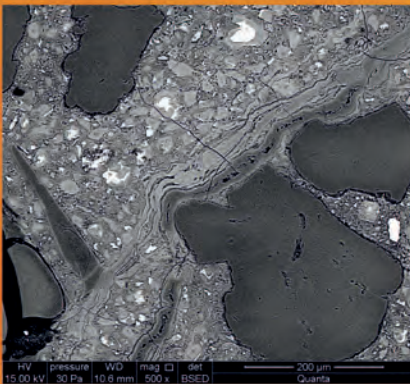


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Streszczenie

Wybrane aspekty zapobiegania skutkom reakcji alkalia-krzemionka

Reakcje wodorotlenków sodu i potasu z kruszywami zawierającymi krzemionkę reaktywną wywołują ekspansję i pękanie betonu, prowadząc do jego zniszczenia. Zachodzące reakcje chemiczne i procesy fizyczne, będące następstwem zmian objętości, skutkują zmniejszeniem trwałości betonu. Stąd wynika potrzeba prowadzenia systematycznych badań w kierunku metod zapobiegania degradacji wewnętrznej betonu.

Praca swoim zakresem obejmuje istotne metody zapobiegania pojawieniu się ekspansji niszczącej beton, uwzględniające stosowanie związków litu oraz dodatków mineralnych. W szerszym kontekście rozważono rolę jonów glinianowych, pochodzących z aktywnego pucolanowego substytutu cementu w postaci metakaolinu oraz domieszki litowej. Rozważania pogłębiono o wpływ równoczesnego stosowania metakaolinu i azotanu litu na poprawę trwałości betonu. Przedstawiono również istotny problem współwystępowania reakcji alkalia-krzemionka i rekrytalizacji ettringitu, stwierdzony w kilkuletnich zaprawach. Poza licznymi wynikami badania ekspansji w pracy zawarto wyniki obserwacji mikrostruktury oraz zmian w składzie produktów reakcji alkalia-krzemionka i ich umiejscowienia.

Przedstawiona monografia stanowi wkład do nauki o procesach zachodzących w betonie narażonym na korozję wewnętrzną, wzbogacając wiedzę teoretyczną dotyczącą mechanizmów oddziaływania dodatków mineralnych i domieszek chemicznych jako potencjalnych metod zapobiegawczych. Z pracy wynikają również ważne wskazania zarówno dla badaczy problemu reaktywności kruszyw w betonie jak i praktyków.

Summary

Selected aspects of preventing deterioration from alkali-silica reaction in concrete

Deleterious expansions and cracking in concrete are induced by the reactions between sodium and potassium hydroxides and aggregates that contain reactive silica. Chemical reactions, as well as physical processes resulting from volume changes, reduce concrete durability. Finding a solution to preventing internal degradation of concrete through further systematic research is imperative.

The scope of the study addresses important methodologies applied to prevent deleterious expansions in concrete. In addition to the use of lithium compounds and mineral additives, the study examines the role of aluminate ions derived from the active pozzolanic cement substitute in the form of metakaolin and lithium admixture. The considerations are further extended to discuss the effects of the combined use of metakaolin and lithium nitrate and respond to the coexistence of alkali-silica reaction and ettringite recrystallization, found in a few years' old mortars. Numerous expansion test results are presented, together with the findings from microstructure observations and those of changes in the composition of alkali-silica reaction products and their location.

This monograph adds to the existing body of knowledge about processes occurring in concrete exposed to internal corrosion, and contributes to theoretical knowledge on the mechanisms of the impact of mineral additives and chemical admixtures as potential preventive methods. The work provides important indications both for the researchers of aggregate reactivity in concrete and for practitioners.