Influence of NaOH concentration on microstructure and properties of cured alkali-activated calcined clay

Kenza El Hafid, Mohamed Hajjaji, Hassan El Hafid

www.elsevier.com/locate/jobe

PII: S2352-7102(16)30113-9
DOI: http://dx.doi.org/10.1016/j.jobe.2017.04.012
Reference: JOBE251

To appear in: *Journal of Building Engineering*

Received date: 2 August 2016
Revised date: 14 April 2017
Accepted date: 20 April 2017

Cite this article as: Kenza El Hafid, Mohamed Hajjaji and Hassan El Hafid Influence of NaOH concentration on microstructure and properties of cured alkali-activated calcined clay, *Journal of Building Engineering* http://dx.doi.org/10.1016/j.jobe.2017.04.012

Influence of NaOH concentration on microstructure and properties of cured alkali-activated calcined clay

Kenza El Hafid *, Mohamed Hajjaji, Hassan El Hafid

Laboratoire Physico-Chimie des Matériaux et Environnement, URAC20, Université Cadi Ayyad, Faculté des Sciences Semlalia, Bd. Prince My Abdellah, B.P. 2390, 40001 Marrakech, Morocco.

Abstract

Microstructure of cured mixes composed of kaolinitic-illitic raw clay calcined at 700°C and sodium hydroxide (4-14 M) was investigated using X-ray diffraction, Fourier-transform infrared spectroscopy, Scanning electron microscopy and Thermal analysis. The change of the properties (flexural strength, density, water absorption, open porosity and electrical conductivity) versus NaOH concentration was evaluated and the possible formation of zeolite ZK-14 within the geopolymer matrix from the amorphous clay phases (mainly metakaolinite) was examined. Sodium carbonate was detected as a carbonation product. Due to heating, geopolymers were characterized by dehydration and subsequent recrystallization into nepheline. The development of the fibrous-zeolitic phase was favored by the increase of NaOH concentration and its impact on the studied properties was somewhat advantageous. The rise of alkali concentration within 4-11.5 M enhanced the extent of geopolymerization. The water absorption kinetic obeyed a pseudo-first order equation and the constant was in the range (18.38–51.01) x 10^{-2} min^{-1}.