SYNTHETIC PRECURSOR TO MAKE ALKALI ACTIVATED CEMENTS

A. Fernández-Jiménez, Instituto Eduardo Torroja (IEtcc CSIC), C/Serrano Galvache 4, 28033 Madrid, Spain
Instituto Eduardo Torroja (IEtcc CSIC), C/Serrano Galvache 4, 28033 Madrid, Spain
anafj@ietcc.csic.es
P. Martín-Rodríguez, Instituto Eduardo Torroja (IEtcc CSIC), C/Serrano Galvache 4, 28033 Madrid, Spain
I. García-Lodeiro, Instituto Eduardo Torroja (IEtcc CSIC), C/Serrano Galvache 4, 28033 Madrid, Spain
A. Palomo, Instituto Eduardo Torroja (IEtcc CSIC), C/Serrano Galvache 4, 28033 Madrid, Spain

Key Words: synthetic aluminosilicates, alkaline activation, characterization, geopolymers, thermal treatment

This work is part of a research line in which the general objective is to establish the scientific and technological basis for the development of synthetic aluminosilicate materials (see Fig. 1) capable of reacting, in the presence of alkaline solutions, to developing alkaline cements or geopolymers. Specifically, the effect of the temperature on the precursor synthesis (1000 ºC, 1100 ºC and 1200ºC) and the CaO content (~ 5.%, 10%, 20% and 40%) was studied in this work. These synthetic precursors were used in the manufacture of alkaline cements, for which they were mixed with a 8M NaOH solution (used as activator) and cured for 20h at 85ºC. One-day compressive strengths (see Fig.2) were determined and selected pastes were characterized by XRD, FTIR and BSEM/EDX.

Fig.1 Synthetic aluminosilicates

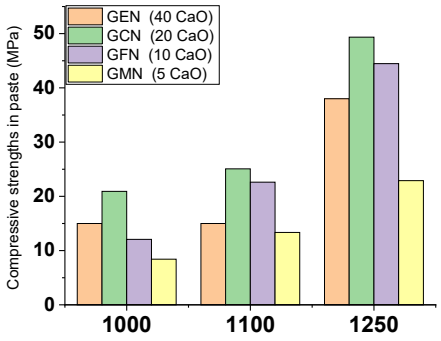

Fig.2 Mechanical strengths (MPa)

References:

I. Garcia-Lodeiron, E. Aparicio-Rebollo, A. Fernández-Jimenez, A. Palomo. Effect of calcium on the alkaline activation of aluminosilicate glass, Ceramics International 42 (2016) 7697–7707
C. Ruiz-Santaquiteria, A. Fernández-Jiménez, A. Palomo, Alternative prime Materials for developing new cements: Alkaline activation of alkali aluminosilicate glasses Ceramics International 42 (2016) 9333–9340
Katrina C. Newlands, Morten Foss, Thomas Matchei, Jørgen Skibsted, Donald E. Macphee, Early stage dissolution characteristics of aluminosilicate glasses with blast furnace slag- and fly-ash-like compositions, J. Am Ceram Soc. 2017;100:1941–1955
F. Bullerjahna, M. Zajaca, J. Pekarkovab, D. Nieda, Novel SCM produced by the co-calcination of aluminosilicates with dolomite, Cement and Concrete Research 134 (2020) 106083