

ACID ATTACKS ON METAKAOLIN BASED-GEOPOLYMERS WITH RECYCLED CORUNDUM: A STUDY FOCUSED ON THE ROLE OF ANIONS BY NMR CHARACTERIZATION

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Recycling corundum (RC) powder in metakaolin (MK)-based geopolymer formulations is proposed to reduce the amount of waste to be treated or disposed of in landfills, allowing to decrease ecological damage as well as to reduce transport costs for removal.

The geopolymer samples were made by adding recycled corundum before and after (as filler) the alkali activation of metakaolin to better understand the role of the Al in the 3D network (Figure 1). One major challenge in using MK-based geopolymers is their resistance to degradation when exposed to sulfuric and nitric acid. Therefore, after 28 days of curing time all the sample were immersed in sulfuric or nitric solutions with different concentrations for 8 days. After the immersion, the samples were washed with tap water, weighed and tested with different techniques (XRD, SEM, Mechanical Properties and NMR).

All the results showed how the RC affected positively the physical, mechanical and chemical properties of all geopolymers before and after the acid attacks.

Finally, using the Nuclear Magnetic Resonance (NMR) spectroscopy we investigated the structure and behavior of geopolymers before and after the acid attacks, obtaining information on the chemical and physical properties of these geopolymer formulations at the molecular level.

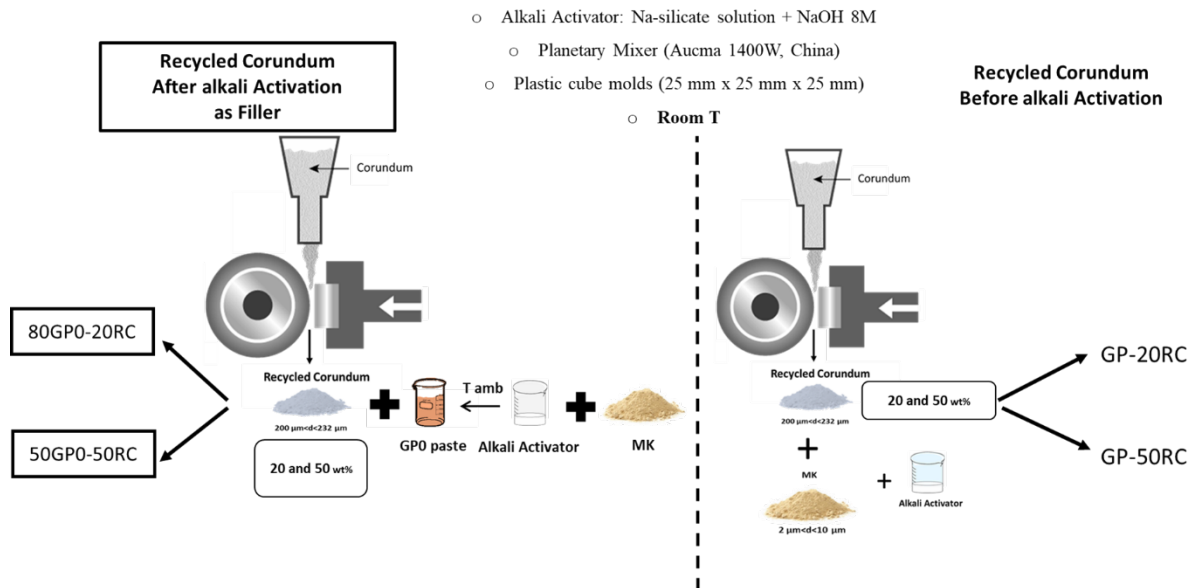


Figure 1. Preparation of geopolymer specimens