CORK POWDERY INDUSTRIAL WASTE IN METAKAOLIN–GEOPOLYMER MATRIX

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Key Words: cork waste; metakaolin; alkali activation; room temperature consolidation; thermal insulation

Cork powdery waste (CW) from agglomerated cork caps manufacturing is usually exploited for its energy content in waste-to-energy plants. In this contribution, we propose its exploitation as additive for locally produced for lightweight building materials. In particular, we proved that the addition of 2.4, 4.8 and 9.1 wt% (calculated upon dry metakaolin) of the as-received powdery waste were added into a MK-based geopolymer formulation is suitable to obtain novel insulating panels with increasing thermal insulating power. The geopolymer mix was based on metakaolin added to NaOH and Na silicate solutions and no pre-treatments were performed on CW nor thermal curing was conducted for the alkali-activated product. In fact, the final panels were consolidated at room temperature to improve product sustainability. The insulating panel presented an apparent density of about 1.521 to 0.990 ± 0.001 g/cm^3, combined with a total porosity in the range of 35.61 to 56.22 ± 0.003 vol% for 2.4 to 9.1 wt% of CW, respectively, and this was dependent upon ageing time. The compressive strength ranged from 2.5 to 1.5 MPa at 28 and 90 days of curing time, complying with UNI EN 998-2. The thermal conductivity was measured to be around 0.1146 W/mK for the composite with the highest percentage of CW, i.e., 9.1 wt%, and it can be considered a good value for self-standing insulating panels.

Microstructural investigations completed the study proving the homogenous dispersion of the cork particles within the MK-based metakaolin matrix when proper mechanical stirring of the fresh paste was operated.

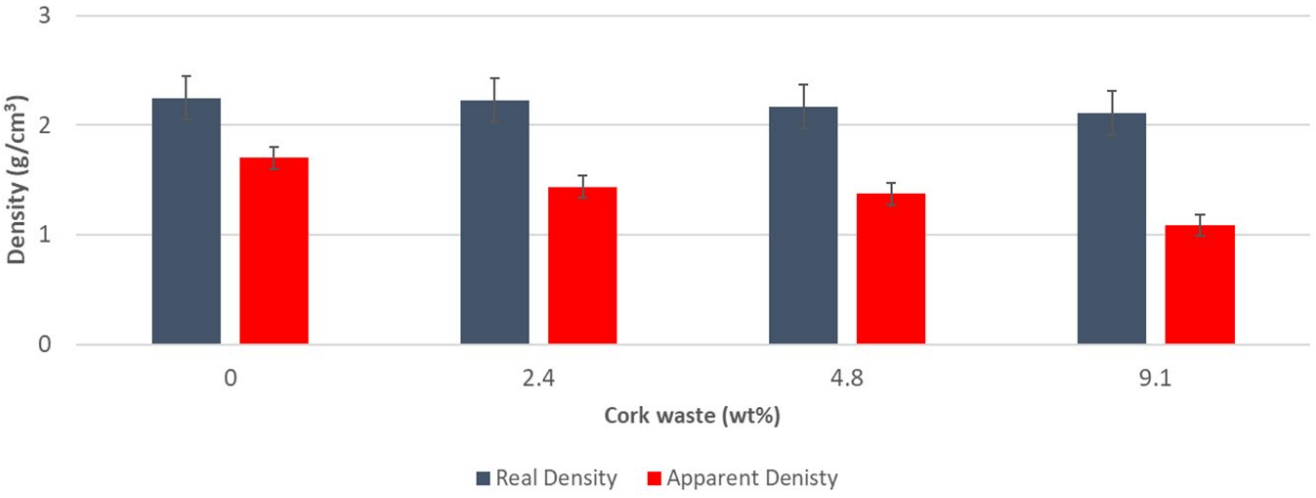

Figure 1 Real density and apparent density of all geopolymers after 28 days