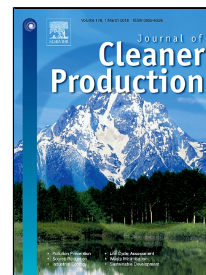


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Development of a new supplementary cementitious material from the activation of copper tailings: Mechanical performance and analysis of factors



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1 **Development of a new supplementary cementitious material from the activation of**
2 **copper tailings: Mechanical performance and analysis of factors**

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16 **Abstract**

17 The use of tailings as aggregate and supplementary cementitious materials has been
18 studied previously. Nevertheless, tailings are generally used as collected, without
19 treatment, showing low cementitious capacity allowing low replacement levels of cement
20 (below 15%). This research studies eight copper tailings to determine which tailings are
21 likely to improve their cementitious capacity as supplementary cementitious material by
22 using thermal and mechanical treatments. In the first stage, using TGA and PSD, the
23 capacity of the tailings to undergo chemical transformations through a thermal treatment
24 of up to 1000°C and physical transformation through low-energy milling for up to 180
25 min, were explored. Relevant chemical modifications were observed over the range of
26 500°C to 900°C, with peaks between 600°C and 800°C. It was also observed that due to
27 the nature of rock processing prior to mineral extraction, the particle size was able to be
28 reduced by 50% after 60 min of milling or less. With these results, a central composite
29 design was proposed using thermal treatment temperatures between 600°C and 800°C
30 (central point at 700°C) and milling with a central point at 30 min. The results show that

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