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Influence of cement type on resistance to attack from two carboxylic acids

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## ABSTRACT

In a number of circumstances, concrete may be required to possess resistance to organic acids. These are frequently carboxylic acids. This paper examines the effect of two such acids – acetic and butyric – on hardened cement paste specimens made from three cement types – Portland cement (PC), a combination of PC and fly ash (PC/FA), and a calcium sulfoaluminate cement (CSA). Specimens were exposed to solutions of the acids and deterioration characterized in terms of mass loss and pH measurements, micro-CT scanning, and chemical and mineralogical analysis. Additionally geochemical modelling was used to further examine the mechanisms involved during acid attack. The CSA cement was most resistant to attack, with the PC paste displaying the least resistance. This resistance has been partly attributed to the higher acid neutralization capacity of CSA cement. However, this paper demonstrates that the enhanced performance is most probably the result of a denser microstructure.

## KEYWORDS

acid attack; Portland cement; fly ash; calcium sulfoaluminate cement; acetic; butyric.

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