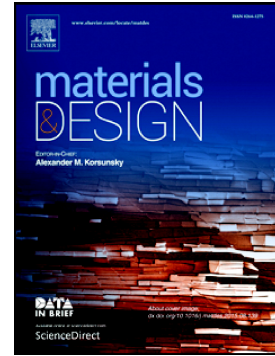


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Chloride ingress and steel corrosion in geopolymer concrete based on long term tests

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Abstract

Alkali activated binders (geopolymer) is an emerging technology to produce concrete without the use of any Ordinary Portland Cement (OPC) by alkali activation of alumino-silicate source materials such as fly ash and/or slag. Limited knowledge on durability issues like corrosion behaviour of reinforced geopolymer concrete impedes the usage of this technology in structural applications.

This study explored the chloride permeability and initiation of chloride induced corrosion of geopolymer concrete in accelerated chloride environment using longer test period. Corrosion initiation was also monitored in embedded rebar in 2% chloride contaminated concrete. Corrosion state of the rebar was monitored using non-destructive test method using Cu/CuSO₄ reference electrode.

The results showed that the apparent chloride diffusion coefficient of blended fly ash and slag geopolymer concrete is lower than that of OPC concrete. The diffusion coefficient also decreased with the increase of slag content in the binder. Blended fly ash and slag geopolymer concrete also exhibited higher aging factor than OPC concrete indicating improved resistance to chloride ingress with time. The study also showed that the embedded rebar in fly ash and slag based geopolymer concrete has higher protection against corrosion than a rebar in OPC concrete even when the concrete is contaminated with significant levels of chloride.

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