

EFFECT OF GEOPOLYMER COMPOSITION AND CURING CONDITIONS ON EFFLORESCENCE IN LIGHTWEIGHT POROUS GEOPOLYMERS

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Lightweight geopolymers are more readily produced and give higher fire resistant performance than foam cement concrete. The fly ash-based lightweight geopolymers stones could be used for decoration due to the similarity in appearance and color to natural vesicular basalts. Efflorescence can be even more nettlesome issue in commercialization of lightweight porous geopolymers. Lowering the density of solid geopolymers can be achieved by inducing chemical reactions that entrain gases to foam the geopolymer structure. The apparent density of lightweight porous geopolymers has a range from 0.7 to 1.2 g/m³ with 0.025, 0.05 and 0.10 wt% of Al powder concentration, which corresponds to about 37~60 % of the apparent density, 1.96 g/cm³, of solid geopolymers. The compressive strength of cellular structured geopolymers decreased to 6~18 % of the compressive strength, 45 MPa of solid geopolymers. The microstructure of geopolymers gel was equivalent for both solid and cellular structured geopolymers. The efflorescence can be controlled by reducing targeted Na/Al molar ratio less than 1.0 or water content in geopolymers or curing at high temperature.



Figure 1 – Solid (a) and cellular structured fly ash-geopolymer cylinders ((b)-(d)). Aluminum concentration is 0.025 wt% (b), 0.05 wt% (c) and 0.10 wt% (d).

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