

AMBIENT TEMPERATURE CURED ONE-PART GEOPOLYMER BINDER

Sustainable alternative to traditional cement, with potential applications in construction, infrastructure, and environmental remediation

Geopolymer binder has the potential to reduce CO₂ emissions and energy consumption by approximately by 60% and 80%, respectively, and are widely recognized as sustainable alternatives to Ordinary Portland Cement (OPC). Conventional or two-part geopolymers are formed by a reaction between a solid aluminosilicate precursor and concentrated aqueous solution of alkali hydroxide, silicate, carbonate, or sulfate, that is, two parts in addition to water. Although significant research has been conducted on different aspects of geopolymer technology in India, this one-part geopolymer technology is in the research stage. However, the impracticalities related to handling large amounts of viscous, corrosive, and hazardous alkali activator solutions has put pressure on the development of one-part or “just add water” geopolymers that could be used similarly to OPC. In one-part mixtures, only a dry mixture is needed in addition to water. The dry mixture is prepared by mixing a solid aluminosilicate precursor with a solid alkali-activator.

Features / Highlights

- Waste to wealth conversion
- High rate of early strength development
- Zero cement
- Zero water for curing or ambient temperature curing
- Avoids hazardous alkali activator solutions
- Highly suitable for cast in-situ applications

Technical Details

- Initial setting time: 90 minutes
- Final setting time: 300 minutes
- Density range: 1700-2000 kg/m³
- Compressive strength: 17 to 62 MPa

Applications

- Grouting and injection
- Mortar and concrete applications
- Fiber-reinforced composites
- Soil stabilization
- Precast construction
- Repair, retrofitting and rehabilitation



Slump flow of one-part geopolymer binder paste



Test for compressive strength



Tested specimen after 28 days

Status of Technology

- Preliminary studies on the mix development using different source materials
- Design and development of optimal mix proportion for different applications
- Varying compressive strength for different application

Future Plan




For further details:

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