



COLLIECRETE

BUILD THE FUTURE

What is geopolymer concrete?

Traditional concrete is a mixture of Ordinary Portland Cement, fine aggregates (sand), coarse aggregates (gravels), water, and air, sometimes with additives such as plasticisers and colourants.

Flyash has been long been added as a beneficial supplement in traditional concrete, but the innovative manufacture of geopolymer cement and geopolymer concrete goes one step further, employing flyash as the main active binding ingredient rather than just as a supplement.

Geopolymer cement (GPC) is an innovative masonry binder. It is a construction material made from alkali activated pozzolanic materials, resulting in a binding material with very good physical and mechanical properties and durability, and can be used in place of Ordinary Portland Cement (OPC) in the manufacture of concrete.

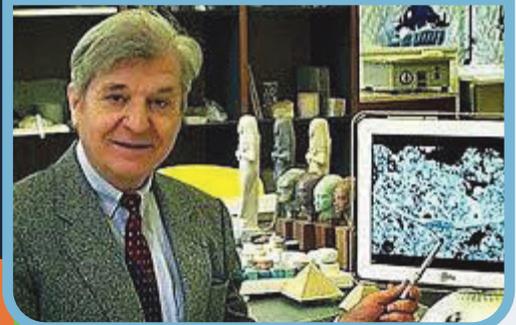
Pozzolanic materials are inorganic aluminosilicate ingredients that can react with alkaline chemicals to undergo polymerisation chain reactions to form solid ceramic-like substances at near ambient temperatures.

Pozzolanic materials include volcanic ash, blast furnace slag, and flyash – the byproduct of burning coal in power stations.

Did you know?

The concept of geopolymer chemistry was first developed by Joseph Davidovits in 1978 as part of his research to develop a 'plastic' material that is both heat resistant and non-combustible for structural applications.

This innovative cementitious binder serves as a sustainable alternative to the production of Ordinary Portland Cement which has a huge carbon footprint due to the high temperatures required in its production.



Chemically different, practically the same

The chemistries of OPC and GPC are entirely different – OPC being a hydrolysis process whereas GPC is polymerisation; and OPC being based on calcium chemistries whereas GPC is based on aluminosilicate chemistries. Despite the differences, the practical properties of the resulting concretes are very similar.

The Colliecrete Project will translate the scientific theory and research into practical alkali-activated masonry binders and geopolymer products with real market value.

Colliecrete's geopolymer cement will be combined with other industrial waste products, and with coarse and fine aggregates, to form innovative geopolymer concretes.



Collie, home of Colliecrete

OPC in Western Australia is largely made from imported materials (lime from Indonesia, clinker from Japan and Malaysia). In contrast, GPC can be made with much lower environmental impact, at lower cost, from close to 100% local materials.

The main raw material for making Colliecrete's geopolymer cement, flyash, is available in enormous quantities in Collie, in the south west of WA.



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FAST FACTS



Concrete is in high demand

Concrete is the world's highest volume manufactured material, with three tonnes of concrete used per person, per year.

Well over 2.5 million cubic metres of concrete is produced annually, just in Western Australia.



Reduction of imported materials

WA's ordinary concrete is largely made from imported materials (typically lime from Indonesia, clinker from Japan and Malaysia).

Up to 500,000 tonnes of flyash is currently produced in Collie every year. Flyash and other available by-product materials in Collie could sustainably make up to about 10% of WA's concrete requirements.

Cost effective

GPC can be produced largely from locally available industrial by-product and waste materials, making it cheaper and easier to manufacture than traditional concrete.



Proven technology

The concept of using Geopolymer Cement and Geopolymer Concrete made from flyash to replace OPC in concrete has been thoroughly researched for a couple of decades, and the potential product application is already largely proven.

The final step is full commercialisation.

80%

Emissions reduced by 80%

Concrete production is enormously carbon-intensive, due to the high temperatures required in its manufacture.

In contrast, geopolymer concrete can be produced at room temperature, reducing carbon emissions by almost 80 per cent.



Just as strong and durable

Our testing has shown geopolymer concrete has the same or better properties as traditional concrete, making it an ideal alternative for government and businesses looking for ways to improve their environmental impact.



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