

## **Chemical reactions in the geopolymerisation process using fly ash-based geopolymer: A review**

### **Abstract**

The development of our world, demanding the power supply which is produced by combustion of coal. Unfortunately, the million of tons of fly ash and related-products have been generated. To overcome these problems, fly ash was used in term of geopolymer to produce precast structure, non structural elements, concrete pavements, concrete products and immobilization of toxic waste that are resistant to toxic waste that are resistant to heat and aggressive environment Geopolymer is a material produced by inorganic poly-condensation, i.e., by so-called "geopolymerization." The process comprises dissolution of aluminosilicate followed by condensation of free silicate and aluminate species to form a three-dimensional structure of silico-aluminate structures. This process involving alumino-silicate materials is a complex process that has yet to be described fully. Several studies focused the dissolution reaction of fly ash, rate of reaction, thermodynamic properties of the reaction and mechanism of hardening process involved in geopolymerisation. The raw materials of geopolymer, such as kaolinitic clays, metakaolin, fly ashes, blast furnace slag, mixtures of fly ashes and slag, mixtures of fly ashes and metakaolin, mixtures of slag and metakaolin, mixtures of slag and red mud, and mixtures of fly ashes and non-calcined materials like kaolin and stilbite have significant effects on the properties of the resulting geopolymer. Recent studies have been conducted to determine the effect of  $\text{SiO}_2/\text{Al}_2\text{O}_3$  ratios on the properties of the geopolymer, such as compressive strength, setting time, strength development, composition of the gel phase, and the microstructure of the alkaliactivated material. It is evident that several factors related to the chemistry of the raw materials and the production of the geopolymer affect the performance of the final geopolymer products.

**Keywords;** Chemical composition; Crystallinity; Fly ash; Geopolymer

