

## **Incorporation of mineral admixtures in sustainable high performance concrete**

### **ABSTRACT**

Concrete is a widely used construction material around the world, and its properties have been undergoing changes through technological advancement. Numerous types of concrete have been developed to enhance the different properties of concrete. So far, this development can be divided into four stages. The earliest is the traditional normal strength concrete which is composed of only four constituent materials, which are cement, water, fine and coarse aggregates. With a fast population growth and a higher demand for housing and infrastructure, accompanied by recent developments in civil engineering, such as high-rise buildings and long-span bridges, higher compressive strength concrete was needed. At the beginning, reducing the water-cement ratio was the easiest way to achieve the high compressive strength. Thereafter, the fifth ingredient, a water reducing agent or super plasticizer, was indispensable. However, sometimes the compressive strength was not as important as some other properties, such as low permeability, durability and workability. Thus, high performance concrete was proposed and widely studied at the end of the last century. Currently, high-performance concrete is used in massive volumes due to its technical and economic advantages. Such materials are characterized by improved mechanical and durability properties resulting from the use of chemical and mineral admixtures as well as specialized production processes. This paper reviews the incorporation of mineral admixtures in binary, ternary and quaternary blended mortars in concrete.

**Keyword:** High performance concrete; Sustainability; Mineral admixtures; Incorporation