

# Strength of High Volume Matrix using By-Product and Alkaline Aqueous by Electrolysis

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## Extended Abstract

Recently, many studies are actively conducted on high volume cementitious matrix where a large portion of industrial by-products such as blast furnace slag and fly ash are replaced with admixtures to reduce the use of cement [1][2]. Because high volume cementitious matrix using blast furnace slag and fly ash has low early strength, the high volume blast furnace slag and fly ash is not used for building construction materials. In order to secure the early strength of high volume blast furnace slag and fly ash, alkaline activators may be used. However, alkaline activators are dangerous to handle and high-priced [3]. This experimental study has conducted the fundamental research to secure the early strength of high volume blast furnace slag using alkaline aqueous by electrolysis instead of the strong alkaline activator. We carried out compressive strength test, SEM (scanning electronic microscope) test and XRD(x-ray diffraction) analysis of high volume blast furnace slag matrix activated by alkaline water by electrolysis.

As a result of testing the strength of high volume cementitious matrix using blast furnace slag and alkaline aqueous by electrolysis, the following conclusions were acquired:

- (1) In case of high volume cementitious matrix using blast furnace slag and alkaline aqueous by electrolysis, flexural strength and compressive strength were higher than the high volume cementitious matrix using plain water.
- (2) As a result of measuring SEM of high volume cementitious matrix, specimen using alkaline aqueous generated more hydrates than the specimen using plain water.
- (3) XRD of high volume cementitious matrix using alkaline aqueous showed higher hydrate peaks than that of specimen using plain water.

It was found that alkaline aqueous by electrolysis helps to strengthen the high volume cementitious matrix with blast furnace slag and additional studies would be necessary to determine the appropriate amount of use and the hydration mechanism of high volume cementitious matrix using blast furnace slag and alkaline aqueous by electrolysis.

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## References

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