

## Comparison of Physical and Chemical Properties of Micro-Silica and Locally Produced Metakaolin and Effect on the Properties of Concrete

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**Abstract :** The properties of locally produced metakaolin (MK) as cement replacing material and the comparison of reactivity with commercially available micro-silica have been investigated. Compressive strength, splitting tensile strength, and load-deflection behaviour under bending are the properties that have been studied. The amorphous phase of MK with micro-silica was compared through X-ray diffraction (XRD) pattern. Further, interfacial transition zone of concrete with micro-silica and MK was observed through Field Emission Scanning Electron Microscopy (FESEM). Three mixes of concrete were prepared. One of the mix is without cement replacement as control mix, and the remaining two mixes are 10% cement replacement with micro-silica and MK. It has been found that MK, due to its irregular structure and amorphous phase, has high reactivity with portlandite in concrete. The compressive strength at early age is higher with MK as compared to micro-silica. MK concrete showed higher splitting tensile strength and higher load carrying capacity as compared to control and micro-silica concrete at all ages respectively.

**Keywords :** metakaolin, compressive strength, splitting tensile strength, load deflection, interfacial transition zone

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