



## **Influence of clay swelling on the mechanical behaviour of Egyptian Helwan limestone**

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Influence of clay swelling on the mechanical behaviour of Egyptian Helwan limestone  
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Clay minerals exist naturally in the majority of different Egyptian limestones types. Changes in the dimensions of clays during swelling / shrinking process induced by changes in the environmental conditions can result in acceleration the deterioration of the hosting stone. Petrographic investigation by scanning – electron microscope (SEM) of Helwan limestone (biomicritic limestone) revealed distribution of a typical smectite morphology (curled – leaf shape) beside abundance of glauconite pellets within the stone material. The clay frication extracted from Helwan reached 10% and oriented aggregates samples were analyzed by X- ray diffraction (XRD) and confirmed the identification of smectite as the main mineral in the clay frication.

To study the effect of the clay content on the mechanical behavior of Helwan limestone, hygric swelling test was performed at first by using displacement sensor and then the effect of multiple wetting/ drying cycles on the stone strength was determined using unconfined compressive strength (UCS). Results revealed that there was a significant correlation between degree of swelling of the clay and strength of the limestone.