

Estimating the effects of frost action on non consolidated & consolidated Sandstone from Petra archaeological site

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Weathering of stone artifacts in natural environment is produced by various extrinsic disintegration agents "physical, mechanical, chemical or biological". Moreover, their intrinsic properties "mineralogical composition, textures and internal structure". Frost damage as a deterioration agents affecting monumental stone buildings is a well known phenomenon. Certain stones which are exposed to freezing temperatures and wet conditions may undergo frost damage. The frost susceptibility of a stone artifacts is largely controlled by studying their porosity and pore size distribution. On one hand, stone artifacts with the smallest mean pore size will be the most susceptible to frost damage. On the other hand, frost resistance also generally decreases with increased available porosity i.e., pore volume which is accessible to water. Where, the frost resistance of the stones is often assessed from its saturation coefficient, with other types of stones having saturation coefficients less than 0.8 being generally immune to frost damage. In this article various deterioration forms were detected through using some scientific techniques. These techniques such as *XRF*, *XRD*, *SEM* and *X-Ray Radiography* that were performed for studying the chemical, mineralogical composition and morphological features. Furthermore, using some *special computer programs* for studying different physical and mechanical properties of consolidating & non consolidating samples of Petra sandstone after exposing to some artificial simulating cycles of weathering. our results proved that the stone of area under study were highly affected in 2 essential deterioration forms. the 1st one concerning physical deterioration forms such as deep cracking, scaling, exfoliation and crumbling. 2nd one regarding chemical deterioration forms such as salt crystallization and powder steadily off. Finally, suggestion the suitable material and methods for conserving this valuable site.

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