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Is sodium sulfate always the most effective salt in destroying any type of rock?

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Sodium sulfate has been recognized as one of the most destructive salt in rock disintegration related to salt weathering. A laboratory experiment was performed to investigate the efficacy of sodium sulfate on eight types of rocks under the same experimental conditions. The rocks used are Oya green tuff, Ashino welded tuff, Koga porous rhyolite, Indian fine sandstone, Tago coarse sandstone, Italian travertine, Kuzuu dolomite and Makabe fine-grained granite. They represent a considerable range of physical properties such as density, porosity and pore size distribution. Cubes of each rock types measuring 5 x 5 x 5 cm were soaked in saturated solution of sodium sulfate for 2 hours and also immersed in saturated magnesium sulfate and sodium carbonate solutions as for comparisons. They were then oven dried at 50ºC for 20 hours and before immersion in the designated solutions, they were allowed to cool to room temperature for two hours to avoid the stresses induced by abrupt phase changes between drying/heating and wetting/cooling and thus by temperature shock. This 24-hour cycle of immersion-drying-cooling was repeated seventy times. Results reveal that sodium sulfate is not invariably powerful to all types of rock tested. Magnesium sulfate perfectly outranked sodium sulfate in disintegrating Tago coarse sandstone. Sodium carbonate also took the highest rank as the most effective salt in destroying Italian Travertine. The reasons behind of these results are elucidated by the porous network interpretation.