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ARCHES: Solid Rock To Windows In Time

There are many factors that contributed to the formation of arches like those in Arches National Park in the Entrada Sandstone Formation. This formation lies on top of the Navajo Sandstone Formation in which no arches are found. Sandstone formations were made from varying materials, were laid down differently, and have unevenly distributed cements like calcite and limestone. The cement characteristics of Entrada and Navajo sandstones contribute to the development of arches in each sandstone type. The purpose of this study was to test if rock samples from the Entrada Formation would breakdown (weather) slower when exposed to an acid than rock samples from the Navajo Formation. Samples of Entrada and Navajo sandstones were exposed to strong acid (HCl), weak acid (vinegar) and water. Navajo Sandstone broke down more quickly in HCl and vinegar than Entrada Sandstone. Electrical conductivity levels indicated that Navajo Formation had more dissolved solids dissolved in vinegar solution. This suggests that the cements that hold the particles in Navajo sandstone are more susceptible to weathering by carbonic acid. Both sandstone types were weathered by acid, however, Entrada held together longer than Navajo. This is one reason arches form in Entrada sandstone and not in Navajo. Both Entrada and Navajo sandstones bubbled vigorously when first placed in a solution regardless if it was HCl, acetic acid or tap water. This indicates large pore spaces in both sandstones allowing water to filter down into the rock. This is how the acid is able to weather the inside of the rock.