

The occurrence of high Zr-bearing amphibole from 28-32 Ma alkali magmatic rocks, Big Bend National Park, TX

REN M.¹, MIGGINS D.P.², WHITE J.C.³, ANTHONY Y.E.⁴,
AND BENKER S.C.⁵

¹Dept of Geoscience, University of Nevada Las Vegas, NV
89154 minghua.ren@unlv.edu

²Oregon State University, CEOAS, Corvallis, OR

³Dept of Earth Sciences, Eastern Kentucky University,
Richmond, KY

⁴Dept of Geological Sciences, UTEP, TX

⁵Arizona Western College, Yuma, AZ

High Zr-bearing amphibole and pyroxene have been studied in the 28-32 Ma high alkalinity igneous rocks, Big Bend National Park (BBNP), Texas. The magmatic activities were either volcanic or shallow intrusive. The 32 Ma Pine Canyon Caldera, a small (6–7 km diameter) ash-flow caldera located at the south eastern BBNP, contains peralkaline (sodium-rich) rhyolite and equivalent intrusions. The majority Zr concentrations are around 0.5 to 4 wt% in subhedral amphibole crystals. The Zr shows clear enrichment at the rim of amphibole. In a slightly devitrified Pine Canyon rhyolite, the Zr content in anhedral small amphibole grains can reach up to 18 wt% ZrO₂. The 28 Ma Peña Mountain, located in western BBNP, is a small near surface intrusion. The light color syenodiorite contains localized vapor phase minerals within vesicles and large cavities. The amphibole can contain up to 5 wt% ZrO₂. The coexisting clinopyroxene in all these rocks do not have detectable Zr content. The Zr contents in the amphibole display negative correlations with Fe, Ca, Na and F. No clear trends can be observed between Si and Al with Zr. Zirconium should mainly substitute Fe, Ca and might affect Na site occupancy. It is believed that the high alkalinity of the magma system in BBNP has buffered the zircon stability and response to the formation of Zr-bearing amphibole.