American Mineralogist, Volume 107, pages 257–261, 2022

Removal of barite from zircon using an aqueous solution of diethylenetriaminepentaacetic acid and potassium carbonate

Aaron J. Martin[1,*] and Claudia L. Rocha-Estopier[1]

[1]División de Geociencias Aplicadas, IPICYT, CP 78216, San Luis Potosí, S.L.P., Mexico

Abstract

In most geologic applications, if barite is present, it must be separated from zircon to enable analysis of the zircon. Current methods of barite removal include mechanical comminution in a ball mill or conversion to barium carbonate by boiling in an aqueous solution of sodium carbonate. Both procedures have potentially serious drawbacks. We optimized an alternative technique for barite removal to avoid these shortcomings. In repeated experiments, boiling in an aqueous solution of 0.1 M diethylenetriaminepentaacetic acid (DTPA) and 6 wt% potassium carbonate for one hour dissolved about 90% of sand-size barite grains. Examination of barite after boiling in DTPA solution revealed evidence for attacks on crystal surfaces in the form of microscopic scallops and pits. In contrast, zircon crystal surfaces were not detectably altered at the microscopic scale by a boiling solution of DTPA and potassium carbonate. The DTPA and potassium carbonate solution procedure may be superior to the other two barite removal methods in two ways. First, it might not introduce bias into the sample, in contrast to both of the other two methods. Second, it requires less time than the sodium carbonate solution technique. If future research shows that the DTPA and potassium carbonate solution technique does not affect isotopic systems in zircon, this method appears to be a favorable alternative to both milling and boiling in sodium carbonate solution.

Keywords: DTPA, chelant, sandstone, mineral separation, bias, provenance, maximum depositional age