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LEACHING TECHNIQUE AND PARTIAL DIGESTION USING MICROWAVE OVEN APPLIED FOR U-PB DATING OF METAMICTIC AND OVERGROWN ZIRCONS

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Abstract

The analytic method: The leaching technique was used to treat metamict zircons showing overgrowth rims and high uranium concentration. Crystals, previously washed with HNO₃, were then put in a savillex cup and attacked by an with 600ul of concentrated HF inside a microwave oven at temperatures not higher than 130 oC and 4 cycles of 90 minutes. With a micropipette the acid solution containing Pb and U leached from zircon rims was carefully transported to another clean savillex cup.

Savillex containing partially leached zircons, a reload of acid solution containing 600 ul of concentrated HF, was again added and the whole procedure was repeated for 4 times. The final dissolution using HF plus HNO₃ took place in a digestion bomb and placed inside a resistive oven kept at 180 oC during 3 days.

Discussion of the results: The grains were completely destroyed in small fragments (< 1um) after 2 leaching phases of 6 hour cycles for each phase. It is possible to observe that U content decrease relative to Pb in the exponential form. These results may to indicate a preferential U leaching or of a possible higher U concentration in the zircon rim. The total amount of Pb and U extracted for the sum of 4 leaching stages exceed 85%. The values of $^{207}\text{Pb}/^{206}\text{Pb} \times ^{238}\text{U}/^{206}\text{Pb}$ ratios of the 3 initial phases plot on a straight line that intercepts the concordia curve between 700 and 800 Ma. This value is very close to the zircon age obtained by SHRIMP ($^{207}\text{Pb}/^{206}\text{Pb}$ age of 795 ± 15 Ma). The large age variation are due: large amounts of common Pb, intense metamictization, continuous lead loss and also mixture age between inherited zircon (around 1700 Ma) and the Neoproterozoic overgrowths around 570 Ma (SHRIMP ages). In addition for each leaching step it also is possible to see high U for step 1 (normal discordance) and decreasing to low U content for step 4 (reverse discordance).

The final leaching fractions (attacked in the bomb) yielded the U/Pb age (upper intercept) of 1635 ± 25 Ma. These values registered in the residue material may reflect a mixed age with major contribution from inherited Paleoproterozoic material.

ACCEPTED as Poster Presentation

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