Zircon and Apatite Separation Using a Spiral Panning Table: Evaluation of Time and Yield Efficiency

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ABSTRACT

With the need for accurate dating and understanding of rock samples, the ability to efficiently separate zircon and apatite is crucial. Current separation methods are time-consuming, toxic, expensive, and have variable yield efficiencies. To evaluate and improve separation methodologies, I processed five samples through a new procedure using a spiral panning table to examine separation methods and their efficiency. All samples were processed through initial steps of Cupric Salt (Lithium Polytungstate, LST) heavy liquid processing, Frantz Isodynamic Magnetic separator, 250 µm sieve, Ultrasonic wash (Acetone), Ultrasonic wash (DI water), De-magging (remove metal from sample after grinding), and depositing in a beaker.

The samples were then processed through a spiral panning table, which involved rotating the table clockwise, thereby facilitating the separation of heavier minerals to the center. The process not only separated minerals but also improved yield efficiency. On average, the spiral panning table yielded 33.5 mg zircon and 308.9 mg apatite, compared to traditional methods with fewer discernible zircons along with many unidentified light minerals. (Lower purity, clear to white minerals). (Higher purity, clear to light gray minerals).

As a result, we were able to improve yield quantity and purity with the use of the spiral panning table. In conclusion: It was possible to significantly improve efficiency and yield with each progression step. The control method yielded the largest amount of zircon, but the purity was less and the process required more time. For the majority of the samples, the spiral panning table is a faster, cheaper, and safer method to preferentially lose smaller heavy minerals. (Higher purity, clear to light gray minerals).

In conclusion:

1. We were able to improve yield quantity and purity with the use of the spiral panning table.
2. We were able to modify the panner method to significantly improve efficiency and yield with each progression step.
3. The control method yielded the largest amount of zircon, but the purity was less and the process required more time.
4. For the majority of the samples, the spiral panning table is a faster, cheaper, and safer method to preferentially lose smaller heavy minerals.

In conclusion:

We were able to improve yield quantity and purity with the use of the spiral panning table. We were able to modify the panner method to significantly improve efficiency and yield with each progression step. The control method yielded the largest amount of zircon, but the purity was less and the process required more time. For the majority of the samples, the spiral panning table is a faster, cheaper, and safer method to preferentially lose smaller heavy minerals.