

## A FLOWSHEET FOR EXTRACTION OF YTTERBIUM FROM ZIRCON TAILING

By

Rasoul Hassanalizadeh, Parisa Doubra

Mintek, South Africa

Presenter and Corresponding Author

Rasoul Hassanalizadeh

### ABSTRACT

Ytterbium is a chemical element with the symbol Yb and atomic number 70. It is the fourteenth and penultimate element in the lanthanide series. There is interest in Ytterbium since it can be utilised in various high-tech industries such as production of organic light-emitting devices (OLEDs), fabrication of fibres in optical glasses, catalysts to be utilised in gasoline-cracking and electronegative elements removal facilitator in iron and steel industries. This is added to the fact that the monazite resources in South Africa contain approximately 200 tonnes of Yb which can be beneficiated through a simple flowsheet.

In order to develop an Yb production demonstration facility under Mintek' supervision and of an appropriate size, it is intended to reduce process streams as rapidly as possible, using simple bulk equipment. This not only saves costs, but also allows the implementation of the sophisticated processing required for the separation and purification of Yb on a scale that can be implemented in an environment that only targets a single metal.

South Africa has multiple monazite sources such as Steenkampskraal or even more importantly, the tailings from the processing of beach sands (zircon tailings) which can contain up to 25% monazite by mass. The flowsheet presented here focuses on production of purified Yb from monazite through an innovative REE separation process. This approach will avoid the costly conventional process and reduces the Yb inventory costs significantly. The process looks into stages of cracking the monazite through aggressive acid baking, water washing, removal of radioactive and non REE impurities, LREE precipitation and extraction of Yb from HREE liquor. The separation of Yb from other HREEs is proposed to be done through either chromatographic elution (ion exchange) or solvent extraction. This project is intended to be the first example of a REE value chain developed in South Africa and SA has ample resources to sustain such a production.

*Keywords: Rare Earth Elements, Ytterbium, Solvent Extraction, Ion Exchange, Flowsheet.*