

# Hydrothermal alteration of ultrapotassic syenite as affordable option to potash supplies in the tropics

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## Abstract

Tropical countries are currently depending on imports of potassium fertilizers (KCl) from northern hemisphere countries, particularly Canada and Russia. Ultrapotassic syenites are a promising and affordable alternative source of potassium for tropical countries. They are resources with an exceptional potassium grade ( $\approx 14$  wt%  $K_2O$ ), and are distributed throughout the world. This presentation will provide an overview of ongoing research work on ultrapotassic syenites carried out by the Allanore Research Group at the Massachusetts Institute of Technology. The methods of the research involve:

- i) petrographic and mineralogical description of the feedstock material to forecast comminution behaviour
- ii) assessment of chemical reactivity with traditional (leaching tests) and advanced (microfluidic) techniques
- iii) engineering of a processing methodology to enhance nutrient availability.

The latter approach has shown that alkaline hydrothermal alteration of ultrapotassic syenites in presence of CaO yields a processed material with potassium availability two orders of magnitude higher than in the raw material. Mineralogical and reactivity properties of the processed material coupled with green-chemistry considerations highlight a novel opportunity for affordable local supplies of potash fertilizers in tropical countries.