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Beneficiation of feldspar-rich pegmatites for the ceramic industry applications

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Intrusions of feldspar-rich pegmatites found in the Northern Cape pegmatite belt display significant potential for mineral beneficiation by the small scale mining sector. The beneficiation of such mineralization is utilized in the ceramic industry for manufacturing simple ceramic glazes. Utilization of these mineral deposits has a potential to contribute significantly to the economic growth and job creation within the small scale mining sector. The Northern Cape pegmatite belt is known to stretch from Vioolsdrif eastward along the Orange River, occurring in both South Africa and Namibia with an average width of 60 km, turning south-eastward in the vicinity of Riemvasmaak and reaching the Kenhardt district over a total length along strike of ~ 400 km [1].

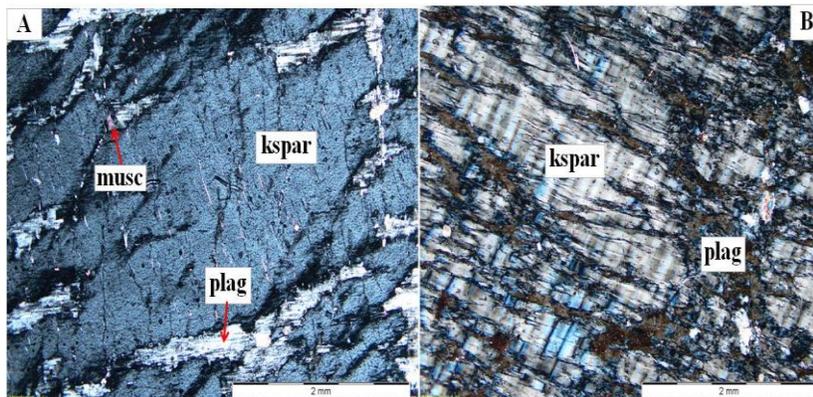


Figure 1: Micrograph showing mineralogy of the feldspar sample collected from the pegmatites in between Kakamas-Kenhardt, Northern Cape

Along this belt, samples of feldspar and white quartz were collected with the aim of determining their suitability in ceramic glaze manufacturing in the small scale mining sector. These samples were collected from pegmatite deposits located between the vicinity of Kakamas and Kenhardt. Mineralogical analysis of the feldspar indicated the abundance of k-feldspar with intergrowths of plagioclase and muscovite. To achieve the aim of

the study, samples of feldspar and white quartz were crushed to a 100% passing 1.7 mm using jaw and cone crushers. This was followed by a dry batch ball milling with a target of 80% passing 75 μm . This material was further milled to achieve a target of 70% passing 15 μm .

The two fine milled samples were mixed with kaolin and limestone using various mixing ratios adapted from Seger's glaze formulas [2; 3]. Mixing ratio of raw ingredients to water was 1:1.2. The mixture was sieved using 75 μm mesh sized sieve to eliminate coarser raw materials in the mixture. To ensure that the ceramic glaze sticks well to the ceramic bisque, bisques were dusted using a damp cloth and allowed to dry off. Glaze was then applied using spray or brush. The glazed material was then fired at temperatures between 1250 $^{\circ}\text{C}$ which is suitable for earthenware glazes.

Laboratory test results obtained from the study indicated viability of utilizing pegmatites industrial minerals such as feldspar and quartz in manufacturing of ceramic glazes using simple techniques. Furthermore, it can also be concluded that operations like this can be more beneficial to small scale miners who are already involved in manufacturing of ceramic products.

References:

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