Removal of Iron Impurity from Vein Quartz by Acid Leaching

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Vein quartz is the major source of silicon for manufacturing of solar cells, computer chips, and silicon carbide. Nevertheless, high-tech applications of vein quartz do not apply in industries due to iron impurities that is the major problem in the quartz processing industries in Sri Lanka. The aim of the investigation was to enhance the purity of exporting semi processed vein quartz by acid leaching. Particle size reduction processes crushing, grinding and milling increase the amount of iron in the quartz and this secondary iron concentration needs to be removed to produce more purified quartz. Thus, in this research quartz was obtained using raw quartz near Badulla area. Raw quartz was processed using primary and secondary crushers and then it was separated into four size fractions (125 rtm, 500 rim, **1 mm,** and 8 mm). The acid leaching was employed for iron removal. Atomic Absorption Spectrophotometer (AAS) was used to measure iron content before and after the leaching. As preliminary studies, Hydrochloric acid and Nitric acids were employed for the leaching and Liquid-Solid ratio was 5:1. According to the results which were observed as preliminary study, HCl was chosen for the leaching and effect of the HC1 for the removal of iron was examined. The particle size of the quartz, leaching time, concentration of the reagents were used as parameters. Leaching was done under normal atmospheric conditions (25 °C, 1 atm). The acid leaching of vein quartz resulted in a reduction of 60 — 65% Iron from the original natural state. Since iron dissolution is a photochemical reaction experiment was conducted in controlled conditions (250 — 500 lux). A progressive amount of leaching (60 — 65%) of iron from quartz was obtained under following conditions, a higher concentration of HC1 (5M), smallest size fraction (0-125 rtm), and 60 hrs. leaching time. Under these conditions, a higher purity of quartz powder can be achieved.

Key Words: Quartz, Leaching, Quartz impurity removal