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Heavy Minerals As a Contaminant From The Quartz Rich Sand Used As Raw Material In Glass Industry

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Silica is the key constituent in production of glass, responsible for its structure, and it typically originates from quartz sand. Quartz-rich sand, commonly used as a primary raw material in glass production, may contain trace amounts of heavy minerals. The presence of these heavy minerals may compromise the quality of raw material and decrease the purity factor. In the glass industry it is believed that this trace amount of heavy mineral content may also act as contaminant and impurity which may affect the coloration of transparent glass. In this study, raw material samples (total five) of quartz rich sand are analyzed for studying proportion of heavy mineral content which contributed as impurity. To determine the heavy mineral content a gravimetric separation technique is used (Andò, 2020). By using this technique, from the bulk samples, approximately 30g of sediment was used for wet sieving to obtain a grain size window of 15-500 μ m, which is considered the most appropriate to identify the suite and amount of heavy minerals. The sieved fraction is mixed with a non-toxic heavy-liquid sodium polytungstate, with a density of 2.90g/cm³, to separate the heavy and light minerals using a centrifuge. A representative aliquot of HM separated is mounted on a slide for microscopic analysis. The investigation of grain mount is carried out by using point counting technique to measure quantitatively the proportion and percentage of different single heavy minerals. The heavy mineral fraction also contains the presence of opaque mineral impurities, which are also considered, due to their contribution as the major contaminants. The results indicate that in all studied samples, overall, the presence of heavy mineral percentage ranges from 0.02% to 0.35%. The most frequently occurring heavy minerals include zircon, rutile, apatite, tourmaline, andalusite and kyanite across all the five samples. The presence of these heavy minerals along with opaque mineral, may contribute as an impurity in the transparent glass, potentially impacting the production process. Furthermore, during the melting process, new minerals can crystallize and incorporated as defects within the final glass product. The identification of these defects (mineral inclusion) in final glass product is also being investigated using optical microscopy and Raman spectroscopy. This approach aims to enable glass manufacturers to identify mineral impurities more quickly and conveniently.