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CHARACTERISTICS AND SUITABILITY OF SEMATAN-LUNDU AND SUNGAI SUAI-KUALA NIAH SILICA SAND, SARAWAK, FOR GLASS-MAKING

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ABSTRACT : Silica sand is an essential constituent in all commercial glass-making. It has a high content of silicon dioxide and a very low iron level as required for making high-quality glass products. The aim of this research is to determine the characteristics and suitability of silica sand extracted from several parts of Sarawak to be used for glass-making. Much work has been done on the silica sand deposits in Sarawak by Department of Mineral and Geosciences. Hopefully, with this additional research, the silica sand areas could be commercialized, so that it will further promote silica-sand mining and its related industries in Sarawak. Seven representative samples from Sematan-Lundu and Sungai Suai-Kuala Niah have been obtained from various depths and have been examined. Comprehensive mineralogical, physical and chemical tests were carried out to characterise the quality of these sand deposits in accordance with international standards (MS 710 : 1981 and BS 2975 : 2004). The specific parameters that were studied are silica content, alkali content; Loss on Ignition (LOI), organic matter, nickel and vanadium, aluminium, iron, chromium, copper and cobalt contents, heavy mineral components as well as particle size distribution, shape, refractoriness and sphericity. The study indicates that the natural silica sand deposits in the Sematan-Sungai Suai area, occurring at a depth between 0.5 m and 1.5 m respectively are F, G and H grades and hence are suitable only for lower-end applications for making window panes, containers, green and amber glass, and insulating fibres. The Lundu silica sand and Kuala Niah silica sand (up to 1.2 m thick) are of F and G grades, which are suitable for making green and amber glass and insulating fibre glass. Sand layers below these depths normally are darker in colour due to presence of organic matter, clay minerals and ferruginous minerals that stained quartz sand. Lundu's silica sands may need to be processed further before it can be used as raw material for glass making. Removal of heavy minerals, by magnetic separation as well as particle size screening and classification are essential. Only Sematan's and Lundu's deposits contain a higher percentage (> 35%) of particle size larger than 106μm. Further mineral processing (washing, scrubbing and acid leaching at appropriate temperatures) would enhance silica content and aid in the removal of iron and clay minerals. This is important for high-end application such as for crystal, optical and borosilicate glasses (A to D grades).

Keywords : Industrial mineral deposit, silica sand and glass ceramic

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