A Preliminary Investigation of Surface Bound Iron in Mica to Develop a Methodology Combined with Magnetism to Remove Contaminated Mica from Industrial Minerals

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Sri Lanka is a country rich with industrial minerals. Mica is one of readily available industrial mineral which belongs to a group of sheet silicate (phyllosilicate) contained Aluminum (Al), Iron (Fe), Magnesium (Mg), Potassium (K), Sodium (Na) etc. as abundant elements. Mica could be easily identified by its unique flaky structure. The most common types of mica in Sri Lanka are phlogopite (blackish brown) and biotite (brownish ash). Kuruwita, Balangoda, Haputhale and Mathale areas are well-known for Mica deposits in Sri Lanka to date. If we consider the industrial use of mica, it has been frequently used in paint industry to produce exterior paints due to its ability to create a protective coating against the extreme weather conditions like rain and ultraviolet light. Mica is a good electrical insulator and a good thermal conductor also mica powder is used as a glitter to decorate pots. Although Mica is useful when it's present as the pure mineral, a huge lose is caused in mineral industry when it is contaminated with other industrial minerals such as Calcite, Dolomite, and Kaolin. The presence of mica in trace amounts in other minerals reduces the quality of the products like in paint, ceramic and glass industries which use the above stated industrial minerals as raw materials. Therefore, the objective of the current study is to develop a methodology to remove contaminated mica form other industrial minerals although it's present in trace levels. Herein, we have investigated about the content of surface bound Iron in mica that can be used to develop a technique combined with magnetism. As the initial stage of the procedure, surface bound iron percentages of phlogopite and biotite were determined by using UV-visible spectroscopy at 510 nm wavelength. Analysis was carried out according to the Beer-Lambert law by using a previously calculated factor from Fe^{2+} standards. Average surface bound iron percentage for phlogopite yield to be 0.36 (± 0.02) % while that the percentage for biotite was 0.62 (±0.01) %. According to the results observed, it seemed that these percentages of iron on outer structure of mica may be attracted to a strong magnetic field. Thus it can be concluded that surface bound iron content can be used to separate contaminated industrial minerals. Currently, further studies are being conducted using high performance techniques such as XRF to gain more insight into this.

Keywords- Contaminated-mica; industrial minerals; surface-bound iron; magnetism

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