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CHARACTERIZATION OF SRI LANKAN MARBLE BY PETROGRAPHICAL, CHEMICAL AND THERMAL STUDIES

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Marbles find widespread application as raw materials in many industries depending mostly on their purity or chemical content. Therefore, prior concise chemical characterizations are necessary before any industrial application. This study aims to investigate the use of combined X-ray Diffraction (XRD) and thermal analysis in the quantitative and qualitative determination of carbonate minerals in marbles of Sri Lanka in addition to optical and chemical methods. Marbles from selected areas in the Highland Complex of Sri Lanka were analysed mineralogically, thermally and chemicall, using an optical microscope, XRD, Thermogravimetric (TG) analysis and Atomic Absorption Spectrophotometer (AAS).

Marbles from Balangoda are distinguished by coarse grained calcite with well developed crystal faces and a yellowish color. Marbles from Ampitiya, Digana and Naula are white colored, medium grained rocks with more than 70 percent carbonate minerals. XRD results revealed that the carbonate phase of these three localities comprised both calcite and dolomite. The corresponding d-values and peak intensities varied for both minerals in each locality. Ionic substitutions, metamorphic grade, quantity and composition of fluid inclusions may vary in each marble and these may correspond with different XRD patterns. Results of the chemical analysis were more comparable with the mineralogical observations. The highest Ca content is reported for marbles from Balangoda while the lowest Ca content is reported for marbles from Ampitiya. The Mg content is highest in Digana marbles and lowest in Balangoda marbles. Further, Digana and Naula specimens have more comparable Ca and Mg compositions. The marble occurrences at three locations, except Balangoda, are associated with mafic rocks and this may correspond with the observed higher content of Mg. TG curves obtained for all marbles show one characteristic slope which initiates at about 650 ^{0}C and ends at about 800 ^{0}C which may be attributed to decomposition of dolomite and calcite respectively. However, the onset temperatures of decomposition and total weight losses differ from each other for all investigated marbles due to quantity and mode of occurrence of calcite and dolomite, localized deformation, impurities and fluid inclusions.

Ca and Mg content of Sri Lankan marble varies significantly spatially, even within a short distance. The prior characterizations based on XRD coupled with thermal analysis are an effective way to study the petrography of marbles compared to optical methods. However, extended investigations are still required for industrial applications.

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